

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. 11,582,343
Issued: February 14, 2023
Filed: August 15, 2022
Inventor: Eric M DeLangis
Title: Device and Methods for Multipath Communications

**PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §312 AND 37 C.F.R. §42.104**

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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
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1007	Certified Copy of U.S. Patent No. 10,868,908
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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”)
1020	Gilbert Held, <i>Network Design Principles and Applications</i> , 2000 (“Held”)

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.

Exhibit No.	Description
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
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)

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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
1056	Random House Webster’s Computer & Internet Dictionary, 3 rd ed., December 1998
1057	Andrew S. Tanenbaum, <i>Computer Networks</i> , Chps. 1 & 5 (3d ed. 1996)
1058	Adolfo Rodriguez <i>et al.</i> , <i>TCP/IP Tutorial and Technical Overview</i> , Chps. 1 & 14 (Prentice Hall PTR 2002)
1059