

Declaration of Bill Lin in Support of Petition for *Inter Partes* Review of U.S.
Patent No. 9,350,649

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

RED HAT, INC.
Petitioner,

v.

COMPETITIVE ACCESS SYSTEMS, INC.
Patent Owner

U.S. Patent No. 9,350,649
Issued: May 24, 2016
Filed: October 11, 2014
Inventor: Eric M DeLangis
Title: Multipath Communication Devices And Methods

**DECLARATION OF BILL LIN IN SUPPORT OF PETITION FOR *INTER*
PARTES REVIEW
UNDER 35 U.S.C. § 312 AND 37 C.F.R. § 42.104**

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LIST OF EXHIBITS¹

Exhibit No.	Description
1001	Declaration of Bill Lin, Ph.D. in support of <i>Inter Partes</i> Review
1002	<i>Curriculum Vitae</i> of Bill Lin
1003	Certified Copy of U.S. Patent No. 11,582,343
1004	Certified File History of U.S. Patent No. 11,582,343
1005	Certified Copy of U.S. Patent No. 11,418,641
1006	Certified File History of U.S. Patent No. 11,418,641
1007	Certified Copy of U.S. Patent No. 10,868,908
1008	Certified File History of U.S. Patent No. 10,868,908
1009	Certified Copy of U.S. Patent No. 9,350,649
1010	Certified File History of U.S. Patent No. 9,350,649
1011	Certified Copy of U.S. Patent No. 8,861,349
1012	Certified File History of U.S. Patent No. 8,861,349
1013	Certified Copy of U.S. Patent No. 8,228,801
1014	Certified File History of U.S. Patent No. 8,228,801
1015	Certified Copy of U.S. Patent No. 7,606,156
1016	Certified File History of U.S. Patent No. 7,606,156
1017	U.S. Patent Application Publication No. 2004/0001512 A1 (“Challener”)
1018	U.S. Patent Application Publication No. 2003/0026221 A1 (“Kotzin”)
1019	James Carlson, <i>PPP Design, Implementation, and Debugging</i> (2d ed. 2000) (“Carlson”)

¹ Unless otherwise specified, citations are to the original page, column, and line numbers in exhibits rather than the PDF page. Citations corresponding to the PDF pagination are indicated in [[brackets]]. Unless otherwise noted, all emphases and annotations are added.

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Exhibit No.	Description
1020	Gilbert Held, <i>Network Design Principles and Applications</i> , 2000 (“Held”)
1021	U.S. Patent No. 6,917,960 (“Decasper”)
1022	Johnny Chen, <i>New Approaches to Routing for Large-Scale Data Networks</i> (Rice University, 1999) (“Chen”)
1023	Declaration of Sylvia Hall-Ellis
1024	Webster's Ninth New Collegiate Dictionary, 1990
1025	Xin, W., Ishihara, S., and Mizuno, T., <i>A QoS-ensured Transmission Scheme with Content-based Priority for Mobile Cluster Users</i> , 2000 (“Xin”)
1026	U.S. Patent Application Publication No. 2002/0042274 A1 (“Ades”)
1027	U.S. Patent No. 7,003,580 (“Cook”)
1028	U.S. Patent No. 5,625,877 (“Dunn”)
1029	U.S. Patent Application Publication No. 2002/010866 A1 (“McCullough”)
1030	Candace Leiden & Marshall Wilensky, <i>TCP-IP for Dummies</i> (3d ed. 1999) (“Dummies”)
1031	U.S. Patent Application Publication No. 2003/0223450 A1 (“Bender”)
1032	U.S. Patent Application Publication No. 2004/0022224 A1 (“Billhartz”)
1033	Hung-Yun Hsieh & Raghupathy Sivakumar, <i>A Transport Layer Approach for Achieving Aggregate Bandwidths on Multi-homed Mobile Hosts</i> (2002) (“Hsieh”)
1034	U.S. Patent No. 6,778,495 (“Blair”)
1035	Cisco Systems, Inc., <i>Troubleshooting Async Multilink PPP Operations</i> (2001) (“Cisco”)
1036	U.S. Patent Application Publication No. 60/377,631 (“Tucker”)
1037	Konishi et al., <i>Web SHAKE: A fast WWW access method for mobile terminals on temporary cluster networks</i> , IEEE Proceedings April 28-May 2, 2002 (“Konishi”)
1038	RFC 1990: The PPP Multilink Protocol (MP), August 1996

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Exhibit No.	Description
1039	<i>Competitive Access Systems, Inc. v. Oracle Corporation, and Oracle America, Inc.</i> , 1:23-ca-00286-ADA, Dkt. 82 (W.D.TX. Aug. 10, 2023)
1040	<i>Red Hat, Inc. v. Competitive Access Systems, Inc.</i> , 4:24-cv-00130-D, Dkt. 1 (E.D.N.C. Sep. 3, 2024)
1041	<i>Red Hat, Inc. v. Competitive Access Systems, Inc.</i> , 4:24-cv-00130-D, Dkt. 1-10 (E.D.N.C. Sep. 3, 2024)
1042	Lai et al., <i>Measuring Bandwidth</i> , IEEE (1999)
1043	RFC 2663: IP Network Address Translator (NAT) Terminology and Considerations, August 1999
1044	U.S. Patent No. 5,878,040 (“Peirce”)
1045	“A Novel Mechanism for Data Streaming Across Multiple IP Links for Improving Throughput and Reliability in Mobile Environments,” IEEE INFOCOM 2002 (“Phatak”)
1046	RFC 2543: SIP: Session Initiation Protocol, March 1999
1047	RFC 2131: Dynamic Host Configuration Protocol, March 1997
1048	RFC 1945: Hypertext Transfer Protocol – HTTP/1.0, May 1996
1049	Endler, David, <i>Brute-Force Exploitation of Web Application Session IDs</i> , iALERT White Paper, Nov. 1, 2001 (“Endler”)
1050	Rappaport, Theodore S., et al., <i>Wireless Communications and Application Above 100 GHz: Opportunities and Challenges for 6G and Beyond</i> , IEEE Access, Vol. 7, 2019 (“Rappaport”)
1051	Reex. Control No. 90/019,265
1052	Gast, Matthew S., <i>802.11 Wireless Networks – The Definitive Guide</i> , 2002
1053	Shoemake, Matthew B., <i>Wi-Fi (IEEE 802.11b) and Bluetooth CoExistence Issues and Solutions for the 2.4 GHz ISM Band</i> , Texas Instruments, Feb. 2001, Ver. 1.1
1054	Furuskär, Anders, et al., <i>EDGE: Enhanced Data Rates for GSM and TDMA/136 Evolution</i> , IEEE Personal Communications, June 1990
1055	RFC 2326: Real Time Streaming Protocol (RTSP), April 1998

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Exhibit No.	Description
1056	Random House Webster's Computer & Internet Dictionary, 3 rd ed., December 1998
1057	Andrew S. Tanenbaum, Computer Networks, Chps. 1 & 5 (3d ed. 1996)
1058	Adolfo Rodriguez <i>et al.</i> , TCP/IP Tutorial and Technical Overview, Chps. 1 & 14 (Prentice Hall PTR 2002)
1059	Richard O. LaMaire, et al., <i>Wireless LANs and Mobile Networking: Standards and Future Directions</i> , IBM, May 31, 1996

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Patent No. 9,350,649

I, Bill Lin, hereby declare as follows:

I. ASSIGNMENT

1. I have been retained as an expert witness on behalf of Red Hat, Inc. (“Red Hat”) to offer technical opinions regarding whether the claims of U.S. Patent No. 9,350,649 (“the ’649 patent”) (Ex. 1009), would have been invalid to one of ordinary skill in the art as of October 15, 2002 in connection with the above-captioned Petition for *Inter Partes* Review (“IPR”).

2. For the purposes of my Declaration, I have been asked to assume that the priority date of the alleged invention recited in the ’649 patent is October 15, 2002 (hereinafter the “Priority Date”).

3. I am not currently, and never have been, an employee of Red Hat. I received no compensation for this Declaration beyond my normal hourly compensation based on my time actually spent analyzing the ’649 Patent, the prior art cited below, and issues related thereto. I will not receive any added compensation based on the outcome of any IPR or other proceeding involving the ’649 Patent. I have no financial interest in Red Hat.

4. In forming the opinions expressed in this Declaration, I have also relied on my academic and professional experience. I also considered the viewpoint of a person having ordinary skill in the art as of the time of the alleged invention of the

Challenged Patents. I also relied on the '649 Patent and its file history, the reference and other documents cited in the petition and in the declaration, as well as on the exhibits in the exhibit list.

II. BACKGROUND AND QUALIFICATIONS

5. I am an expert in the field of computer engineering and have been an expert in that field since before the Asserted Patents were filed. A copy of my curriculum vitae and prior testimony is attached to this report (Ex. 1002) and provides a comprehensive description of my relevant experience, including my academic and employment history, publications, professional activities, and speaking engagements.

6. I received a B.S. in Electrical Engineering and Computer Sciences from the University of California, Berkeley, in 1985. I received an M.S. in Electrical Engineering and Computer Sciences in 1988 and a Ph.D. in Electrical Engineering and Computer Sciences in 1991, both from the University of California, Berkeley.

7. I am currently a Full Professor and the Department Chair of Electrical and Computer Engineering at the University of California, San Diego ("UCSD"), where I have been a professor since 1997.

8. At UCSD, my teaching and research has focused on computer architecture and computer networking problems, including the design of

multiprocessor and multi-core processor architectures, multiprocessor and multi-core processor interconnection buses and networks, network processors, system-on-chips, and data networks. I regularly teach senior-level design courses on advanced FPGA designs and the design of advanced processors, and I have taught graduate courses in hardware/software co-design and advanced special topics in computer architecture.

9. At UCSD, I am a Principal Investigator in the UCSD Center for Wireless Communications (CWC). CWC brings together researchers to work on a range of challenges in the design of future wireless communications systems. My contribution to CWC has been expertise in the design of multi-core processor architectures for wireless communications and mobile computing. I am also a Principal Investigator in the UCSD Center for Networked Systems (CNS). CNS brings together researchers to work on a range of challenges in the design of computer architecture solutions for packet processing and computer networking.

10. Before joining UCSD, I led the System Control and Communications Group at IMEC, Europe's largest independent microelectronics and information technology research center. At IMEC, I led a research team working on VLSI architecture, system design, and circuit techniques for system-on-chip applications.

I also previously held positions at Hewlett Packard, Hughes Electronics, and Western Digital.

11. During my career, I have received or worked on research efforts that received millions of dollars in research funding from both government agencies and industry, including funding for research in multi-core processor design, hardware/software co-design, packet processing, and computer networks.

12. I have authored numerous publications, including books, chapters in books, and journal papers, and I have presented numerous invited lectures and keynote presentation around the world. A number of my publications have received best paper awards or distinguished paper citations, including best paper awards in the IEEE Transactions on VLSI Systems and the ACM/IEEE Design Automation Conference, and I have also been awarded five patents.

13. I have served as an Associate or Guest Editor for several prestigious journals published by the Association for Computer Machinery (“ACM”) and the Institute of Electrical and Electronics Engineers (“IEEE”). I have also served on the Editorial Board of the International Journal of Embedded Systems. Further, I have served as General Chair of several ACM/IEEE conferences, and on the Organizing or Steering Committees of many ACM/IEEE conferences, including the ACM/IEEE Symposium on Networks-on-Chips (NOCS) and the ACM/IEEE Symposium on

Architectures for Networking and Communication Systems (ANCS). I have served on the Technical Program Committees of over 45 ACM/IEEE conferences.

III. UNDERSTANDING OF PATENT LAW

14. I am not an attorney, but I have been provided with an understanding of the patent law relevant to conducting the analysis given in this report. The following represents a summary of my understanding of these issues.

15. I have been informed and understand that patent claims are construed from the perspective of a person of ordinary skill in the art (“POSITA”) at the time the claimed invention was made and that, during this proceeding, terms are ordinarily to be given their plain and ordinary meaning as would be understood by a POSITA. I understand that this is the same standard as would be applied in District Court litigation.

16. I understand that claims in an IPR are construed under the case *Phillips v. AWH Corp.*, 415 F.3d 1303, decided by the Federal Circuit in 2005. I understand that under the rule in *Phillips*, words of claims are given their plain and ordinary meaning as understood by a person of ordinary skill in the art in view of the specification and prosecution history, unless those sources show an intent to depart from such meaning. No terms need to be construed for the purposes of this

declaration. I reserve the right to respond to any constructions offered by the Patent Owner or adopted by the Board.

17. I understand that in IPR a claim is unpatentable if it is anticipated or obvious. Anticipation of a claim requires that every element of a claim be disclosed expressly or inherently in a single prior art reference, arranged in the prior art reference as arranged in the claim. An element is inherent if it is necessarily present in the reference.

18. It is my understanding that a patent claim is unpatentable for obviousness if the claimed invention would have been obvious at the time the invention was made to a person having ordinary skill in the art (POSITA).

19. I understand that, for the purpose of an IPR, the Board may only consider anticipation or obviousness based on prior printed publications or prior patents and patent applications. I understand that a publication is prior art under § 102(a) if that publication was known or used by others in the U.S., or was patented or published anywhere, prior to the date of invention of the '649 Patent. I understand that a publication is prior art under § 102(b) if that publication was patented or published anywhere, or was in public use, on sale, or offered for sale in this country, more than one year prior to the earliest U.S. filing date of the '649 Patent. I understand that a patent or patent application is prior art under § 102(e) if that patent

or published patent application has an effective filing date that is prior to the date of invention of the '649 Patent.

20. I have been informed and understand that the subject matter of a patent claim is obvious if the differences between the subject matter of the claim and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. I have also been informed that the framework for determining obviousness involves considering the following factors: (i) the scope and content of the prior art; (ii) the differences between the prior art and the claimed subject matter; (iii) the level of ordinary skill in the art; and (iv) any objective evidence of non-obviousness.

21. I further understand that a claim can be found obvious if it unites old elements with no change to their respective functions or alters prior art by mere substitution of one element for another known in the field, with that combination yielding predictable results. While it may be helpful to identify a reason for this combination, common sense should guide, and there is no rigid requirement for a teaching, suggestion, or motivation to combine. When a product is available, design incentives and other market forces can prompt variations of it, either in the same field or different one. If a person having ordinary skill in the relevant art can

implement a predictable variation, obviousness likely bars patentability. Similarly, if a technique has been used to improve one device, and a person having ordinary skill in the art would recognize that the technique would improve similar devices in the same way, use of the technique is obvious. I further understand that a claim may be obvious if common sense directs one to combine multiple prior art references or add missing features to reproduce the alleged invention recited in the claims.

22. I also understand the following rationale may support a finding of obviousness:

- a. Combining prior art elements according to known methods to yield predictable results;
- b. Simple substitution of one known element for another to obtain predictable results;
- c. User of known technique to improve similar devices (methods, or products) in the same way;
- d. Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- e. “Obvious to try” — choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

f. 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;

g. Some 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 prior art reference teachings to arrive at the claimed invention.

23. I also understand that it is impermissible to use the claimed invention itself as a blueprint for piecing together elements in the art. In other words, it is impermissible to use hindsight reconstruction to pick and choose among disclosures in the prior art to reconstruct the claimed invention.

24. I understand that so-called “secondary considerations of nonobviousness,” must be considered in an obviousness analysis. I understand that an analysis including these secondary considerations helps to prevent the forbidden use of hindsight in determining whether a patent claim is obvious. I understand that secondary considerations of non-obviousness include, among others: (a) a long-felt but unresolved need for the invention; (b) commercial success of the invention; (c) copying of the invention; (d) praise and recognition of the invention by others; (e) licensing of the rights to the invention; and (f) unexpected results.

25. In rendering my opinions, I followed these guidelines.

IV. SUMMARY OF OPINIONS

26. I have reviewed and agree with the analysis in the Petition for IPR of the '649 patent. It is my opinion that each and every Challenged Claim would have been obvious to a person of ordinary skill in the art ("POSITA") at the time of the alleged invention in view of the knowledge of a POSITA and prior art cited in the Petition and as further explained in this declaration.

27. It is my opinion that claims 1–23 are obvious in view of Kotzin (Ex. 1018) (Ground IA).

28. It is my opinion that claims 2, 7, 8, 10, 12 are obvious in view of Kotzin (Ex. 1018), Peirce (Ex. 1044) and Held (Ex. 1020) (Ground IB).

29. It is my opinion that claims 1–23 are obvious in view of Phatak (Ex. 1045) (Ground IIA).

30. It is my opinion that claim 10 is obvious in view of Phatak (Ex. 1045) and Held (Ex. 1020) (Ground IIB).

V. OVERVIEW OF THE TECHNOLOGY

31. I have read and agree with the technology overview in the Petition.

VI. THE '649 PATENT

A. Claims

32. The '649 patent, titled "Multipath Communication Devices and Methods," discloses devices and methods to combine voice, data, and video communications and to transmit these communications over multiple paths. Ex. 1009, Abstract. The devices and methods disclosed by the '649 patent enhance the speed of the communications. *Id.*

33. The '649 patent has 23 claims of which claims 1, 7, 13, 18, and 21 are independent claims. The independent claims are directed to methods and devices for establishing and sending data during a multipath connection. Dependent claims 2-6, 8-12, 14-17, and 22-23 claim generic variations on the methods and systems presented in independent claims. Specifically, dependent claims are directed to variations on the multipath information, types of connections, types of devices, and removal of network-edge devices from the multipath connection.

34. Independent claim 1 of the '649 patent claims a method of establishing and sending data during a multipath connection. Claim 1 is reproduced below:

A method for establishing and sending data during a
multipath connection comprising:

a data-source device receiving multipath information
about each of a plurality of network-edge devices that is
capable of joining a multipath connection with a data-

requesting device, each of the network-edge devices being connected to one or more networks, and each of the network-edge devices being connected to the data-requesting device over a different connection; and

the data-source device performing at least one of (i) sending different groups of data packets to different network-edge devices that are participating in the multipath connection, (ii) sending different streams of data to one or more of the network-edge devices that are participating in the multipath connection, and (iii) sending combinations of different streams and different groups of data packets to one or more of the network-edge devices that are participating in the multipath connection.

Ex. 1009, claim 1.

35. Independent claim 7 of the '649 patent claims a method for establishing and sending data during a multipath connection. Claim 7 is reproduced below:

A method for establishing and sending data during a multipath connection, comprising:

the data-source device receiving multipath connection requests from a plurality of data-requesting devices, each of the multipath connection requests involving a particular multipath connection to a data-requesting device;

the data-source device associating a connection ID to each multipath connection request;

the data-source device using multipath information about each of a plurality of network-edge devices that is capable of joining in a particular multipath connection to a

particular data-requesting device, the particular multipath connection having a particular connection ID;

the data-source device notifying each of the network-edge devices that is participating in the particular multipath connection associated with the particular connection ID;
and

the data-source device sending data associated with the particular connection ID to the network-edge devices participating in the particular multipath connection associated with the particular connection ID.

Ex. 1009, claim 7.

36. Independent claim 13 of the '649 patent claims a method of establishing and sending data during a multipath connection. Claim 13 is reproduced below:

A method for establishing and sending data during a multipath connection, comprising:

a data-requesting device sending a multipath request to a network-edge device where the multipath request indicates that the network-edge device will join a multipath connection associated with the data-requesting device, the data-requesting device being connected over a first connection to a network and over a second connection to the network-edge device, the multipath connection comprising the first connection and the second connection which are capable of receiving data at the same time;

the data-requesting device receiving first data over the first connection from the network; and

after the network-edge device joins the multipath connection, the data-requesting device receiving second data over the second connection from the network-edge device.

Ex. 1009, claim 13.

37. Independent claim 18 of the '649 patent claims a data-requesting device with an interface capable of connecting concurrently to a plurality of devices during a multipath connection. Claim 18 is reproduced below:

A data-requesting device comprising:

at least one interface capable of connecting concurrently to a plurality of network-edge devices during a multipath connection, the multipath connection comprising the connections between the data-requesting device and each of the network-edge devices; and

at least one processor coupled to the at least one interface that sends multipath information to each of the network-edge devices that is capable of joining the multipath connection; and receives different data at the data-requesting device from different ones of the network-edge devices that are able to join the multipath connection.

Ex. 1009, claim 18.

38. Independent claim 21 of the '649 patent claims a method for creating and using a multipath connection. Claim 21 is reproduced below:

A method for creating and using a multipath connection, comprising the steps of:

a data-requesting device sending first multipath control information to or through a first network-edge device, the first multipath control information indicates that the first network-edge device will join the multipath connection, the data-requesting device being connected over a first connection to the first network-edge device;

the data-requesting device sending a second multipath control information to or through a second network-edge device, the second multipath control information indicates that the second network-edge device will join the multipath connection, the data-requesting device being connected over a second connection to the second network-edge device, the data-requesting device capable of receiving different data over the first connection and the second connection at the same time; and

after the first network-edge device joins the multipath connection, the data-requesting device receiving first data over the first connection from the first network-edge device; and

after the second network-edge device joins the multipath connection, receiving second data at the data-requesting device over the second path from the second network-edge device.

Ex. 1009, claim 21.

B. Specification

39. According to the specification, Local Exchange Companies, (“LECs”) had a “strangle hold” over “the ‘last mile’ of copper over which almost all residential customers receive their communications services.” Ex. 1009, 1:20-24. Competitive Local Exchange Companies (“CLECs”) worked to resell existing services offered

by LECs but were not able to truly compete in the market. *Id.* 1:36-59. To attract customers, companies were attempting to provide Voice Over IP services (VoIP) “over high-speed or broad-band backbones just as DSL and cable modems, over Internet connections via a computer.” *Id.* 2:4-7. However, as the specification explains, the high-speed services required enhancing infrastructure to the local telephone companies’ facilities and cable plants, which is very expensive. *Id.* 2:7-10. The high-speed services also required installing expensive modems at the customer’s end. *Id.* These services were also difficult to install and were hard to use for the average user so were primarily provided to corporate markets rather than residential users. *Id.* 2:10-20. While residential users could obtain high speed services through DSL and cable modems, the specification deems these solutions a failure because they “reach only a small segment of the population” and many DSL service providers failed during the collapse of the internet boom. *Id.* 2:21-28. Accordingly, the specification identifies a need for residential customer access to higher speed connections that do not require DSL, cable modems, or replacing last mile communication infrastructure.

40. To address this problem in the art, the ’649 Patent proposes using a specialized Residential Communications Gateway (“RCG”), which is a stand-alone external device that having the capabilities and features of “IP routers, Class 5 circuit

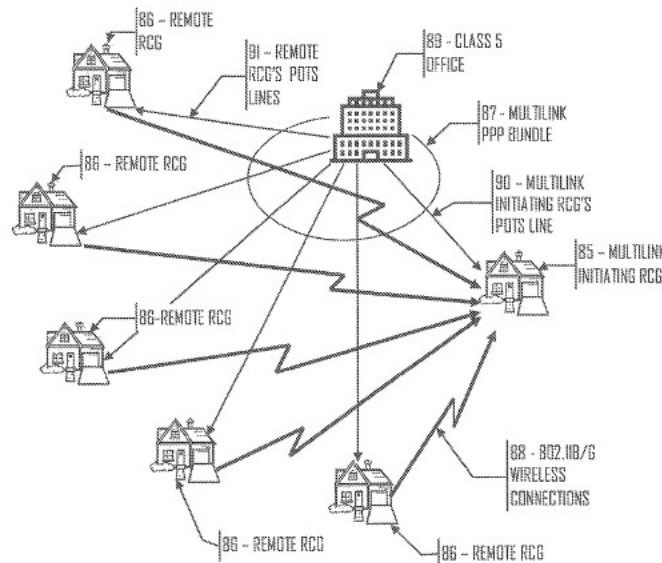
switches and wireless LANs in a small stand-alone external modem like device.” *Id.* 2:31-34. The RCG has additional capabilities of a hands-free speakerphone device with a touch display, which can provide video telephone services. *Id.* 2:34-39.

41. The alleged benefit of the RCG is that a Competitive Local Exchange Company (CLEC) can offer a variety of services to customers using the existing POTS line, and it doesn’t require the expensive enhancements of the network infrastructure like DSL and Cable services. The specification further explains that the RCG can be readily deployed to quickly expand CLEC customer bases because extra equipment is not needed. *Id.* 3:4-17. Indeed, the specification states that “[t]he RCG is designed to enhance, not replace, the existing phone line, enabling it to provide new combined packetized voice and data services” and will “continue to work seamlessly” with “all existing telecommunications infrastructure.” *Id.*, 3:18-22.

42. The specification describes an RCG receiving data over at least two separate communication paths and combines the paths to increase bandwidth. *Id.*, Abstract. It further indicates that the RCG has “a main system processor that is responsible for all house keeping and traffic routing tasks.” *Id.* 2:65-67. The specification further explains that the RCG can be placed in a residence and be connected to a POTS line (a telephone line) coming from the Local Exchange Carrier

(LEC). *Id.*, 2:48-50. Devices like telephones, FAX machines, computers, or Local Area Network (LAN) can be connected to the RCG via the built in Universal Serial Bus (USB) or the Ethernet interface. *Id.*, 2:40-47.

43. The RCG also “implements broadband” over POTS by using an 802.11b/g wireless interface to configure a PPP multilink bundle. *Id.* 11:4-6. The specification, however, clarifies that “[a]ny wireless interface scheme can be used to implement this device” and “[t]here is nothing special or specific to the 802.11 wireless interface that makes it particularly suited to this application.” *Id.* 11:17-20. The specification also explains that an individual RCG is also “used to provide a peer-to-peer wireless home networking environment to other 802.11 compatible wireless component within the residence” while also “acting as an always on dialup Internet gateway.” *Id.* 11:21-26. During data transmission, in order to gain greater bandwidth, an RCG can request that other RCGs assist in transferring data by using their respective POTS lines. *Id.* 11:26-35. For example, Figure 7 shows “an ad-hoc wireless LAN configuration with ppp multilink data distribution and wireless connectivity.”



Id., 4:10-11, Fig. 7.

44. Elements like wired and wireless networks, residential voice and data services, including IP routers, Class 5 circuit switches, and wireless LANs, sharing and dynamically routing and allocating bandwidth including through standardized methods like Multilink PPP, sending packets and allocating bandwidth through protocols like the Link Control Protocol for Multilink PPP, and routing tables such as those available in IP router devices were well known in the art at that time. Indeed, the specification itself confirms these elements were widely used in the communications field. *See id.*, 2:48-63 (describing wired and wireless networks and stating an RCG can be connected to a telephone line, LAN through a USB, firewire, or Ethernet ports and various devices through 802.11b/g interface for wireless communication), 1:17-20, 2:4-20, 2:32-34 (stating an RCG's primary function is to

compete with existing companies for residential voice and data services and explaining that an RCG combines capabilities of IP routers, Class 5 circuit switches and wireless LANs), 11:4-20 (describing a well-known 802/11 b/g interface used to configure multilink PPP bundle consistent with RFC 1990 protocol to share and dynamically route and allocate bandwidth), 11:48-13:52 (describing well-known Link Control and Multilink PPP protocols for sending packets and allocating bandwidth), 14:50-62 (describing routing tables used by IP router devices).

C. Prosecution History

45. I have reviewed the prosecution history of the '649 Patent. I understand that the Applicant originally submitted 20 claims, four of which were independent claims. The claims submitted to the Board have undergone two amendments. *See generally* Ex. 1010 at [[430]]-[[438]] (Preliminary Amendment, July 23, 2015), [[462]]-[[467]] (Amendment after Non-Final Rejection, Nov. 18, 2015).

46. I understand that during prosecution, the Examiner considered several prior art references, including Perkins (US 6,496,477), Pung (US 2002/0150099), Li (US 2001/0037472) and Cain (US 8,370,507). The Examiner found these references to disclose “multicasting,” which was a method known in the art. Multicasting uses a single source sender to transmit data to multiple destinations at the same time. The

Examiner eventually issued Notice of Allowance on April 13, 2016, without stating the reasons for allowance. *See id.* at [[548]] (Notice of Allowance, April 13, 2016). The '649 patent issued on May 24, 2016. *Id.* at [[570]] (Issue Notification, May 4, 2016).

47. I understand that the Examiner did not consider any of the prior art references now presented in the Petition for *inter partes* review of the '649 Patent.

48. As I discuss below, the Kotzin and Phatak references both teach the claim limitations that the Examiner found missing from the cited prior art.

D. Person of Ordinary Skill in the Art

49. I understand that there are multiple factors relevant to determining the level of ordinary skill in the pertinent art, including the educational level of active workers in the field at the time of the alleged invention, the sophistication of the technology, the type of problems encountered in the art, and the prior art solutions to those problems.

50. In determining the characteristics of a hypothetical person of ordinary skill in the art of the '649 Patent at the time of the alleged invention, I considered several factors, including the type of problems encountered in this field, the swiftness with which innovations were made, the sophistication of the technology involved, and the educational background that would be necessary to understand the

'649 Patent. Finally, I placed myself back in the relevant periods of time and considered the state of the art and the level of skill of those working in this field at those times.

51. In my opinion, taking all of the factors into account, a person of skill in the art for the '649 Patent would have had at least a bachelor's degree in electrical engineering, computer science, or a related field, and at least one year of experience with network design. Individuals with different education and additional experience could still be of ordinary skill in the art if that additional experience compensates for a deficit in their education and experience.

52. I also note that my opinions provided in this Declaration would not change in view of any minor modifications to this level of skill.

VII. CLAIM CONSTRUCTION

53. I understand that for the purposes of this *inter partes* review, the claims are to be construed under the so-called *Phillips* standard, under which claim terms are given their ordinary and customary meaning as would be understood by one of ordinary skill in the art in light of the specification and prosecution history, unless the inventor has set forth a special meaning for a term.

54. I further understand that pursuant to 37 C.F.R. § 1.906, in *IPR* proceedings, claims are evaluated based on the requirements of 35 U.S.C. § 112 only

with respect to subject matter added or deleted in the reexamination proceedings themselves. For example, it is my understanding that indefiniteness of a claim term cannot be raised in an *IPR*. Accordingly, I have not considered §112 challenges for this declaration, but I reserve the right to do so in litigation or any other forum. The fact that I have sought to express a meaning for each claim, or not otherwise challenged the definiteness of any terms, is not a concession that the term is not indefinite, and I reserve the right to render my opinion in litigation that certain limitations are indefinite.

55. In my view, there is no need to construe any terms for the purpose of the Petition or my Declaration. If Patent Owner raises claim construction arguments, I reserve the right to respond. Additionally, I reserve the right to render my opinion on claim construction in litigation.

VIII. OVERVIEW OF THE PRIOR ART

56. I have read and agree with the characterization of the prior art in the Petition.

IX. SPECIFIC GROUNDS FOR PETITION UNDER 37 C.F.R. § 42.104(B)

A. Ground IA and IB: Claims 1-23 are Obvious in View of Kotzin, or in the Alternative, Kotzin in Combination With Peirce and/or Held

57. I do not explain every aspect or every claim limitation of Kotzin, Peirce and Held below. I have read and agree with the mapping of that prior art to

the claim limitations provided in the Petition. However, to the extent that I believe context from the perspective of a POSITA is helpful, I discuss the '649 patent and the prior art. Further, I provide my rationale why I believe Kotzin renders claims 1–23 obvious alone or in view of Peirce and/or Held.

58. As discussed in detail below, it is my opinion that Kotzin alone (Ground IA) discloses or at least renders the Challenged Claims obvious. It is also my opinion that a POSITA would have been motivated to combine Kotzin with Peirce and/or Held (Ground IB), rendering the Challenged Claims obvious.

1. Independent Claim 1

- a. [1.1] a data-source device receiving multipath information about each of a plurality of network-edge devices that is capable of joining a multipath connection with a data-requesting device, each of the network-edge devices being connected to one or more networks, and each of the network-edge devices being connected to the data requesting device over a different connection; and*

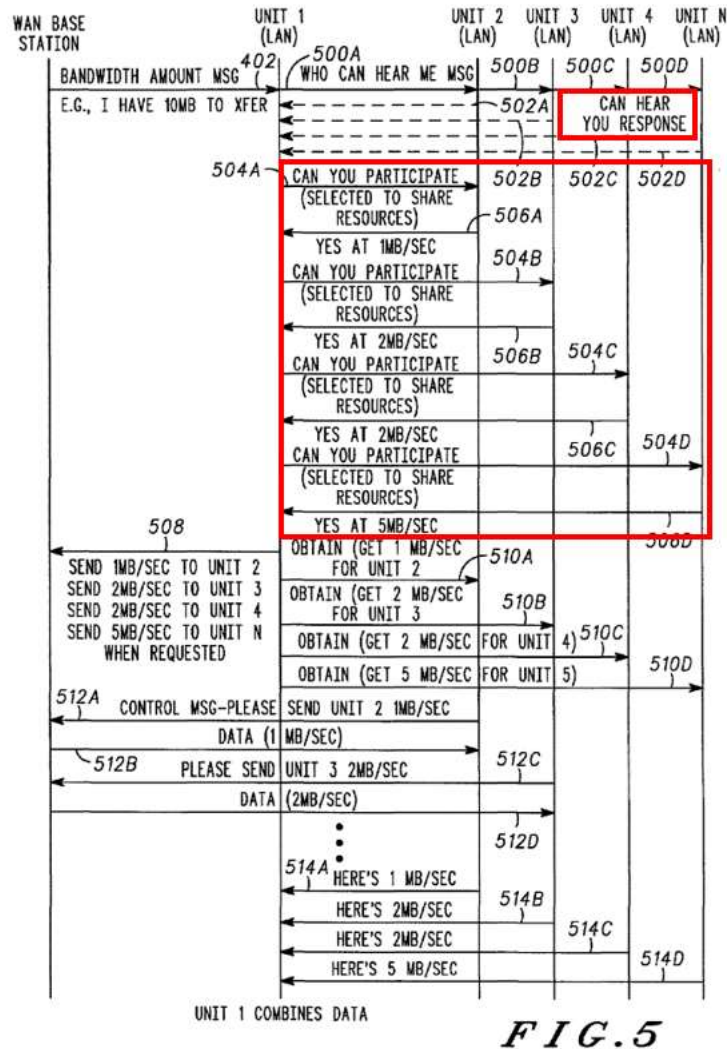
59. In my opinion, Kotzin discloses or renders element 1.1 obvious.

- i. a data-source device receiving multipath information about each of a plurality of network-edge devices that is capable of joining a multipath connection with a data-requesting device,*

60. In my opinion, Kotzin discloses element 1.1.i. Here, I find it helpful to discuss with particularity how the *data-source device* is present, *capable of joining a multipath connection with a data-requesting device*, and receives *multipath*

information. Kotzin discloses a network element, such as cellular base station (BS), Internet Web server, or other device (data-source device) receiving multipath information about each of a plurality of wireless units 106b-n (network-edge devices) that are capable of joining a multipath connection.

61. Upon querying each unit to determine available bandwidth, “each of the proximal units in the group indicate the amount of wireless resources that they are willing to allocate to this particular communication or session.” *Id.*, ¶ [0038]. I have highlighted the initial query and response messages in Figure 5 below:



Id., Fig. 5. As illustrated above, device 106a (Unit 1 in the figure), as a result of a query (“can you participate”), receives multipath information, including whether a device can participate in the multipath connection (“yes. . .”) as well as the bandwidth the device will allocate to the connection (“. . . at 1MB/sec”), from Units 2-n (network-edge devices 106b-n), each of which may be capable of joining the connection, as shown by the response to message 504A. *See id.*, ¶¶ [0037]-[0038].

62. Next, Kotzin discloses that the data-source device receives this multipath information in the form of bandwidth distribution message 508. As shown in Figure 5 below, at step 508, which I have highlighted, device 106a (Unit 1, data-requesting device) sends “a bandwidth distribution message 508 which notifies the wide area network which of the plurality of proximal wireless units will participate in sharing the wireless resources for use in facilitating communication with the wireless apparatus 106a.” *Id.*, ¶ [0039]. In my opinion, a POSITA would have known that this information constitutes multipath information about a plurality of units that are capable of joining a multipath connection:

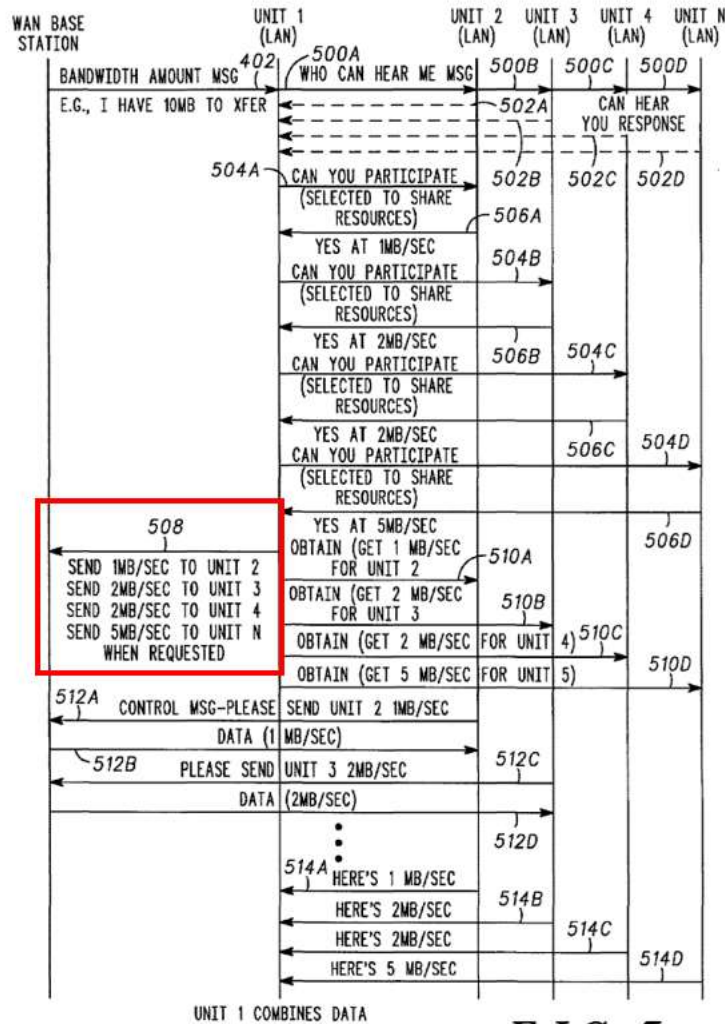


FIG. 5

Id., Fig 5.² Therefore, it is my opinion that Kotzin, including through step 508 as shown in Figure 5 above, discloses a data-source device, here an element on the

² I note that while Figure 5 depicts the data-source devices as a “Base Station” on the WAN, in my opinion a POSITA would have understood that any data-source device connected to the wide area network could provide the functionality

WAN, receiving multipath information about each of a plurality of network edge devices, here units 2-n, that is capable of joining a multipath connection with a data-requesting device, here unit 1.

63. Accordingly, it is my opinion that Kotzin renders this limitation obvious.

- b. *[1.2] the data-source device performing at least one of (i) sending different groups of data packets to different network edge devices that are participating in the multipath connection, (ii) sending different streams of data to one or more of the network-edge devices that are participating in the multipath connection, and (iii) sending combinations of different streams and different groups of data packets to one or more of the network-edge devices that are participating in the multipath connection.*

64. In my opinion, Kotzin discloses element 1.2. I find it helpful to discuss here why Kotzin's *data-source device* may send *data packets*, *streams of data*, or

described in Kotzin. Throughout this declaration I may refer to the data-source device on the WAN as "Base Station" for ease of reference. However, in doing so I am not intending to limit my opinion to only embodiments where the data-source device is a base station. In my opinion, Kotzin's disclosures apply equally to other systems where a different networking device is used as the data-source device so long as that device can perform the disclosed functionality.

combinations of both. Kotzin discloses that the device on the WAN (data-source device) transmits a “partial bandwidth request 510a-501d” to each of the proximal wireless units (network-edge deices). Ex. 1018, ¶ [0040]. The wireless units (network-edge devices) respond “via a control message or any other suitable scheme, with the wide area network to receive the portion of the bandwidth of the communication that is destined for the wireless apparatus 106a.” *Id.*, *see also* Fig. 5. “[N]etwork element 400 responds by transmitting to each of the participating wireless units, ***subsets of the total information*** destined for the wireless apparatus 106a.” *Id.* “In other words, each of the participating wireless units 106b-106n receive ***portions of a communication*** destined for the wireless apparatus 106a.” *Id.* Then wireless unit 106a recombines the portions of the data “to obtain the complete ***data stream or message.***” *Id.* ¶¶ [0040]-[0041]. Accordingly, the device on the WAN (data-source device) transmits different groups of data packets or different streams of data to nearby wireless units 106b-106n (network-edge devices) and the full message (groups of data packets) or a stream is reassembled by device 106 (data-requesting device).

65. Further, it would have been obvious to a POSITA that when a system is configured to transmit data over multiple paths, the system would send data packets, streams of data, or a combination of the two. Sending streams of data was

a well-known method for transmitting large amounts of data by sending continuous transmissions and would have been obvious to a POSITA to implement in Kotzin's system. *Id.* I note that streaming was well known in the art and the asserted patent confirms that streaming was a known method to transmit data. Ex. 1009, 11:36-40 (discussing receiving a file or data stream), 13:13-18 (streaming video). Indeed, a POSITA would find it obvious that streaming data is essentially comprised of sending data packets. Similarly, if a data-requesting device requested multiple files of data to be sent at the same time, it would have been obvious to send different groups of packets for each file over each link, streams of data for each file over each link, or a combination of groups of packets and data streams.

66. A POSITA would have known to optionally send a group of packets, a stream, or a combination of data packets and streams based on the size and type of requested files. For example, if an image and a video were requested to be sent at the same time, it was well known to send a combination of packets to transmit the image and data stream to transmit the video. By using a combination of data packets and streams as needed to transmit multiple files, the transmission of each file would not interrupt the transmission of the other or prevent the data transmission altogether. Using data packets in place of streams as described in Kotzin would have further been a minor modification and required nothing more than basic engineering. Ex.

1058, 654 (“TCP uses what is known as a three-way handshake. A handshake is simply the exchange of control information between the two computers. This information enables the computers to determine which packets go where and ensure that all the information in the message has been received.”)

67. Accordingly, Kotzin discloses this element.

2. Dependent Claim 2

a. “The method of claim 1, wherein the multipath information includes a connection ID that is generated by one of the data-source device, one of the plurality of network-edge devices, the data-requesting device and a network device.”

68. In my opinion, Kotzin renders claim 2 obvious. I find it helpful to discuss here the *connection ID* of this limitation.

69. Kotzin teaches that at the beginning of the multipath connection, “the network element 400 [data-source device] receives a message in the form of data indicating an amount of data (i.e. voice non-voice etc.) to be sent via the wide area network 104 for the wireless apparatus 106a.” Ex. 1018, ¶ [0037]. Based on my experience, multipath technologies were well known in the art by 2002. In my opinion, a POSITA would have known that these protocol families and transmission methods include multipath protocols, which were well known to generate a connection ID. I note here that the ’649 patent does not claim to invent “connection

ID,” but rather uses connection identifiers used in the above-mentioned well-known protocols, including in Multilink PPP. *Cf.* Ex. 1009, 11:55-60.

70. Connection IDs were well-known and were regularly used to correctly route packets at the time of the invention. An arbitrary or randomly generated number has been a common and straightforward example of such connection identifies. The use of such arbitrary or randomly generated numbers for tracking sessions was well known in the art as of 2002. Further, randomly generated connection IDs have been used with web-based applications since at least 2001. For example, connection IDs were generated by the web server and stored in a cookie in order to “to associate a group of online actions with a specific user.” Ex. 1049 at 3. Further, the Real Time Streaming Protocol (RFC 2326), a protocol used since 1998, generated session IDs and included them in the packet headers of packets send between client and server. Ex. 1055, at §3.4. Random connection IDs are also used in other well-known protocols: The Session Initiation Protocol used from 1999, and the Dynamic Host Configuration Protocol from 1997. Ex. 1046 (RFC 2543); Ex. 1047 (RFC 2131), §2 (using a random number “Transaction ID” that is “used by the client and server to associate messages and responses between a client and a server”). Another well-known connection identifier is the TCP/IP tuple (composed of source IP address/port number, destination IP address/port number, and the protocol in use)

(see Ex. 1043 at §2.3), which would be obvious to use with Kotzin. TCP/IP runs underneath the protocol used to browse Web pages, HTTP, which means it is already present in Kotzin. Ex. 1048 (RFC 1945) (“On the Internet, ***HTTP communication generally takes place over TCP/IP connections.***”). A POSITA would thus be motivated to use the TCP/IP tuple, such the tuple between unit 106A and Internet Web server 400, as a connection ID—a POSITA would find it obvious to include this tuple to identify a specific bandwidth-sharing session.

71. Further, Kotzin describes a process in which a data-source device (such as a base station or web server) queries multiple network-edge devices (wireless units) to determine their availability and bandwidth for a given communication session, and then distributes portions of the data stream to each participating device. Ex. 1018, ¶¶ [0037]–[0040], Figs. 4–5. While Kotzin does not use the term “connection ID,” the protocol requires that each portion of the data stream be associated with the correct session and recipient, which a POSITA would have recognized as necessitating some form of session or connection identifier to ensure proper routing and reassembly at the destination. Accordingly, it is my opinion that a POSITA would have known the initial request from wireless apparatus 106a (data-requesting device) would have included a connection ID so that data in the multipath transmission is properly routed to the requesting device. It is further my opinion that

a POSITA would have known that, in order for a data sending device to properly route the packets and for a data receiving device to properly reassemble the packets, one of the devices participating in the connection, including data-source device, network-edge device, or network device, would associate an identifier with the packets according to well-known routing protocols. *See id.*, ¶ [0035].

i. Peirce

72. In my opinion, Peirce further renders claim 2 obvious. Although Kotzin alone (Ground IA) renders this claim obvious, a POSITA would have been motivated to combine Kotzin with Peirce (Ground IB) to incorporate into Kotzin's system Peirce's session identifier as the claimed connection ID.

73. A POSITA would have been motivated to incorporate Peirce's session identifier into Kotzin, rendering this claim (and the similar elements in claims 7, 8, and 12) obvious. Kotzin's wireless units aggregate bandwidth ("use each other's short range wireless communication resources") for a "given communication session," which a POSITA would find obvious to indicate that the solution presented in Kotzin requires a way to distinguish those sessions. Ex. 1018, ¶[0021]. In the absence of discussion of what specific method should be used to distinguish sessions, a POSITA would be motivated to turn to Peirce, a method in same field of endeavor and are directed to the same problem, namely, developing a system for

bandwidth sharing through the aggregation of multiple data streams, which discloses a specific way to distinguish sessions.

74. Peirce's method for distinguishing and managing bandwidth aggregation sessions uses a "bundle mapping update packet" with a connection identifier described as an "identification field" which "notifies the other termination units that if they should receive a portion of the data stream via a channel that belongs in the call originator's 'bundle', *representing the session*, they should forward their packets of data to the designated termination unit." Ex. 1044, 2:57-65. Given the need identified by Kotzin, a POSITA would find it obvious to use Peirce's disclosed session identifier, such that Kotzin's wireless units would be able to properly manage and route data from Internet Web server 104 to the data-requesting wireless unit 106a.

75. In my opinion and based on my expertise, implementing Peirce's session identifier would have been compatible with Kotzin's disclosed architecture and a POSITA would not have needed to modify Kotzin's bandwidth aggregation configuration to enable the use of Peirce's session identifier. Furthermore, in my opinion, it would have been obvious to a POSITA to include such a session identifier with Kotzin's messages 510 and 512 so that the session identifier is included with all data packets as a coordinating reference to ensure that UNIT 1 receives all packets

destined for it, while at the same time fulfilling Kotzin's express requirement that its wireless units only share bandwidth for a particular session. In my opinion, a POSITA would have also understood and found obvious that Peirce's session identifier would have been helpful in the upload direction, when Kotzin's UNIT 1 is uploading data to Internet Web Server 104, because the session identifier ensures that the bandwidth-sharing wireless units only forward packets to WAN server 400 for the specific session to which those packets belong. Ex. 1018, ¶ [0042], Fig. 7.

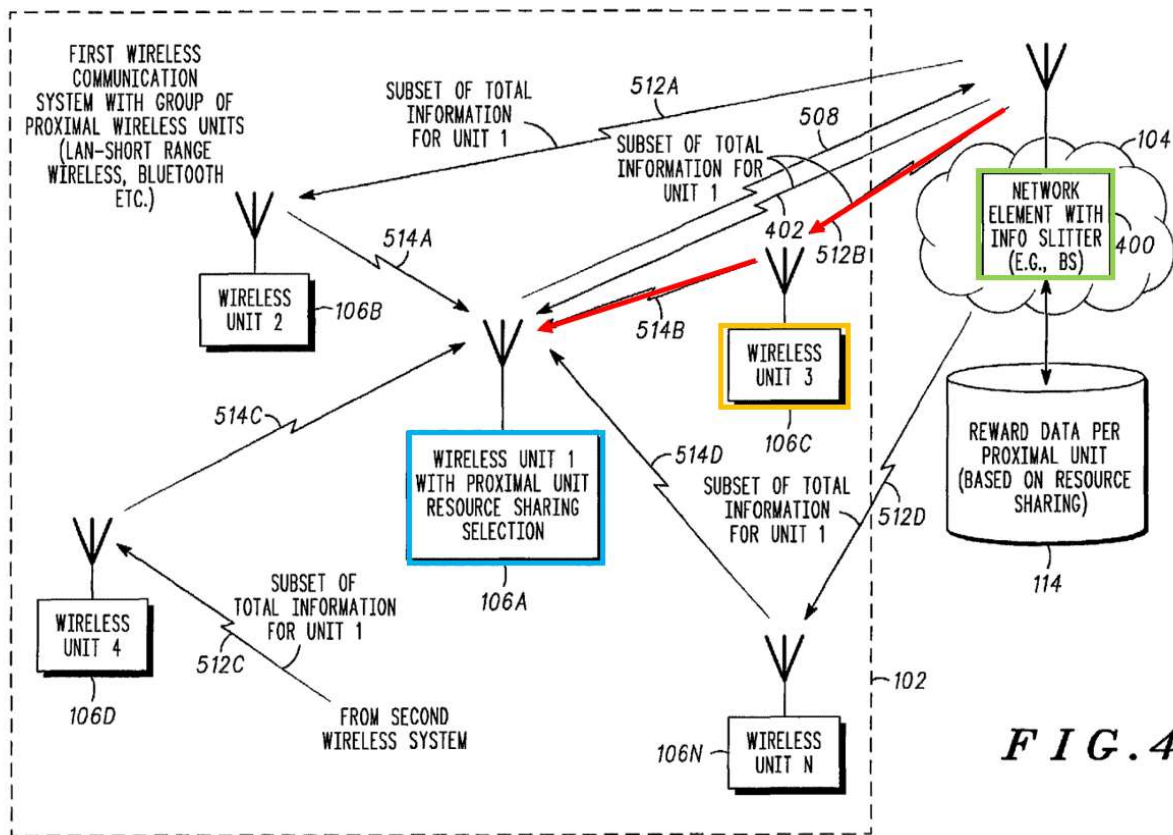
76. Both Kotzin and Peirce present architectures that employ multiple communication links to transmit segmented data streams, which are subsequently reconstructed at the destination. The functional and architectural parallels between these systems would naturally lead a POSITA to consider the adoption of Peirce's session identification mechanism—specifically, the bundle mapping update packet containing a session identifier—within Kotzin's bandwidth sharing framework. This integration would enable precise session management, ensuring that bandwidth-sharing wireless units participate only in the intended communication session. The implementation of such a mechanism would be a straightforward application of established networking principles, requiring only routine programming and configuration to achieve predictable and reliable results in session coordination and data integrity.

3. Dependent Claim 3

- a. [3.2] “*the data-source device joining the second network-edge device to the multipath connection.*”

77. In my opinion, Kotzin renders element 3.2 obvious. I find it helpful here to discuss how Kotzin illustrates this limitation, and why in particular these illustrations show that one device *join[s] the second* device to the connection.

78. Kotzin discloses a data-source device joining a second network-edge device to the multipath connection. This is illustrated by Figures 4 below, which I have annotated to show the connection between the network element (*e.g.*, a WAN base station or a web server; data source device), wireless unit 3 (second network-edge device), and wireless unit 1 (data-requesting device).



Ex. 1018, Fig. 4. That Kotzin discloses a data-source device joining a second network-edge device to the multipath connection is further illustrated by Figure 5 reproduced below, which in step 512 D (emphasized in red), shows that the WAN base station (data source device) sends data to unit 3 (network-edge device).

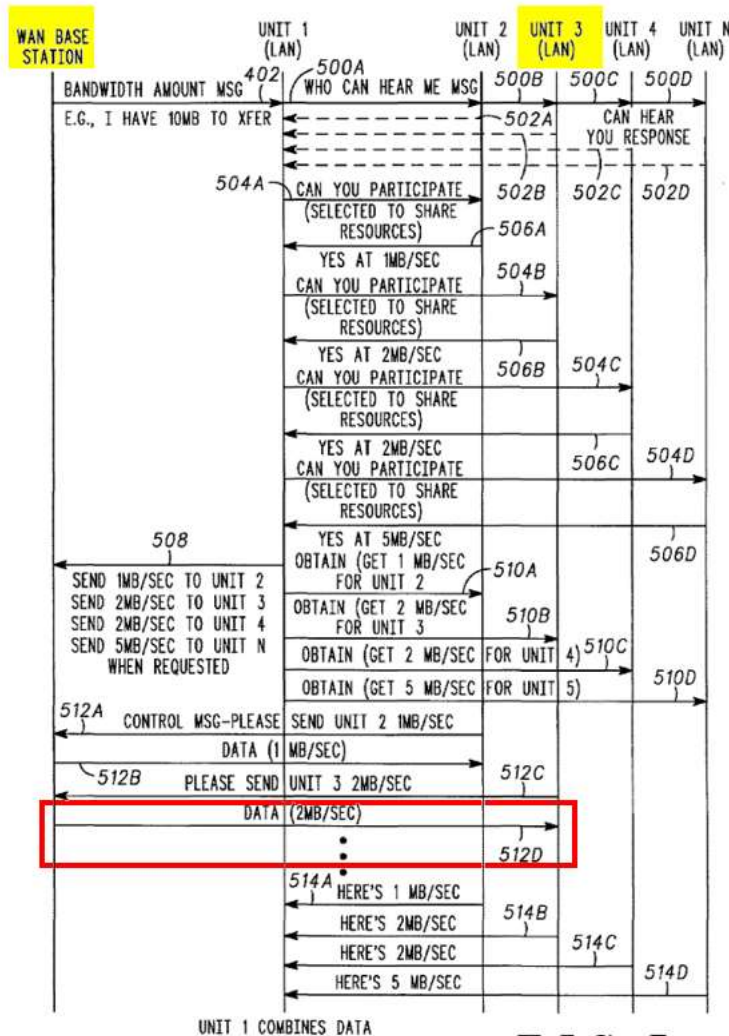


FIG. 5

Id., Fig. 5. I note here that it would have been obvious to a POSITA that in order for the WAN base station to send data to unit 3, a WAN base station would first join unit 3 to the connection.

4. Dependent Claim 4

- a. [4.1] "the data-source device receiving multipath information about which network-edge devices are to be

removed from the multipath connection; and”

79. In my opinion, Kotzin renders element 4.1 obvious. It is helpful to discuss here why *information* regarding *remov[ing]* a device *from the multipath connection* is *receiv[ed]*.

80. Wireless units 106 such as UNIT 1 instruct Internet Web server 104 through multilink packets to redirect the data flow, when whether an interface’s signal strength is too low. Ex. 1018, ¶[0043] (“Conversely, during a downlink communication, the wireless area network may obtain the signal strength level, either from messages that it receives or from queries to the proximal wireless apparatus and attempt to split the communication such that a majority of the information is sent to the wireless units with the higher signal quality levels.”). It is thus my opinion that it would have been obvious to a POSITA that the network element 400 (*e.g.* a WAN base station, data-source device), receives information from either device 106a (data-requesting device) or from the other devices 106b-n (network-edge devices) about which devices should be removed from a multilink connection, so that data is not routed to a device that is no longer able to receive the transmission. Thus, a POSITA would have found this limitation obvious.

5. Dependent Claim 6

a. “The method of claim 1, wherein the data-source device is one of a multipath link aggregator, a network relay, a

multipath link server, a server, a network switch, a network router and a device capable of providing multipath services.”

81. It is my opinion that Kotzin renders claim 6 obvious. It is useful to discuss here why the *data-source device is a server*, or a *device capable of providing multipath services*.

82. According to Kotzin, a data-source device is a network element in a wide area network. Ex. 1018, ¶ [0035], *see also* § IX.A.1.a.i. According to Kotzin’s specification, Figure 4 shows “a downlink communication in which a network element 400, such as a cellular base station (BS), **Internet Web server**, or any other suitable unit within the second wireless communication system 104, splits (i.e., distributes) a communication destined for the wireless apparatus 106a.” *Id.*, ¶ [0035], Fig. 4. Therefore, pursuant to Kotzin’s disclosure, the data-source device can at least be a server.

83. In my opinion, a POSITA would have found it obvious that other devices served as a network element 400. In particular, devices like a multipath link aggregator, a network relay, a multipath link server, a network switch, a network router and any suitable device capable of providing multipath services were known to also serve as a network element 400. In particular, a POSITA would have known that these devices are capable of connecting to other devices in a network and

transfer data (including via multiple links). Each of these devices was further well-known in the art and a POSITA would have found it obvious to use any of these devices to provide communication services as described in Kotzin.

84. Therefore, Kotzin renders this limitation obvious.

6. Independent Claim 7

a. [7.1] “the data-source device receiving multipath connection requests from a plurality of data-requesting devices, each of the multipath connection requests involving a particular multipath connection to a data-requesting device;”

85. In my opinion, Kotzin renders element 7.1 obvious. It is helpful here to discuss the *multipath connection requests*.

86. Kotzin discloses a wide area network element (data-source device) that receives multipath connection requests from a device 106a (data-requesting device) in order to establish a multipath connection and send data through the multiple paths. *See* § IX.A.1.a.i. In particular, as explained above “network element 400 receives a message in the form of data indicating an amount of data (i.e. voice, non-voice etc.) to be sent via the wide area network 104 for the wireless apparatus 106a.” Ex. 1018, ¶ [0037]; *see* § IX.A.1.a.i. In my opinion, a POSITA would have understood that this message is a connection request. Because multiple devices participate in the connection disclosed by Kotzin and each of the devices request data from the

network element 400, a POSITA would have known that this connection request would, in practice, be sent from multiple devices as opposed to just one requesting device. Further, a POSITA would have understood that each request that the network element receives will involve a particular connection to the device, depending on the availability of wireless units 106b-n to participate in the data transfer (network edge devices). Additionally, given that the responses are uncoordinated and that multiple devices participate, a POSITA would find it obvious that these multipath connection requests would be likely to occur at the same time. *See also* § IX.A.1.a.i.

87. Therefore, Kotzin renders this element obvious.

b. [7.2] “*the data-source device associating a connection ID to each multipath connection request;*”

88. In my opinion, Kotzin renders element 7.2 obvious. It is helpful to discuss here the *connection ID* and how it is *associate[ed] to each multipath connection request*. In my opinion, a POSITA would have known that a network element 400 (*e.g.*, a WAN base station or a web server; data-source device) associates the connection ID with multipath connection requests. These requests include messages 402 to device 106a and messages 512B and 512D to wireless units 106b and 106c. The network element 400 associates the connection ID with particular session in order to properly route the data within the network. Further, to establish a multipath connection between the devices, a POSITA would know and

find it obvious to associate a connection ID to each received multipath connection request so that when the connection is established, data would be routed correctly. Therefore, Kotzin renders this limitation obvious.

89. For the reasons discussed with respect to claim 1, to the extent Kotzin does not render this element obvious (Ground IA), Kotzin in view of Pierce renders this element obvious (Ground IIA).

- c. [7.3] “*the data-source device using multipath information about each of a plurality of network-edge devices that is capable of joining in a particular multipath connection to a particular data-requesting device, the particular multipath connection having a particular connection ID;*”

90. In my opinion, Kotzin renders element 7.3 obvious. Here, I find it helpful to discuss the *particular multipath connection having a particular connection ID*. It was known in the art at the time of the invention that for one device to send data to another device, first the connection between the devices must have been established. In order to establish a connection, a data-requesting device sends a connection request. Further, the request from the remote site constitutes a multipath connection request, as the request initializes a “multipath connection,” as described for claim 1. As such, it would be obvious to a POSITA that the multipath connection would have a particular connection ID, which would be used to identify the network-edge

devices responding to a connection request and share bandwidth between the network-edge devices with the data-source device.

- d. [7.4] “the data-source device notifying each of the network-edge devices that is participating in the particular multipath connection associated with the particular connection ID; and”

91. In my opinion, Kotzin renders element 7.4 obvious. It is helpful to discuss here the *notif[ications]* sent to each device.

92. As described above, pursuant to Kotzin’s teachings, before the network element 400 (data-source device) would send data to devices 106b-n in the network (network-edge devices), the particular multipath connection between the wide area network element and the device must be established. *See* § IX.A.1.a.i. Kotzin further states that each wireless unit “communicates via a control message or any other suitable scheme, with the wide area network.” Ex. 1018, ¶ [0040]. These communications are illustrated by Figure 5 below by messages 512A and 512C sent from wireless units 2 and 3 respectively (network-edge devices) to the WAN network element (data-source device), which I have highlighted in red:

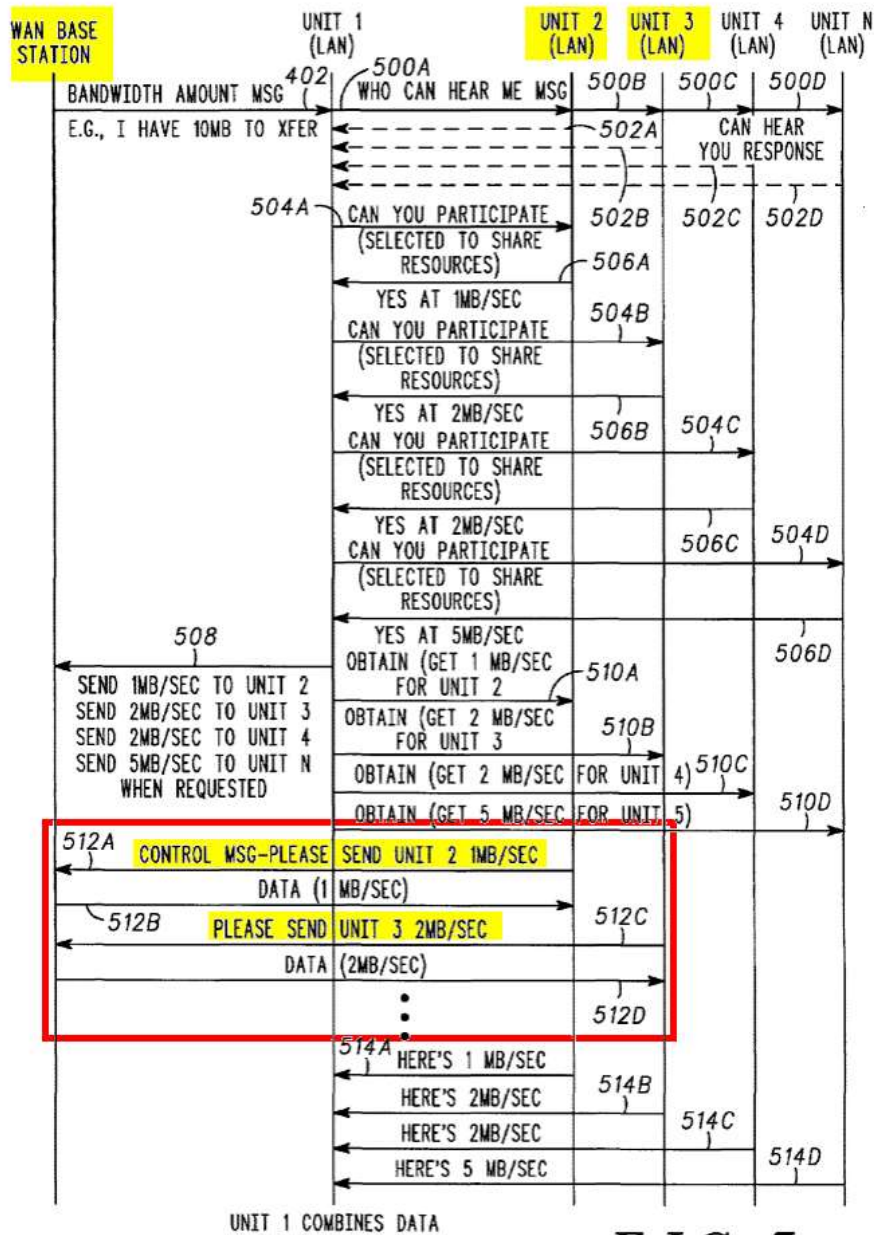


FIG. 5

Id., Fig. 5. As shown, unit 2 sends a control message to a WAN base station requesting data ("control msg-please send unit 2 1Mb/sec"). Similarly, unit 3 also

sends a control message to a WAN base station requesting data (“please send unit 3 2Mb/sec”).

93. Based on my experience, it is my opinion that a POSITA would have known that before the network element 400 sends the data back to the wireless units (as shown in Figure 5 in steps 512B and 512D), the base station would inform the devices that the control message was received and that the device will participate in the multipath connection. Indeed, Kotzin discloses an embodiment where the entire transmission requires sending 10MB of data and devices 106b-n can together provide a transfer rate of 10MB/second. *Id.*, ¶ [0039]. However, in this example, the wireless apparatus 106a does not directly receive any of the data from the WAN base station. *See id.* Kotzin explains that “the wireless apparatus 106a itself may also participate in receive a portion of the message destined for it.” *Id.* Thereby, the WAN base station in Kotzin does not necessarily use all of the links that were offered by the plurality of wireless units 106b-n. Accordingly, a POSITA would have understood that before sending the portion of the data to each wireless unit, the WAN base station would send a notification confirming the particular multipath connection has been established with the wireless unit and will be used in the transfer of data. In fact, the use of such notification messages through, for example, handshakes or

similar acknowledgments were well-known methods in the art of establishing a connection between multiple devices. Accordingly, Kotzin discloses this limitation.

- e. [7.5] “the data-source device sending data associated with the particular connection ID to the network-edge devices participating in the particular multipath connection associated with the particular connection ID.”

94. In my opinion, Kotzin renders element 7.5 obvious. It is helpful to discuss here the *connection ID* and the *sending data* associated.

95. According to Kotzin’s disclosure, requested data is associated with the particular connection ID and is sent to the wireless units (network-edge devices) participating in the multipath connection associated with the particular connection ID. To establish a multipath connection between the devices and in order to route data correctly, a POSITA would have known a connection ID would be used for the bandwidth sharing devices to properly route the packets between the data-source device and the data-requesting device, as discussed with respect to claim 1. Kotzin further explains that “each of the participating wireless units 106*b*-106*n* receive portions of a communication destined for the wireless apparatus 106*a*.” Ex. 1018, ¶ [0040]. This is illustrated by the Figure 5 below in steps 512B and 512D, which I have highlighted in yellow.

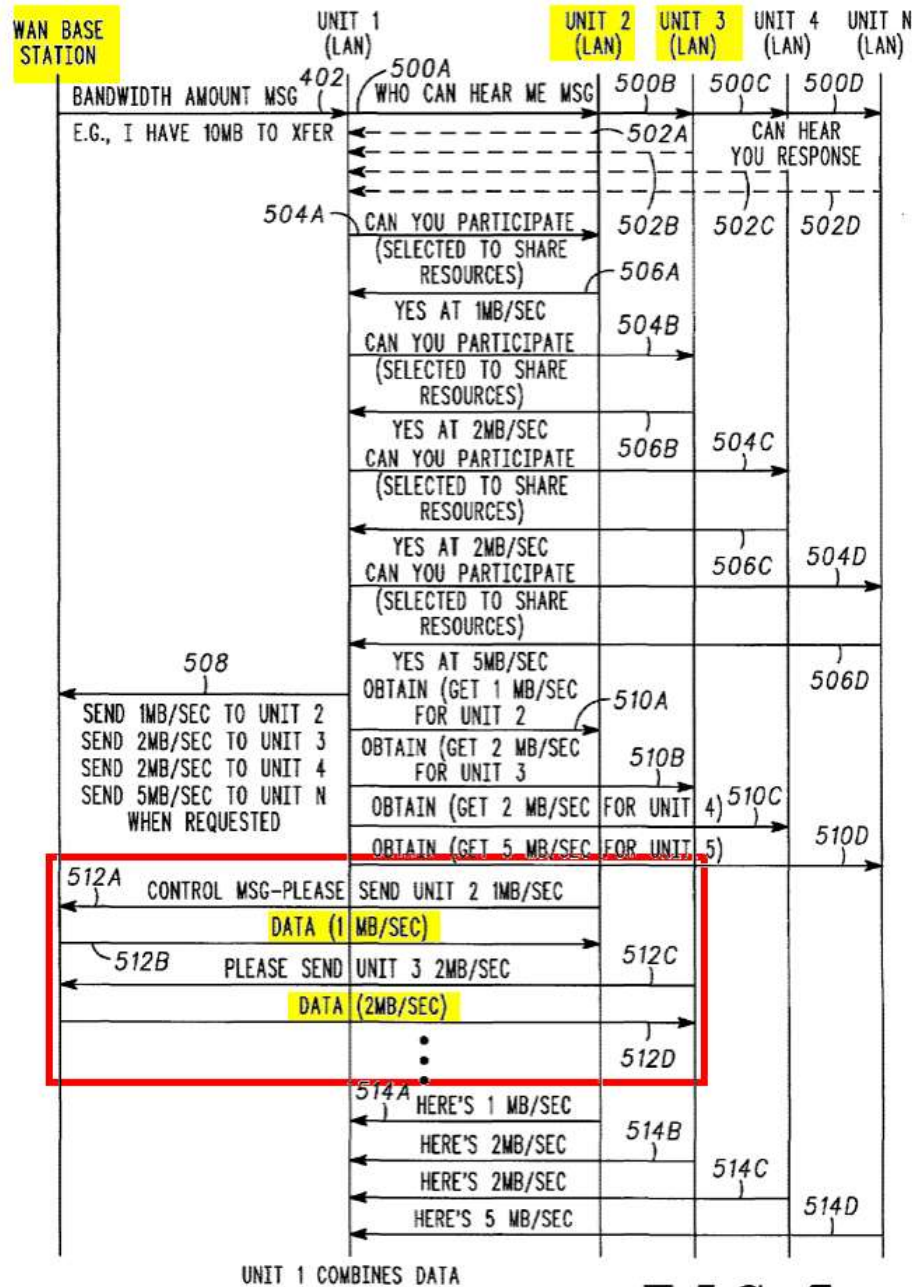


FIG. 5

Id., Fig. 5; see also *id.*, Fig. 6, ¶ [0041]. For example, unit 2 receives from the WAN base station “data (1MB/SEC),” and unit 3 receives from the WAN base station “data

(2MB/SEC).” As such, the data-source device, network element 400, sends *data associated with the particular connection ID* to each wireless unit 106.

7. Dependent Claim 10

- a. “The method of claim 7, further comprising the data-source device notifying the data-requesting device when all data has been sent over the particular multilink connection.”*

96. In my opinion, Kotzin renders claim 10 obvious. I find it helpful to discuss here the *notifying ... when all data has been sent*. It was a well-known problem in the art that sometimes packets sent through various paths would not be delivered properly. To resolve this problem, it was well known that transmitting devices would provide a notification that all data has been sent so that the data receiver would know that a transmission was complete and no further packets were expected. For example, in TCP/IP, a FIN flag is set to indicate that the sender, *i.e.*, data-source device, has completed its transmission. In my opinion, it would have been obvious to a POSITA to implement this well know functionality to have the WAN network element (data-source device) sent a notification to wireless unit 106a (data-requesting device) when all data has been sent over the particular multilink connection.

97. Further, Kotzin explains that wireless units “indicate the amount of wireless resources that they are willing to allocate” to a particular communication.

Ex. 1018, ¶ [0038]. Accordingly, the devices “allocate” resources to a “particular communication or session.” *Id.* Based on my experience, it is my opinion that a POSITA would have found it obvious to send a notification from the data-source device to the data-requesting device notifying data-requesting device that all data has been sent through the particular multilink connection to inform the data-receiving device that it can release the resources reserved for the connection. Therefore, Kotzin renders this limitation obvious.

b. Held

98. Although Kotzin alone (Ground IA) renders this claim obvious, a POSITA would have been motivated to combine Kotzin with Held (Ground IB) to incorporate into Kotzin’s system commonly employed protocol families such as TCP and the notification that all data has been sent.

99. First, in my opinion, a POSITA would have understood that Kotzin and Held are in the same field of endeavor and are directed to the same problem, namely, optimizing the communication range of wireless resources for enhanced information throughput. According to Kotzin, there was a known problem where a wireless unit wishing to receive information over the network has “insufficient bandwidth to receive the entire communication from the wide area network.” Ex. 1018, ¶ [0036]. To resolve this problem, Kotzin proposes a method for “enhance[d] participation by

potential wireless apparatuses” and “aggregation of shared resource usage . . . to enhance the information throughput,” *id.* ¶ [0006], specifically a method for “retransmitting by each of the participating proximal wireless units the portions of data that were split by the wide area network and distributed to each of the independent proximal wireless units, to the wireless apparatus 106a,” *id.* ¶ [0041]. Additionally, Kotzin discloses that its network element 400 may be an Internet Web server. *Id.* ¶ [0035]. At the same time, Held describes the very concept described in Kotzin, namely, transmitting data over a network (*e.g.*, Internet) server. Held discloses that such Internet communications are based on TCP/IP. Ex. 1020, 142 (describing “the emergence of the Internet, a ubiquitous network of applications ***based on the TCP/IP***”). Therefore, Kotzin and Held are in the same field of endeavor and describe various aspects of the same concept: transmitting packets of data to a destination wireless unit. Both Kotzin and Held disclose techniques or characteristics of techniques that allow a user to achieve efficient data transmission across a network.

100. Second, a POSITA would have understood that both Kotzin and Held disclose similar techniques or characteristics of techniques such that integrating Held’s teachings on commonly employed protocol families such as TCP and a notification that all data has been sent into Kotzin’s bandwidth aggregation system

was a known technique to improve similar devices [and methods] in the same way and a combination of known prior-art elements according to known methods to yield predictable results. As I explained above, Kotzin discloses a bandwidth aggregation system in which a wireless apparatus splits information that is ultimately destined for another wireless apparatus on the network and distributes the split information among other proximal wireless units, and the aggregated bandwidth of these other proximal wireless resources accomplishes the transmission of the complete information to the destination wireless unit. Ex. 1018, ¶ [0035]. Additionally, Kotzin describes that its network element 400 can be an Internet Web server. *Id.* Held discloses transmitting data over the Internet using TCP/IP protocol. Ex. 1020, 142 (“The elimination of price discrimination between voice and data services can lead to dramatic reductions in the price of voice calls, precipitating significant changes in market structure. These changes were first evident in the emergence of the Internet, a ubiquitous network of applications *based on the TCP/IP.*”). Held describes notifications that all data has been sent in this context. Ex. 1020, 654 (“[IP] relies on other protocols within the TCP/IP stack to provide the connection-oriented services. The connection-oriented services (i.e., TCP) take care of the handshake - the exchange of control information. ... [TCP] contains error detection and correction features. ... TCP uses what is known as a three-way handshake. A

handshake is simply the exchange of control information between the two computers. This information enables the computers to determine which packets go where and ensure that all the information in the message has been received. When a connection is desired between two systems, Host A and Host B, using TCP/IP, a three-way handshake must occur.”) In my opinion, given that Kotzin expressly teaches Internet Web communications and Held teaches that the use of TCP/IP for Internet communications is “ubiquitous,” it would have been obvious to a POSITA to use TCP/IP when communicating with Kotzin’s web server 104, and that such notifications as those described with reference to TCP’s handshake protocol would be integrated. Therefore, in my opinion, a POSITA would have been motivated to implement Held’s teachings into Kotzin’s system in order to achieve effective data transmission over the network.

101. Finally, based on my expertise, implementing Held’s teaching of commonly employed protocol families such as TCP and notifications that all data has been sent into Kotzin’s system would have required only routine experimentation and yield a predictable result—namely, that the bandwidth aggregation system would incorporate fundamental characteristics of TCP, including the handshake protocol necessitating such notifications. In order to do so, a POSITA would not have needed to modify Kotzin’s bandwidth aggregation configuration,

and doing so would have been easily achieved and would have changed neither Kotzin's nor Held's functionality. Further, in my opinion, a POSITA would have had a reasonable expectation of success. Because Kotzin's bandwidth aggregation system employs a network element that can be an Internet Web server, a POSITA would have recognized that Kotzin's network corresponds exactly to the Internet and TCP protocol concepts referenced by Held, and both use these concepts for the same purpose – data transmission. Ex. 1018, ¶ [0035]. Accordingly, in my opinion, a POSITA would have had a high likelihood of success in combining Held's teachings regarding the use of a destination URL and the use of TCP/IP protocol (including its session identifier) with Kotzin's bandwidth aggregation system.

102. As such, a POSITA would have found it obvious for the data-source device to notify the data-requesting device when all data has been sent.

8. Independent Claim 13

- a. [13.1] a data-requesting device sending a multipath request to a network-edge device where the multipath request indicates that the network-edge device will join a multipath connection associated with the data-requesting device, the data-requesting device being connected over a first connection to a network and over a second connection to the network-edge device, the multipath connection comprising the first connection and the second connection which are capable of receiving data at the same time;*

103. In my opinion, Kotzin renders element 13.1 obvious.

- i. a data-requesting device sending a multipath request to a network-edge device

104. It is my opinion that Kotzin renders element 13.1.i obvious. I find it helpful to discuss here the *sending of a multipath request*. Kotzin discloses device 106a (data-requesting device) sending a multipath request to devices 106b-n (network-edge devices). Specifically, Kotzin states that in order to determine which proximal wireless units are capable of joining the connection, the apparatus 106a sends “query messages” to the wireless units. Ex. 1018, ¶ [0037]. These steps are illustrated by Figure 5 below, which I have indicated in red:

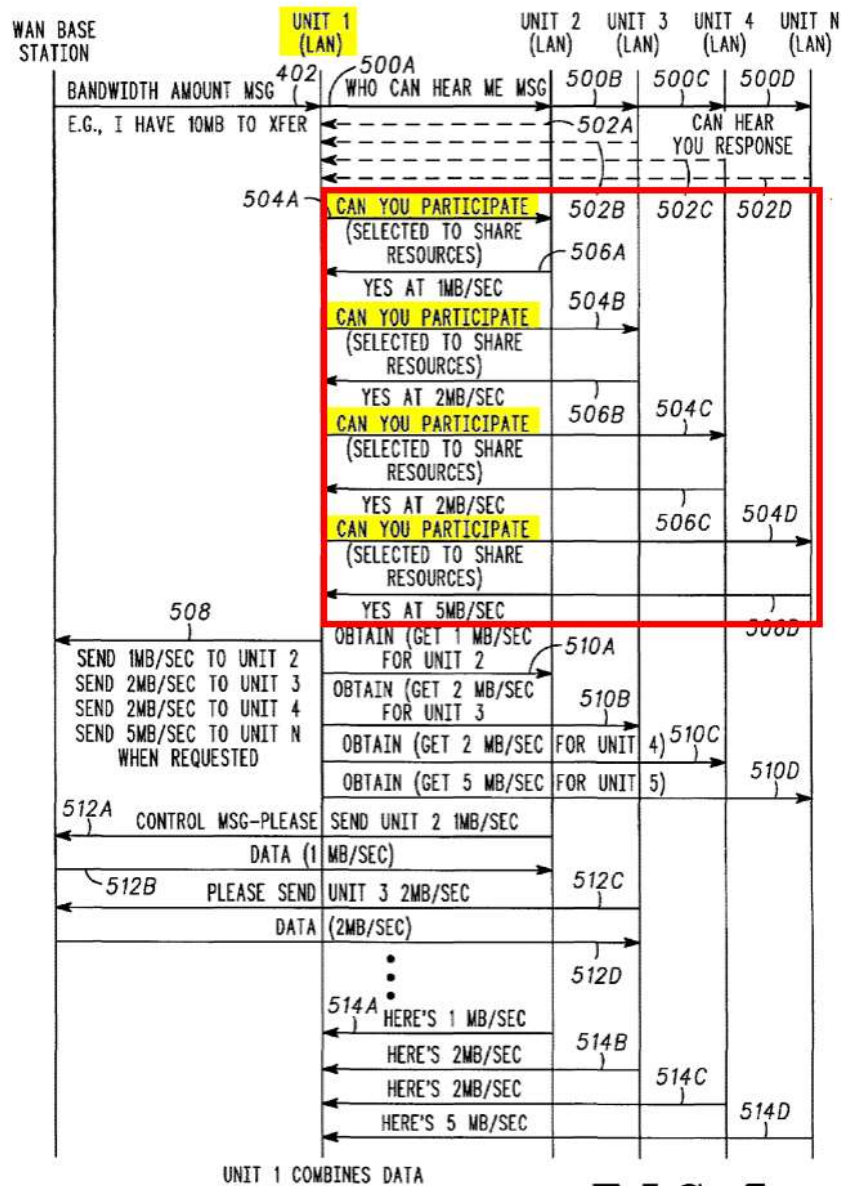


FIG. 5

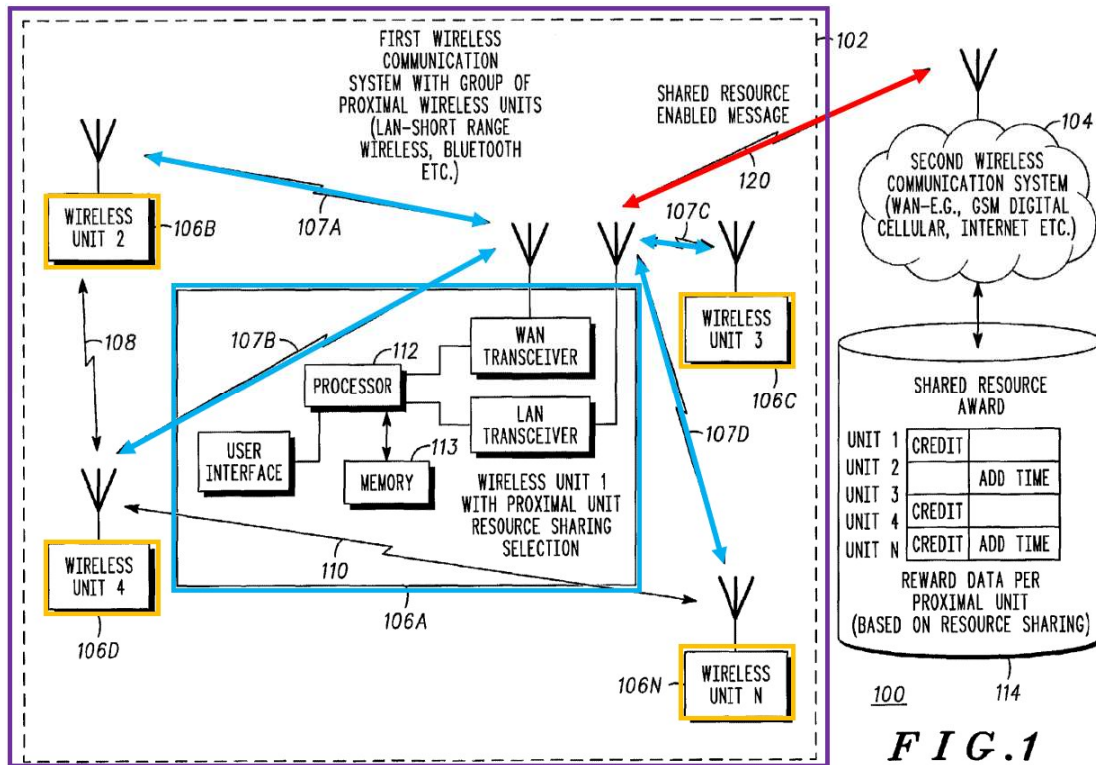
Id., Fig. 5; See § IX.A.1.a.i. For example, unit 1 (106a) (data-requesting device) sends a query to unit 2 (network edge device) requesting participation in the data transfer (“can you participate”). Ex. 1018, Fig. 5. The device that will be sharing its resources responds “yes” and “indicate[s] the amount of wireless resources that they

are willing to allocate to this particular communication or session” (e.g. “. . . at 1 Mb/sec”). *Id.*, ¶ [0038], Fig. 5. The same is true of messages 510, by which the data-requesting device requests of the participating network-edge devices a certain amount of data to share in the multipath connection. Accordingly, a POSITA would have understood that the device 106a (data-requesting device) sends a multipath request to devices 106b-n (network-edge devices) to join the particular multipath communication. Therefore, Kotzin renders this limitation obvious.

- ii. the data-requesting device being connected over a first connection to a network and over a second connection to the network-edge device, the multipath connection comprising the first connection and the second connection which are capable of receiving data at the same time;

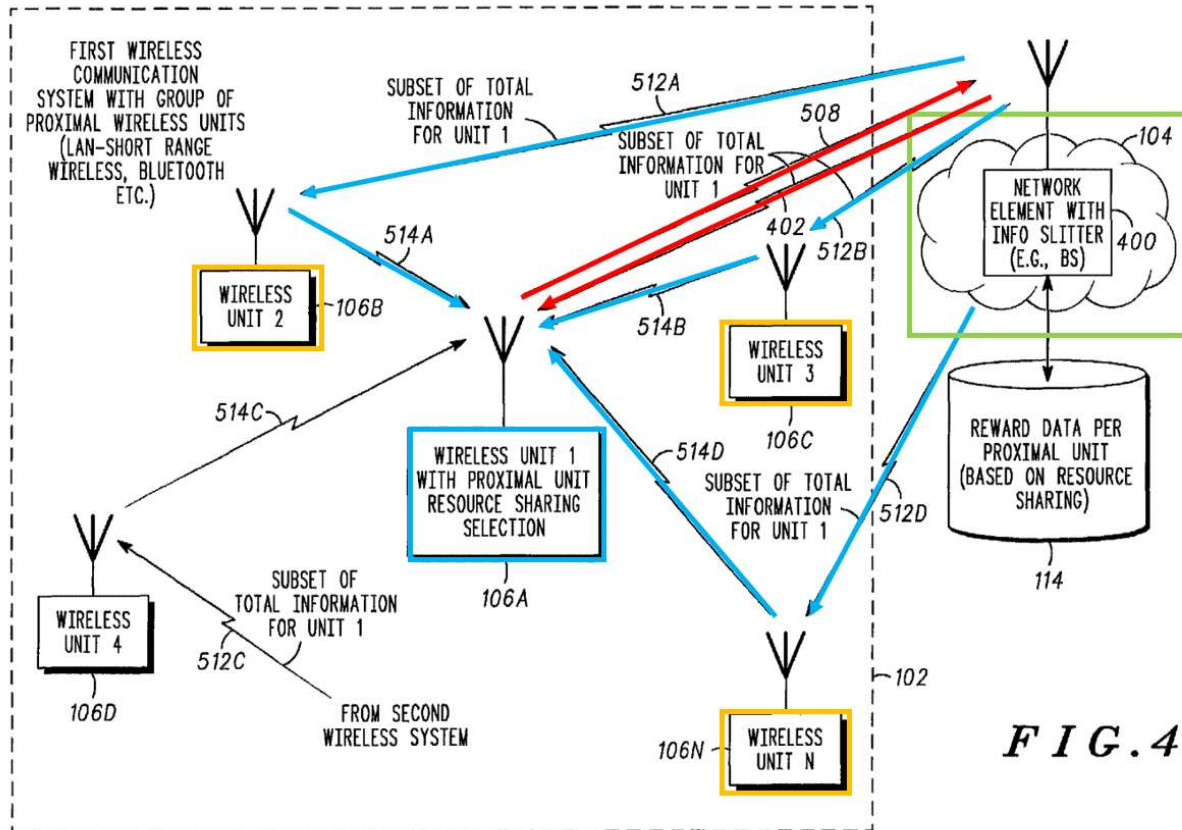
105. In my opinion, Kotzin renders element 13.1.iii obvious. I find it helpful to discuss here the *first* and *second connection* and that they *are capable of receiving data at the same time*.

106. I have annotated Figure 1 below, to highlight that device 106a, the data-requesting device in Kotzin’s system, is connected over a first connection (**red**) to a WAN 104 and is connected over multiple additional connections (**blue**) to multiple wireless units 106 (network-edge devices, **orange**) over LAN 102 (**purple**):



Ex. 1018, Fig. 1. Note that each such wireless unit “includes both a wireless local area network communication transceiver . . . and a wireless wide area network transceiver.” Ex. 1018, ¶ [0022]. Kotzin further explains that the network-edge devices “are operative to communicate using a wireless [LAN] protocol with wireless unit 106a via wireless LAN communication links 107a-107d.” *Id.* “Also as shown, wireless unit 106a is in communication with the wireless [WAN] 104 via link 120.” *Id.*

107. I have annotated Figure 4 below, to show that in the multipath connection established between 106a and the wide area network, the first and second paths are available to simultaneously receive data:



Id., Fig. 4. Kotzin explains that all participating wireless units “receive the portion of the bandwidth of the communication that is destined for the wireless apparatus 106a,” therefore, the complete message can be received “in a period of about ten seconds or less.” *Id.*, ¶¶ [0039]-[0040]. By combining the links’ transmission speeds, the total transmission speed is improved. In my opinion, a POSITA would have

understood that one way of improving transmission speed is using multiple links. Further, the “wireless apparatus 106a itself may also participate in receive a portion of the message destined for it.” *Id.*, ¶ [0039]. A POSITA would have further understood that these transmissions are simultaneous to shorten the amount of time it would take for the data-receiving device 106a to receive all the data and improve the overall throughput which are the goals of Kotzin’s invention. *Id.*, ¶¶ [0006], [0019].

9. Dependent Claim 14

- a. “The method of claim 13, wherein the first connection and the second connection are each a wireless connection, a wired connection or a combination of wired and wireless connections.”*

108. Here, I find it helpful to discuss why the *connection[s]* may be *wireless*, *wired*, or a *combination of* both. Kotzin expressly discloses that its system comprises both a wireless local area network (LAN) and a wireless wide area network (WAN), and that the participating devices are wireless units capable of communication over these networks. For example, Kotzin describes that each of the devices that are able to participate in the connection are expressly wireless units such that the connections are wireless. Specifically, Kotzin states each wireless unit includes “both a wireless local area network communication transceiver... and a wireless wide area network transceiver,” and that these units “are operative to

communicate using a wireless [LAN] protocol with wireless unit 106a via wireless LAN communication links 107a-107d[.]” Ex. 1018, ¶ [0022]. Furthermore, “wireless unit 106a is in communication with the wireless [WAN] 104 via link 120[.]” *Id.* Thus, both the first and second connections can be wireless, as illustrated in Figures 1 and 4 of Kotzin.

109. It would have been obvious to a POSITA to implement any of the connections disclosed by Kotzin as wired, wireless, or a combination of both, given the state of the art at the time. Wired connections, such as Ethernet, were well known and commonly used for LANs, as discussed in Held (Ex. 1020, 168-69), which describes the prevalence of Ethernet and other wired LAN technologies, as well as the importance of flexibility in network design to accommodate both wired and wireless media. Therefore, a POSITA would have found it obvious to substitute a wireless device with a wired device, or to use a combination of wired and wireless connections, without changing the fundamental operation of the system disclosed by Kotzin, as supported by the teachings of Held.

10. Dependent Claim 15

- a. *“The method of claim 13, wherein the data-requesting device is one of a cell phone, a tablet, a switch, a network device, a router, a computer, a Wi-Fi device, a Wi-Max device, a communications device, a mobile communications device, a near-field communications*

device, and a Bluetooth device.”

110. It is my opinion that Kotzin renders claim 15 obvious. I discuss here why the *data-requesting device* is at least one of the various *communications device[s]* recited. Kotzin discloses that wireless units, including unit 106a (data-requesting device) can be one of many wireless units including “an Internet appliance, radiotelephone appliance, including but not limited to, hand held apparatus, laptop computers, desk top computers, or any other suitable wireless communication apparatus.” Ex. 1018, ¶ [0022]. Kotzin further discloses that the device 106a has wireless communication capabilities that may include a “BluetoothTM-based transceiver” and a “CDMA cellular transceiver.” *Id.* As such, a POSITA would find it obvious that the data-requesting device would be one of the recited devices, as each was known in the art, and the disclosed devices consist of at least several of the recited devices. Accordingly, Kotzin renders claim 15 obvious.

11. Dependent Claim 16

- a. “The method of claim 13, wherein the network-edge device comprises one or more routers, modems, cellphones, tablets, computers, cellular towers, wireless towers, base stations, wireless base stations, repeaters, wireless repeaters, Wi-Fi devices, networking devices, hot spot devices, WiMAX devices, LTE devices, GSM devices, consumer electronic devices, an Internet-ready device, a network switch, a network router, a multipath server and a device capable of providing multipath*

services.”

111. I note here only that each of the recited devices in this claim was known in the art as of the '649 Priority Date, and it would have been obvious to a POSITA that any of them would comprise the claimed data-requesting device, including for the reasons discussed above with respect to Claim 15.

12. Dependent Claim 17

- a. “The method of claim 13, wherein the data-requesting device is capable of connecting to another network device which is capable of joining the multipath connection, and further comprising the data-requesting device receiving data from the another network device after the another network device joins the multipath connection.”*

112. In my opinion, Kotzin renders claim 17 obvious. I find it helpful to discuss here the *connecting to another network device which is capable of joining the multipath connection*.

113. As I explained with respect to claim 13, Kotzin discloses that device 106a (data-requesting device) connects to a plurality of additional wireless units 106b-n (network-edge devices). Indeed, Kotzin discloses that data is sent to network-edge wireless units 106 during the multipath connection, and that this data is routed through the network-edge devices to device 106a (wireless unit 1). Ex. 1018, ¶¶ [0039]-[0040]; *see also* Figs. 4-6.

13. Independent Claim 18

- a. *[18.1] at least one interface capable of connecting concurrently to a plurality of network-edge devices during a multipath connection, the multipath connection comprising the connections between the data-requesting device and each of the network-edge devices; and*

114. In my opinion, Kotzin renders element 18.1 obvious. It is helpful to discuss here the *connecting concurrently to a plurality* of devices.

115. As I explained with respect to claim 13, during a multipath connection, device 106a (data-requesting device) can simultaneously connect to multiple network-edge devices 106b-n. The multipath connection connects wireless unit 106a to each network-edge device. Kotzin discloses that this connection may be concurrent: it describes using a wireless air interface, such as “Blue Tooth, 802.11, Hiperlan, etc.,” with a “common air interface ... [that] can simultaneously provide a connection to a wide area network and other local subscriber units.” Ex. 1018, ¶ [0003].

- b. *[18.3] sends multipath information to each of the network-edge devices that is capable of joining the multipath connection; and*

116. In my opinion, Kotzin renders element 18.3 obvious. It is useful here to discuss the *send[ing of] multipath information*.

117. Kotzin discloses that the wireless unit 106a (data-requesting device) requests data from network 104 via network element 400 (data-source device). *See*

Ex. 1018, ¶ [0037]. The wireless unit 106a then sends queries 500 and 504 to wireless units 106b-n (network-edge devices) which are in proximity to device 106a, followed by query 510. *Id.*, ¶ [0037]. I have highlighted this process in Figure 5 below:

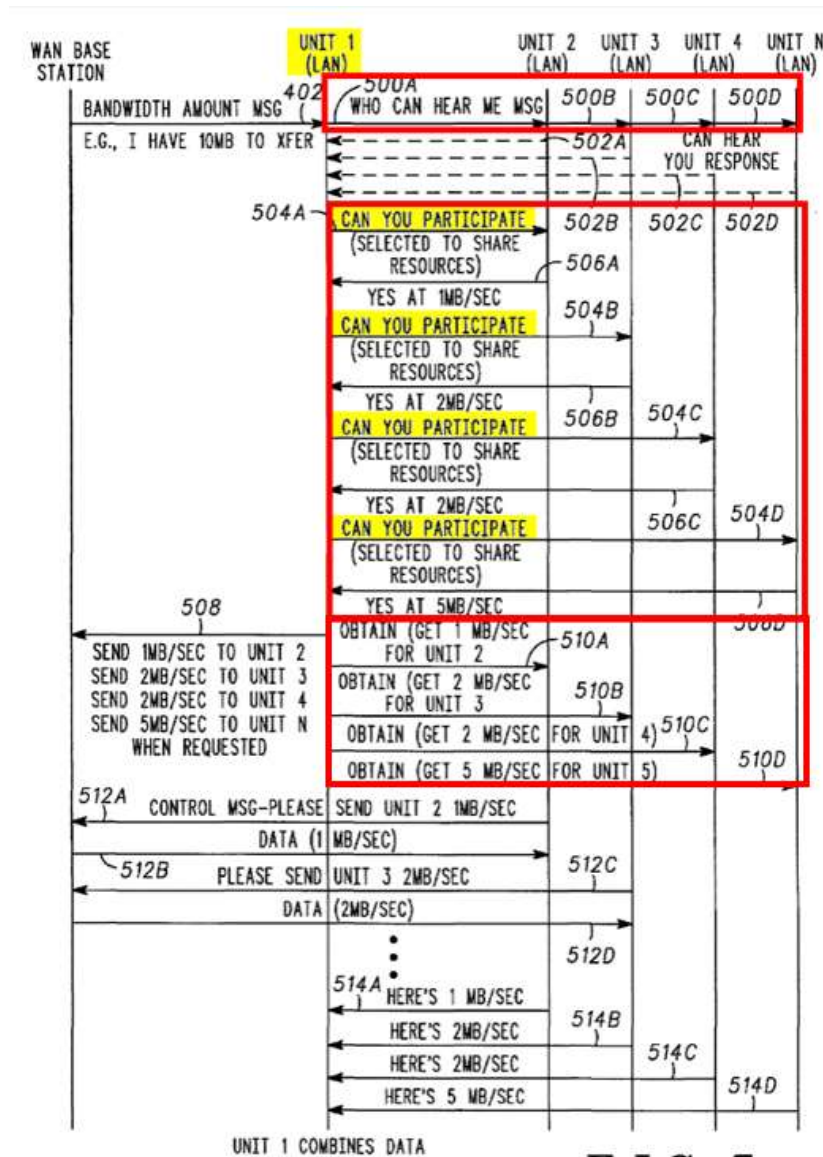


FIG. 5

Id., Fig. 5. For example, as illustrated by Figure 5, unit 1 (106a; data-requesting device) sends a query to unit 2 (network edge device) requesting participation in the communication (“can you participate”). *Id.* If a device has been designated as a device that will share resources, it responds confirming that it will allow shared use of its resources (“yes”). *Id.* It further “indicate[s] the amount of wireless resources that [it is] willing to allocate to this particular communication or session” (“. . . at 1 Mb/sec”). *Id.*, ¶ [0038], Fig. 5.

118. Based on my expertise, it is my opinion that it would have been obvious to a POSITA that message 500 sent by device 106a to identify the proximal units, message 504 sent by the device to determine which units can share bandwidth, and message 510 including the amounts of bandwidth would have included multipath information. The multipath information relates to a particular transmission between device 106a and network element 400 and is required to carry out the transmission over multiple paths. Furthermore, the 500, 504, and 510 messages are sent to devices 106b-n that have not yet joined the multipath connection, but are capable of doing so. *Id.*

14. Independent Claim 21

- a. *[21.1] a data-requesting device sending first multipath control information to or through a first network-edge device, the first multipath control information indicates that the first network-edge device will join the multipath*

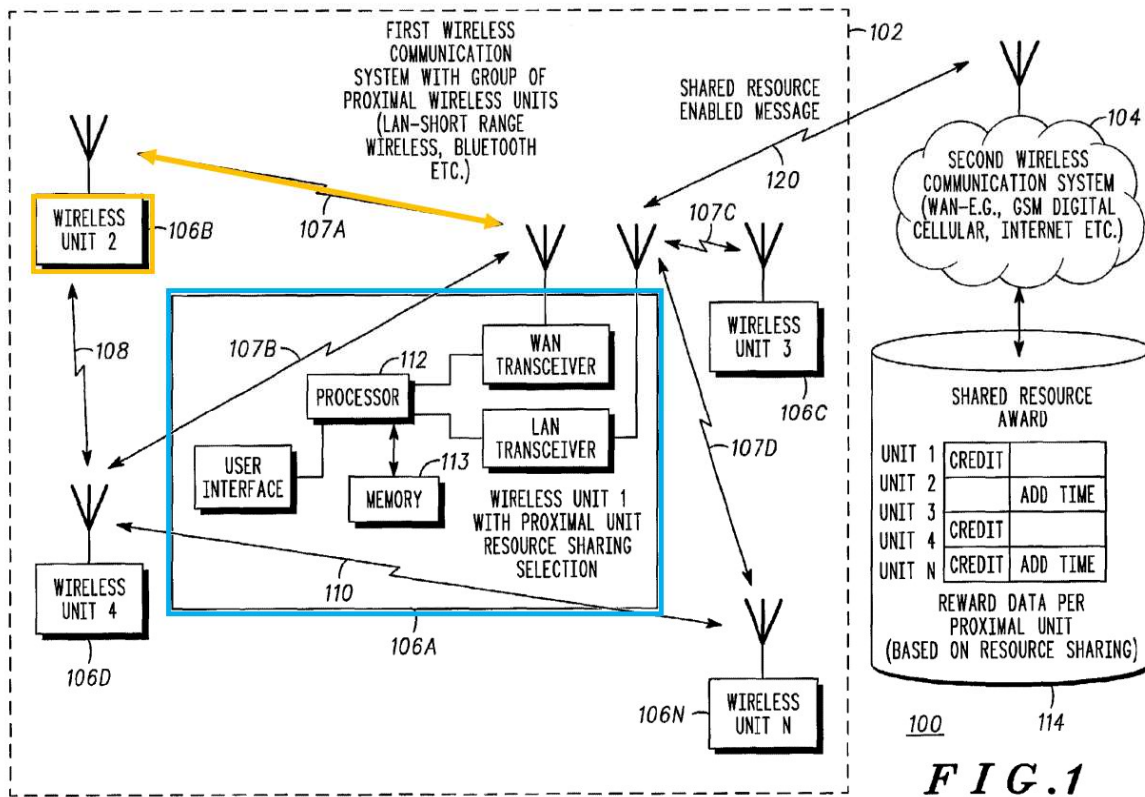
connection, the data-requesting device being connected over a first connection to the first network-edge device:

119. In my opinion, Kotzin renders element 21.1 obvious. I feel it is helpful here to discuss the *sending first multipath control information* and that the *information indicates that the first network-edge device will join the multipath connection*. Kotzin discloses that device 106a (data-requesting device) sends “a partial bandwidth request indicating an amount of data to be received by a party from the wide area network [data-source device].” Ex. 1018, ¶ [0040]. Then, “[i]n response thereto, each of the proximal wireless units [network-edge devices] communicates via a control message or any other suitable scheme, with the wide area network to receive the portion of the bandwidth of the communication that is destined for the wireless apparatus 106a.” *Id.* In my opinion, it would have been obvious to a POSITA that each wireless unit 106b-n (network-edge device), would first receive the control information from the wireless unit 106a before it would send a message with control information to the wide area network to receive data from network element 400.

120. Kotzin further explains that when devices 106b-n receive message 510, they join the multipath connection, as they “communicate[] with the wide area network to receive the portion of the bandwidth. . .” and “each of the participating

wireless units 106b-106n receive portions of a communication destined for the wireless apparatus 106a.” See Ex. 1018, ¶ [0040], see also Fig. 5.

121. Finally, as illustrated by the annotated Figure 1 below, the data-requesting device 106a (blue) is connected to network-edge device 106b (orange) via a first connection (107A) (orange):

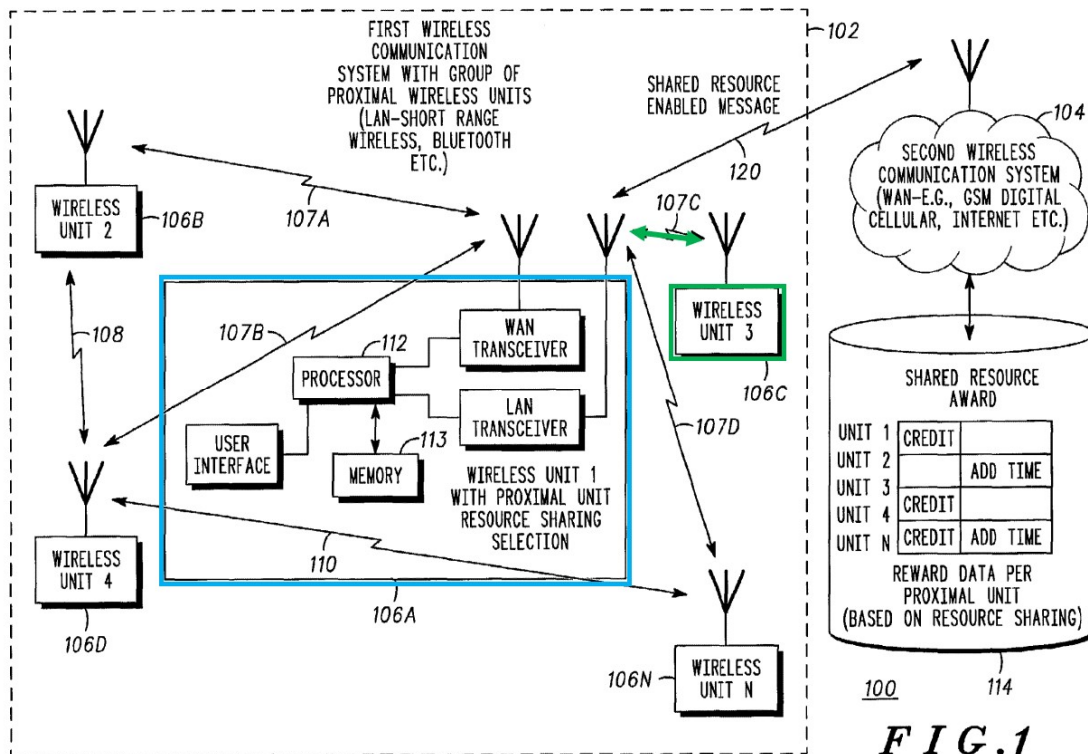


Ex. 1018, Fig. 1. Accordingly, Kotzin renders this element obvious.

- b. [21.2] the data-requesting device sending a second multipath control information to or through a second network-edge device, the second multipath control information indicates that the second network-edge device will join the multipath connection, the data-requesting

device being connected over a second connection to the second network-edge device, the data-requesting device capable of receiving different data over the first connection and the second connection at the same time; and

122. In my opinion, Kotzin discloses element 21.2. I find it helpful to display here the relevance of Kotzin's figures to the limitation. As explained above for element 21.1, Kotzin discloses a device that sends multipath control information to network-edge devices 106b-n. See § IX.A.14.a. Moreover, as illustrated by the annotated Figure 1 below, the data-requesting device 106a (blue) is connected to a second network-edge device 106c (green) via a second connection (107C) (green):



Ex. 1018, Fig. 1. Accordingly, Kotzin discloses this element.

- c. *[21.3] after the first network-edge device joins the multipath connection, the data-requesting device receiving first data over the first connection from the first network-edge device; and after the second network-edge device joins the multipath connection, receiving second data at the data-requesting device over the second path from the second network edge device.”*

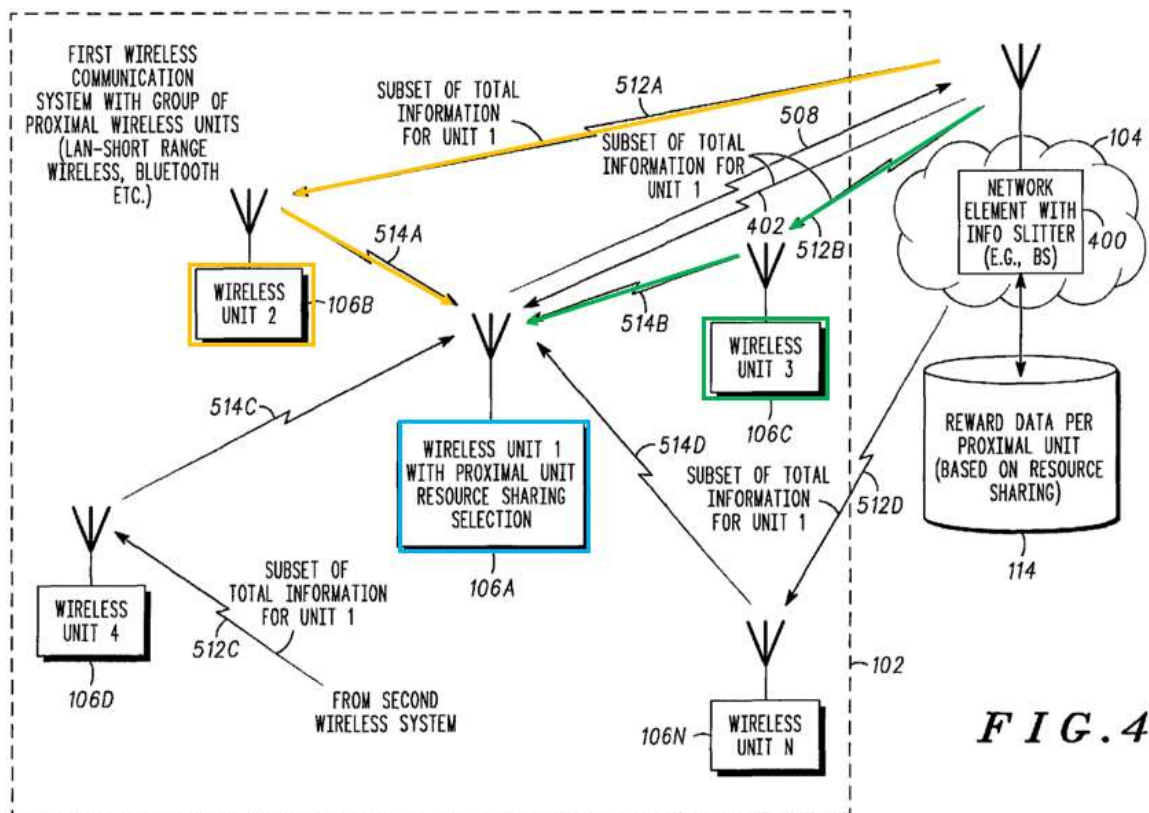
123. In my opinion, Kotzin renders element 21.3 obvious. I find it helpful to discuss here receiving *first and second data* over the *first and second connection* from the *first and second network-edge devices*.

124. As I explained above with respect to elements 21.1 and 21.2, Kotzin discloses that the first and second network-edge devices join the multipath connection. *See* §§ IX.A.14.a, IX.A.14.b.

125. In my opinion, Kotzin discloses the data-requesting device receiving *first and second data* over the first and second connection *from the first and second network-edge devices*. As I explained with respect to element 1.2, Kotzin discloses that after the devices 106b-n are joined to the connection, each device 106b-n receives a portion of the total data from network element 400 on the wide area network (data-source device). *See* § IX.A.1.b. Kotzin further explains that when devices 106b-n receive data from the wide area network, “each of the units then

retransmits the respective portions of the communication to the wireless apparatus 106a [data-requesting device].” Ex. 1018, ¶ [0040], Fig. 4 (messages 514).

126. Further, Kotzin discloses the data-requesting device receiving first and second data over ***the first and second connection*** from the first and second network-edge devices. As shown by the annotated Figure 4 below, unit 2 (106b; first network-edge device) transmits data over the first connection (blue) and unit 3 (106c; second network-edge device) transmits data over the second connection (green):



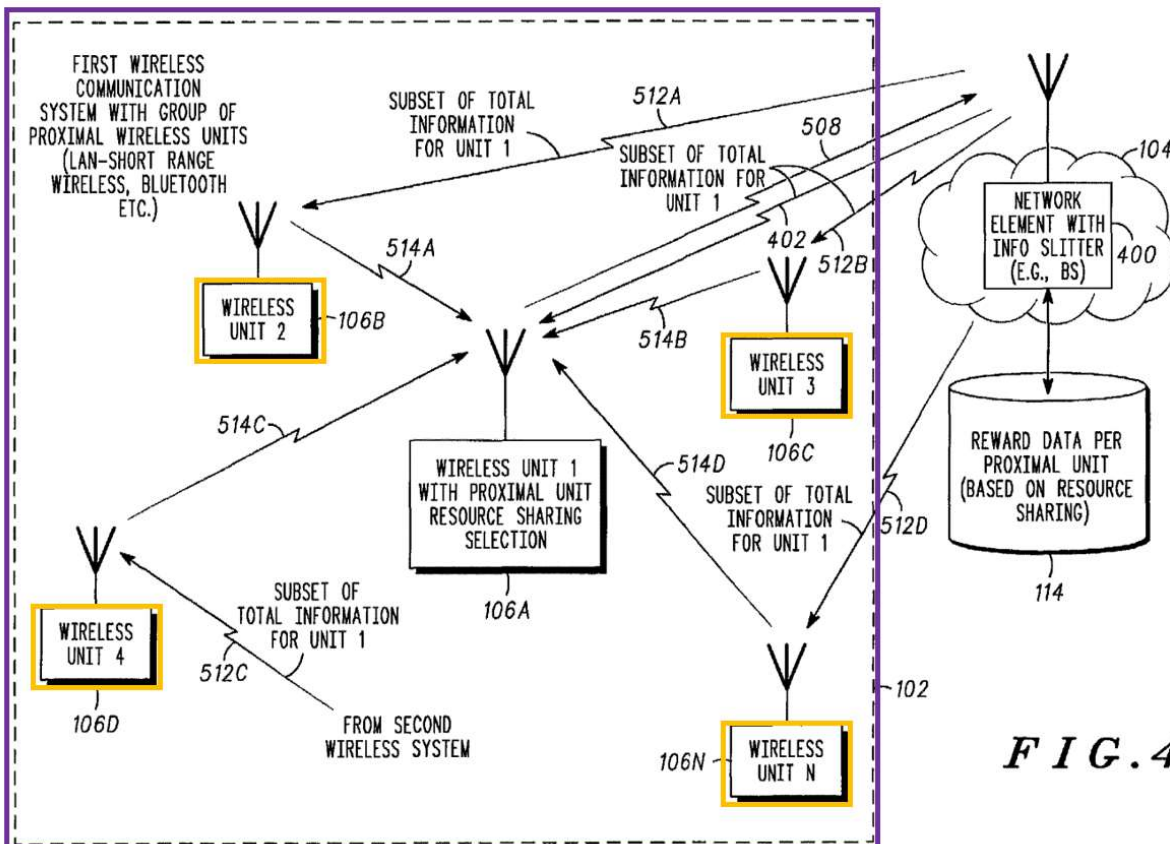
Id., Fig. 4. Accordingly, Kotzin renders element 21.3 obvious.

15. Dependent Claim 22

- a. “The method as in claim 21, wherein the first network-edge device is connected to a network, and wherein the second network-edge device is connected to the network or a different network.”*

127. It is my opinion that Kotzin renders claim 22 obvious. I find it helpful to discuss the connections of the network=edge devices to *network(s)*. Kotzin discloses that each wireless unit (network-edge device) is connected to the same local area network. As Kotzin explains, “In response to receiving the data indicating the amount of data to be sent via the wide area network, the wireless apparatus 106a carries out local communication via the wireless short range communication system[.] . . . wireless apparatus 106a [data-requesting device] sends query messages . . . to determine which proximal wireless units in the LAN can hear the query message.” Ex. 1018, ¶ [0037]. This is further illustrated by Figure 4 below, which I have annotated (in purple) to show that devices 106b-n are in the same local area network communication system 102. *See also id.*, ¶ [0022] (communication system 100 “includes a wireless local area network (LAN) communication system 102, such as a short range wireless communication system compliant, for example, with the Bluetooth™ standard, or any other suitable short range communication protocol including, but not limited to, 802.11 or optical communication protocols. . . . wireless units 106b-106n are operative to communicate using a wireless local area network

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Id., Fig. 4, ¶ [0035] (“other proximal units within the short range local area network 102 will receive portions of the communication on behalf of the destination wireless apparatus 106a.”). Further, as illustrated by the annotated Figure 4 below, at least devices 106b, 106c, and 106n are also connected to the same network 104:

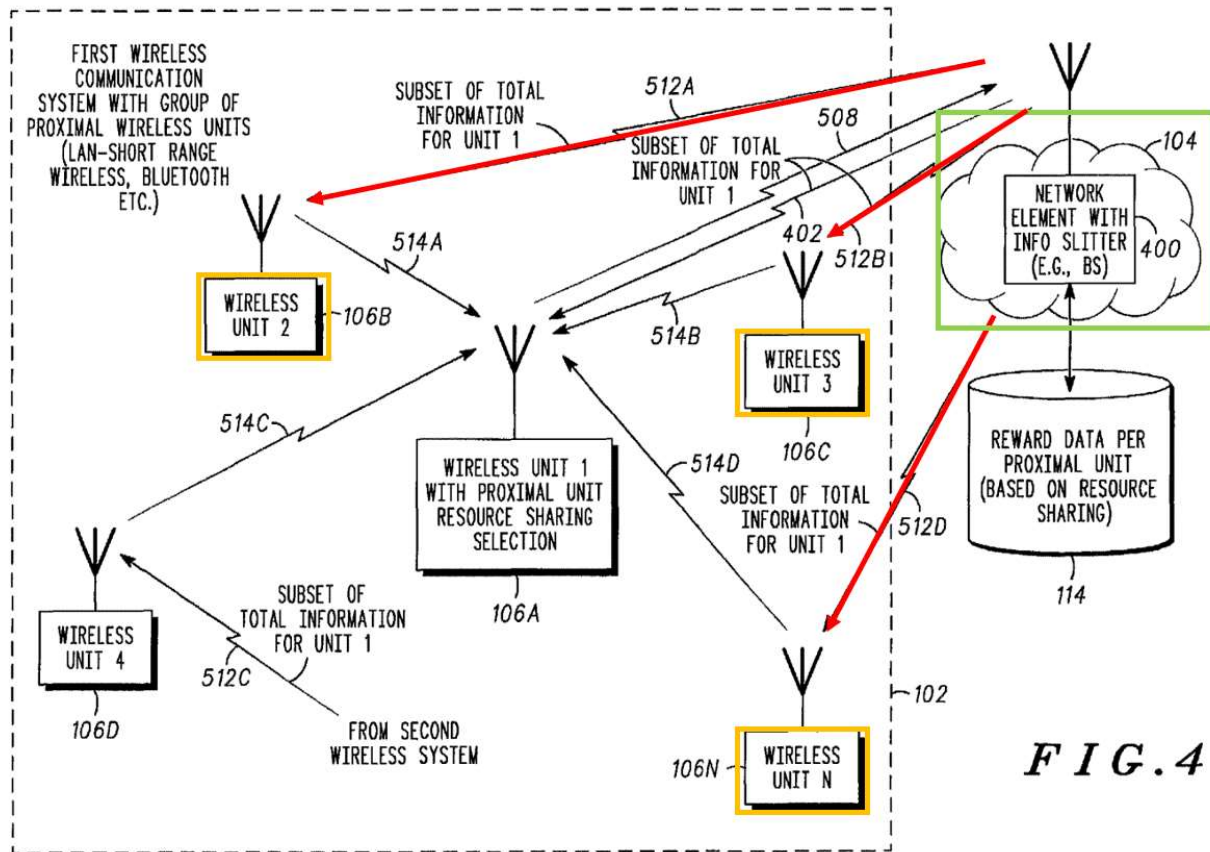
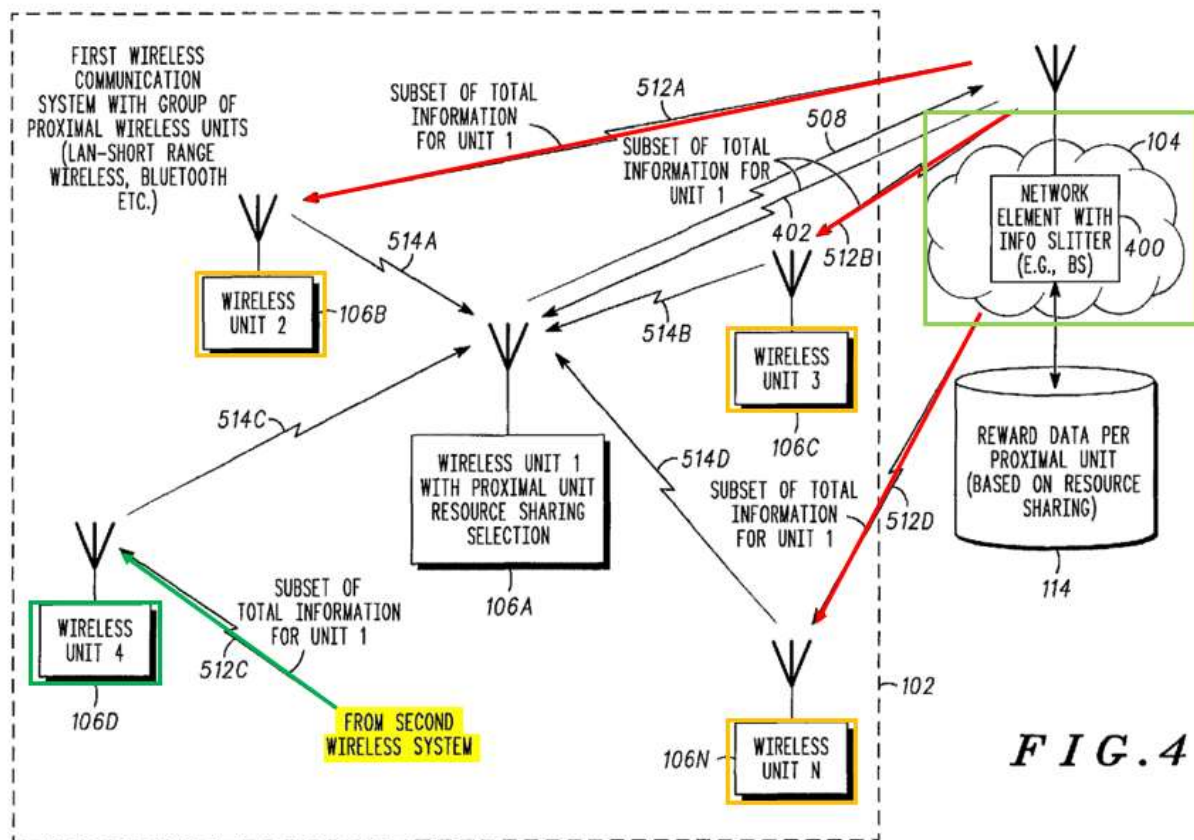


FIG. 4

Id., Fig. 4, ¶¶ [0035] (“For example, if wireless apparatus 106a decides that it wants to download a very large file from the WAN 104, the information destined for the wireless apparatus 106a is distributed among the independent members of the aggregated group,” *i.e.*, distributed from WAN 104 to members 106n which are connected to WAN 104.); [0022] (“Each of the wireless units communicates in a peer-to-peer arrangement with each other using the wireless local area network communication transceivers, but also communicates individually with the wireless wide area network communication system 104.”). Accordingly, Kotzin discloses this limitation.

128. It is further my opinion that Kotzin discloses a second network-edge device connected to a second network. As shown in Figure 4, which I have annotated below, wireless unit 4, or unit 106D, receives a subset of the total information for unit 1, or unit 106A, from a second wireless system.



Accordingly, Kotzin also discloses a second device connected to a different network.

B. Ground IIA and IIB: Claims 1-23 are Obvious in View of Phatak, or in the Alternative, Phatak in Combination With Held

129. I do not explain every aspect or every claim limitation of Phatak and Held below. I have read and agree with the mapping of that prior art to the claim

limitations provided in the Petition. However, to the extent that I believe context from the perspective of a POSITA is helpful, I discuss the '649 patent and the prior art. Further, I provide my rationale why I believe Phatak renders claims 1–23 obvious alone or in view of Held.

130. As discussed in detail below, it is my opinion that Kotzin alone (Ground IIA) discloses or at least renders the Challenged Claims obvious. It is also my opinion that a POSITA would have been motivated to combine Phatak with Held (Ground IIB), rendering the Challenged Claims obvious.

1. Independent Claim 1

- a. [1.1] a data-source device receiving multipath information about each of a plurality of network-edge devices that is capable of joining a multipath connection with a data-requesting device, each of the network-edge devices being connected to one or more networks, and each of the network-edge devices being connected to the data requesting device over a different connection; and*

131. In my opinion, Phatak discloses or renders element 1.1 obvious.

- i. a data-source device receiving multipath information about each of a plurality of network-edge devices that is capable of joining a multipath connection with a data-requesting device*

132. In my opinion, Phatak discloses or renders element 1.1.i obvious. I find it helpful to discuss here how the *data-source device* is present, *capable of joining a multipath connection with a data-requesting device*, and receives *multipath*

information. Host A is aware of a plurality of interfaces connecting to network-edge devices capable of joining the multipath connection, as well as the relevant properties of those interfaces such as bandwidth and latency. *See* Ex. 1045, 774-776 (Section II). Given the presence of these interfaces, in my opinion, a POSITA would have found obvious that the interfaces (*e.g.*, local interfaces including 802.11 LAN, Bluetooth, and cellular modems) use network-edge devices (*e.g.*, a Wi-Fi access point, Bluetooth gateway, or cellular base station, respectively) to connect to the Internet. The interfaces would require such network-edge devices in order to connect to the Internet, thereby joining the multipath connection. The bandwidth aggregation methods described by Phatak—requiring a connection to the data-requesting device—would obviously not work without such network-edge devices.

133. Phatak discloses that each host receives IP addresses (multipath information) about the individual interfaces of the other host. Ex. 1045, 775 (“The first issue is how to ***make [Hosts] A and B aware of any multiple IP addresses the other may have***. To accomplish this, IP and/or TCP headers and their processing would have to be modified. This is similar to the solution in SCTP which allows initialization chunks to ***list multiple addresses***. While such modifications would interfere with interoperability and typically break ‘something else’, we believe that using some more of the full header length allowed (by TCP, IPv4 and IPv6) and

employing some of the unused fields is a fairly transparent solution.”) In my opinion, it would be obvious to a POSITA that these IP addresses are “multipath information” because they inform each host of the possible paths to transmit data over the multipath connection. It would be obvious to a POSITA that because each IP address corresponds to an interface and because each interface has a corresponding network-edge device (as noted above), the multipath information is also *about* the corresponding network-edge devices. The multipath information is disclosed to be transmitted and received via including lists of available interfaces (*i.e.*, IP addresses) in protocol headers. Ex. 1045, 775. It would be obvious to a POSITA that the hosts can only coordinate the use of available interfaces with this information, and can likewise only accomplish Phatak’s bandwidth aggregation goals using the same.

2. Dependent Claim 2

- a. “The method of claim 1, wherein the multipath information includes a connection ID that is generated by one of the data-source device, one of the plurality of network-edge devices, the data-requesting device and a network device.”*

134. In my opinion, Phatak renders claim 2 obvious. I find it helpful to discuss here the *connection ID*.

135. Phatak discloses using session-identifying information to manage data flows for a multipath session, such as IP addresses, header fields, tunneling, and

possibly protocol extensions. Ex. 1045, 774-776 (Section II). Phatak uses IP-in-IP tunneling to encapsulate a TCP/IP packet inside another IP packet, where the inner packet includes the TCP/IP 5-tuple, as all TCP/IP packets do. Ex. 1045, 775. Note that the 5-tuple is obviously unique to a specific communication session, as stated by Phatak. Ex. 1045, 775 (“When the packet reaches its destination, *B*, it is not recognized as belonging to an established connection since a TCP connection is uniquely identified by the tuple (source IP address, source port, destination IP address, destination port.).”) A POSITA would understand these to be four of the five parts of the classic TCP/IP tuple, and that the fifth part is used to identify the protocol. The IP-in-IP packet is therefore a connection ID containing the multipath information and addresses related to the data-requesting interfaces, and this information is used to correctly associate the given data with a multipath session. A POSITA would further find it obvious that the connection IDs discussed herein are “generated by” one of the claim’s listed devices, as in the context of Phatak, a POSITA would find it obvious that the data-source device can initiate the use of IP addresses, header fields, tunneling, and protocol extensions. In particular, the tuple would be created at Host B’s initial request.

3. Dependent Claim 3

- a. [3.1] “the data-source device receiving second multipath information about a second network-edge device that is*

capable of joining the multipath connection; and”

136. In my opinion, Phatak renders element 3.1 obvious. I find it helpful to discuss the number of interfaces in Phatak and how that indicates a *second network-edge device*. Phatak discloses more than one network-edge device on the multipath connection. Ex. 1045, 773, Fig. 1. In my opinion, a POSITA would thus find it obvious that the data-source device will receive new multipath information about an additional network-edge device available for the connection, and will use the multipath information to join the additional device to the multipath connection.

4. Dependent Claim 4

a. [4.1] *“the data-source device receiving multipath information about which network-edge devices are to be removed from the multipath connection; and”*

137. In my opinion, Phatak discloses element 4.1. I find it helpful to discuss the addition and dropping of devices in Phatak, as in claim 3. Phatak discusses rerouting packets on the multipath connection (“If the route through an interface becomes congested packets can simply be sent through an alternate interface.”), which a POSITA would find obvious to include adding and removing interfaces. Ex. 1045, 774. In other words, a POSITA would have found obvious that given this disclosure, the data-source host receives multipath information about the status of each participating network-edge device, and uses it to remove the relevant (suboptimal) network-edge devices.

5. Dependent Claim 5

- a. *“The method of claim 1, further comprising at least one of the data-source device, the network-edge devices and the data-requesting device determining which of the network-edge devices are to be removed from the multipath connection.”*

138. In my opinion, Phatak renders claim 5 obvious. I find it helpful to discuss the *remov[al]* of device from the connection.

139. Phatak describes how various devices can determine whether network-edge devices will be removed from the multipath connection. Here, I only note Phatak’s discussion of network-edge devices determining their own participation. Phatak states that a network-edge device may be unwilling to participate in the connection and therefore opt out, increasing reliability when “for example *if one interface goes down* or one network is congested the end-to-end connection is not interrupted.” Ex. 1045, 773. In my opinion, a POSITA would find it obvious that the phrase “if one interface goes down”—which, in some cases, could be caused by the network-edge device itself ‘going down,’ or becoming unavailable—encompasses scenarios in which the network-edge device removes itself from the connection.

6. Dependent Claim 6

- a. *“The method of claim 1, wherein the data-source device is one of a multipath link aggregator, a network relay, a multipath link server, a server, a network switch, a network router and a device capable of providing*

multipath services.”

140. In my opinion, Phatak renders claim 6 obvious. I find it helpful to discuss why Phatak’s *data-source device* is one of the recited devices. Phatak describes the multipath connection as splitting at nodes called ‘network interfaces,’ and further notes that in the future, “multiple network transport mechanisms will become available to hosts.” Ex. 1045, 773. As such, in my opinion, a POSITA would find it obvious that the data-source device is at least a network router. A POSITA would likewise find it obvious that the data-source device is at least a device capable of providing multipath services. Because the additional listed devices were known in the art, it would similarly be obvious to a POSITA for the host to be a multipath link aggregator, a network relay, a multipath link server, a server, or a network switch.

7. Independent Claim 7

- a. [7.1] *“the data-source device receiving multipath connection requests from a plurality of data-requesting devices, each of the multipath connection requests involving a particular multipath connection to a data-requesting device;”*

141. In my opinion, Phatak renders element 7.1 obvious. Phatak notes that in the case that the data stream is “split into multiple streams at the application level,” “the application would open multiple connections across different network interfaces and be responsible for splitting the data stream at the server and merging

it properly at the client.” A POSITA would find it obvious that a server offers its services to multiple clients, and when the data-source device is a server, it would be obvious to a POSITA to use multiple multipath connections to multiple clients (data-requesting Hosts B, C, D, etc.). Ex. 1058, 9. (“A server is an application that offers a service to internet users; a client is a requester of a service. An application consists of both a server and a client part, which can run on the same or on different systems. Users usually invoke the client part of the application, which builds a request for a particular service and sends it to the server part of the application using TCP/IP as a transport vehicle. The server is a program that receives a request, performs the required service and sends back the results in a reply. A server can usually deal with multiple requests and multiple requesting clients at the same time.”)

142. Further, the solution described in Phatak is transparent to the transport and higher layers. *See* Ex. 1045, 773 (Abstract). As such, it would be obvious to a POSITA that the multipath connection appears to the transport layer to be a series of normal connections, and that it is possible to establish multiple connections to different hosts simultaneously, as with ordinary connections over the transport layer.

b. [7.2] “the data-source device associating a connection ID to each multipath connection request;”

143. In my opinion, Phatak discloses element 7.2. Phatak discusses managing multipath connection flows; in particular, it discusses the problem of

tunneling a TCP connection without identifying the connection using headers on the encapsulating packet. Ex. 1045, 775 (“Typically, the source address of a packet is the address associated with the interface through which it is sent out. ... When the packet reaches its destination, B, it is not recognized as belonging to an established connection since a TCP connection is uniquely identified by the tuple (source IP address, source port, destination IP address, destination port). ... To keep B from unnecessarily dropping these otherwise valid packets, suppose the source address $\text{Addr}(A_1)$ is inserted into packets sent out through A_2 . As a side effect, these packets now appear spoofed to intermediate routers. ... Therefore packets sent through A_2 still do not reach the destination application at B. ... The first issue is how to make A and B aware of any multiple IP addresses the other may have. ... This is similar to the solution in SCTP which allows initialization chunks to list multiple addresses.”). In my opinion, it would be obvious to a POSITA that managing the multipath connection would thus need an identifier to assign packets to logical connections by, *e.g.*, the TCP/IP 5-tuple included in the inner encapsulated packet disclosed by Phatak. *Id.* It would have further been obvious to a POSITA to use the TCP/IP 5-tuple as a connection ID given that Phatak’s solution is transparent at the transport layer. Ex. 1045, 773. Finally, it would be obvious to a POSITA that *each* request would have its own related tuple as an identifier.

- c. [7.4] *“the data-source device notifying each of the network-edge devices that is participating in the particular multipath connection associated with the particular connection ID; and”*

144. In my opinion, Phatak renders element 7.4 obvious. I find it helpful to discuss here the *notifying* of the *network-edge devices*. Phatak discloses the use of TCP in the multipath connection. Ex. 1045, 774 (“Since TCP is used more predominantly than UDP from inter-LAN communication, we illustrate our method for TCP[.]”). It would be obvious to a POSITA that TCP requires a handshake protocol with a connection notification to enable servers to interface. When Phatak uses IP-in-IP, a POSITA would still find it obvious that there would be an understanding between sender and receiver consisting of basic information about the connection. It would thus similarly be obvious to a POSITA to notify the receiving network-edge devices of their roles in the multipath connection when the tunneling solution mentioned in Phatak is used. In the same circumstance, the POSITA would find it obvious that these devices are notified when data is delivered, stripped, accepted, and/or rerouted.

- d. [7.5] *“the data-source device sending data associated with the particular connection ID to the network-edge devices participating in the particular multipath*

connection associated with the particular connection ID.”

145. In my opinion, Phatak renders [7.5] obvious. Here, I find it helpful only to note that transmission protocols were known in the art as of the Priority Date of the '649 patent, and that they operated such that data would be associated with the correct logical connection when received. Phatak confirms as much. Ex. 1045, 775 (“When the packet reaches its destination, B, it is not recognized as belonging to an established connection since a TCP connection is uniquely identified by the tuple (source IP address, source port, destination IP address, destination port).”); 774 (“If the route through an interface becomes congested packets can simply be sent through an alternate interface.”)

8. Dependent Claim 10

- a. “The method of claim 7, further comprising the data-source device notifying the data-requesting device when all data has been sent over the particular multilink connection.”*

146. In my opinion, Phatak renders claim 10 obvious. I find it helpful to discuss the *notifying of the data-requesting device when all data has been sent*. As noted above, a POSITA would find it obvious that TCP manages sessions and uses a handshake protocol to notify receiving interfaces that all data has been sent, for example using the FIN flag. It would be obvious to a POSITA that there must

similarly be an understanding that all data has been sent when TCP is not used as the outer protocol, for example when the protocol IP-in-IP is used for tunneling.

i. Held

147. Although Phatak alone (Ground IIA) renders this claim obvious, a POSITA would have been motivated to combine Phatak with Held (Ground IIB) to incorporate into Phatak's system a notification that all data has been sent.

148. First, in my opinion, a POSITA would have understood that Phatak and Held are in the same field of endeavor and are directed to the same problem, namely, optimizing the communication range of wireless resources for enhanced information throughput. Phatak's method is proposed for bandwidth aggregation "to obtain higher overall bandwidth" since "wireless bandwidth is likely to remain a scarce resource" and "mobile hosts will require simultaneous data transfer across multiple IP interfaces." Ex. 1045, 773. At the same time, Held describes the very concept described in Phatak, namely, transmitting data over a network. Held discloses that such Internet communications are based on TCP/IP. Ex. 1020, 142 (describing "the emergence of the Internet, a ubiquitous network of applications *based on the TCP/IP*"). Therefore, Kotzin and Held are in the same field of endeavor and describe various aspects of the same concept: transmitting packets of data to a destination

wireless unit. Both Kotzin and Held disclose techniques or characteristics of techniques that allow a user to achieve efficient data transmission across a network.

149. Second, a POSITA would have understood that both Phatak and Held disclose similar techniques or characteristics of techniques such that integrating Held's teachings on commonly employed protocol families such as TCP and a notification that all data has been sent into Phatak's bandwidth aggregation system was a known technique to improve similar devices [and methods] in the same way and a combination of known prior-art elements according to known methods to yield predictable results. As I explained above, Phatak discloses a bandwidth aggregation system in which a wireless apparatus splits information that is ultimately destined for another wireless apparatus on the network and distributes the split information among other proximal wireless units, and the aggregated bandwidth of these other proximal wireless resources accomplishes the transmission of the complete information to the destination wireless unit. Ex. 1045, 773.

150. Held confirms it would be obvious to a POSITA that data-sending and data-requesting interfaces receive various notifications upon sending and receiving data packets, which a POSITA would have found obvious to include a notification that all data has been sent. Ex. 1020, 654 ("[IP] relies on other protocols within the TCP/IP stack to provide the connection-oriented services. The connection-oriented

services (i.e., TCP) take care of the handshake - the exchange of control information. ... [TCP] contains error detection and correction features. ... TCP uses what is known as a three-way handshake. A handshake is simply the exchange of control information between the two computers. This information enables the computers to determine which packets go where and ensure that all the information in the message has been received. When a connection is desired between two systems, Host A and Host B, using TCP/IP, a three-way handshake must occur.”); *see also* Ex. 1020, 232 (“the frame relay standard has defined two bits for congestion management. These are called the forward explicit congestion notification and backward explicit congestion notification bits. ... The use of the congestion notification bits ripples back through all of the attached frame relay networks to the customer’s attachment point. ... vendors will [likely] simply let users apply the functions of the transport layer to the [congestion management] problem. Therefore, whatever transport layer protocol is used over frame relay (e.g., TCP or OSI TP4), it must be capable of implementing the adaptive behavior described above.”), 270 (“[Routers] notify transmitting end stations when packets are being discarded.”), 272 (IP and VIP enable nondelivery notifications at the network layer).

151. In my opinion, given that Phatak expressly teaches TCP/IP for its solution and Held teaches that the use of TCP/IP is “ubiquitous,” it would have been

obvious to a POSITA that such notifications as those described with reference to TCP's handshake protocol would be integrated. Therefore, in my opinion, a POSITA would have been motivated to implement Held's teachings into Phatak's system in order to achieve effective data transmission over the network.

152. Finally, based on my expertise, implementing Held's teaching of commonly employed protocol families such as TCP and notifications that all data has been sent into Phatak's system would have required only routine experimentation and yield a predictable result—namely, that the bandwidth aggregation system would incorporate fundamental characteristics of TCP, including the handshake protocol necessitating such notifications. In order to do so, a POSITA would not have needed to modify Phatak's bandwidth aggregation configuration, and doing so would have been easily achieved and would have changed neither Phatak's nor Held's functionality. Further, in my opinion, a POSITA would have had a reasonable expectation of success. Phatak references explicitly the protocols discussed by Held, and a POSITA would have had a high likelihood of success in combining Held's related teachings with Phatak's bandwidth aggregation system. Ex. 1045, 774-75.

9. Independent Claim 13

- a. *[13.1] a data-requesting device sending a multipath request to a network-edge device where the multipath*

request indicates that the network-edge device will join a multipath connection associated with the data-requesting device, the data-requesting device being connected over a first connection to a network and over a second connection to the network-edge device, the multipath connection comprising the first connection and the second connection which are capable of receiving data at the same time;

- i. a data-requesting device sending a multipath request to a network-edge device

153. In my opinion, Phatak renders element 13.1.i obvious. I find it helpful to discuss *sending a multipath request*. Phatak describes Host A using Host B's multiple interfaces for a multipath connection. Ex. 1045, 775. It would have been obvious to a POSITA that setting up this connection, including learning the addresses of Host B's interfaces, demonstrates a request to a data-requesting network-edge device.

- ii. where the multipath request indicates that the network-edge device will join a multipath connection associated with the data-requesting device,

154. In my opinion, Phatak renders element 13.1.ii obvious. I find it helpful to discuss why *the network-edge device will join* in this circumstance. The network-edge device and the data-requesting device coordinate with each other to use multiple paths, including a request as discussed above, and a POSITA would have thus found it obvious that the network-edge device will join a multipath connection associated with the data-requesting device.

- iii. the data-requesting device being connected over a first connection to a network and over a second connection to the network-edge device, the multipath connection comprising the first connection and the second connection which are capable of receiving data at the same time;

155. In my opinion, Phatak discloses element 13.1.iii. I find it helpful to note the use of multiple *connection[s] at the same time*. As illustrated in Phatak's Fig. 1, Host has a first connection to a network through B1 and a second connection to a data-requesting network-edge device through B2. *See* Ex. 1045, 773, Fig. 1. Additionally, Phatak describes the data-requesting device and the network-edge device using multiple connections for a single data flow, and this use being simultaneous. Ex. 1045, 773 (describing how, *inter alia*, "this paper investigates the ***simultaneous use*** of multiple network interfaces to enhance the overall bandwidth available to a wireless node"). Therefore, a POSITA would find it obvious that the first and second connections 'are capable of receiving data at the same time.'

- b. [13.2] *the data-requesting device receiving first data over the first connection from the network; and*

156. Here, I find it helpful to note the *receiving [of] first data over the first connection*. Phatak discloses that the first connection described above enables the data-requesting device to receive first data over the first connection. Specifically, in the proposed architecture, Host B (the data-requesting device) is capable of receiving

data via multiple interfaces, each corresponding to a distinct network path. As illustrated in Figure 1 of Phatak, Host B receives data over interface B1, which is connected to a particular network-edge device or access point. Ex. 1045, Fig. 1, 773. The mechanism for data transfer across these interfaces is further detailed in Section II, where Phatak describes the use of IP-in-IP tunneling and the management of multiple IP addresses to facilitate simultaneous data reception over independent links. Ex. 1045, 774–776.

- c. [13.3] “*after the network-edge device joins the multipath connection, the data-requesting device receiving second data over the second connection from the network-edge device.*”

157. Here, I find it helpful to note how Phatak extends to *receiving second data over the second connection*. After the network-edge device joins the multipath connection, Phatak further discloses that the data-requesting device receives additional (second) data over the second connection from the newly joined network-edge device. The architecture supports concurrent data flows across multiple interfaces, allowing Host B to aggregate bandwidth and improve throughput by receiving data over both the first and second connections simultaneously. Ex. 1045, Abstract, 773. The experimental results presented in Section IV validate that the system can effectively stripe data across multiple links, with Host B receiving

segments of the data stream over each active interface, thereby demonstrating the feasibility and performance benefits of multipath data reception. Ex. 1045, 780–781.

10. Dependent Claim 16

- a. “The method of claim 13, wherein the network-edge device comprises one or more routers, modems, cellphones, tablets, computers, cellular towers, wireless towers, base stations, wireless base stations, repeaters, wireless repeaters, Wi-Fi devices, networking devices, hot spot devices, WiMAX devices, LTE devices, GSM devices, consumer electronic devices, an Internet-ready device, a network Switch, a network router, a multipath server and a device capable of providing multipath services.”*

158. In my opinion, Phatak further renders claim 16 obvious. I find it helpful to note here only why the recited devices, such as *base stations* and *Wi-Fi devices*, are disclosed by Phatak. As noted above with respect to claim 1, the network-edge devices disclosed in Phatak are at least a Wi-Fi access point, a Bluetooth gateway, or a cellular base station. It would therefore be obvious to a POSITA that these network-edge devices are among the devices listed in claim 16, namely, at least “base stations” and “Wi-Fi devices.”

11. Independent Claim 18

- a. [18.1] at least one interface capable of connecting concurrently to a plurality of network-edge devices during a multipath connection, the multipath connection comprising the connections between the data-requesting*

device and each of the network-edge devices; and

159. In my opinion, Phatak discloses element 18.1. I find it helpful to discuss here why *a plurality of* devices are used. Phatak discloses that multiple network interfaces can be used simultaneously such that data can be received concurrently over multiple devices. Ex. 1045, 773 (Abstract, stating “multiple network conduits will be available to mobile as well as static hosts (for instance, wired connections, 802.11 style LANs, Bluetooth, cellular phone modems, etc). ... we foresee scenarios wherein mobile hosts will require simultaneous data transfer across multiple IP interfaces to obtain higher overall bandwidth.”). It would be obvious to a POSITA that when concurrently using multiple devices/paths to receive data, the data-requesting device would concurrently connect to a plurality of network-edge devices.

b. [18.2] at least one processor coupled to the at least one interface that

160. In my opinion, Phatak renders element 18.2 obvious. I discuss here only the use of a *processor*. Phatak discloses multiple ways for the endpoints of the multipath connection to be aware of each other’s interfaces and IP addresses to enable to multipath connection, such as header modifications, tunneling, and address exchange. Ex. 1045, 775. A POSITA would find it obvious that such tasks would

require a processor, including because Phatak discusses processing overhead caused by tunnelling and headers. *See id.*

12. Independent Claim 21

- a. [21.1] a data-requesting device sending first multipath control information to or through a first network-edge device, the first multipath control information indicates that the first network-edge device will join the multipath connection, the data-requesting device being connected over a first connection to the first network-edge device:*

161. In my opinion, Phatak renders 21.1 obvious. I find it helpful to note here only why *multipath control information* indicates the recited whether a device will join. As noted above, Phatak discloses multiple ways for the endpoints of the multipath connection to be aware of each other's interfaces and IP addresses to enable to multipath connection, such as header modifications, tunneling, and address exchange. Ex. 1045, 775. This is also how a new interface becomes part of a multipath connection. A POSITA would have found it obvious for the data-requesting device's communications to this effect to include 'multipath control information.'

X. SECONDARY CONSIDERATIONS

162. I have seen no evidence of, and I am not aware of any evidence of secondary considerations that have a nexus to the claimed inventions that would overcome the combinations of prior art cited above in showing the obviousness of

the claims of the '649 patent. The sheer number of independently developed, simultaneous inventions, developed within in a relatively short time-period are persuasive indicia of obviousness. However, should Patent Owner assert any secondary considerations of non-obviousness, I reserve the right to respond.

XI. CONCLUSION

163. For all the reasons discussed above, it is my opinion that each and every claim of the '649 patent is invalid.

164. I hereby declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct, and that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements are punishable by fine or imprisonment or both. *See* 18 U.S.C. §1001.

Declaration of Bill Lin in Support of Petition for *Inter Partes* Review of U.S.
Patent No. 9,350,649

Dated: August 7, 2025

Respectfully submitted,

A handwritten signature in dark ink, appearing to be 'Bill Lin', written above a horizontal line.

Bill Lin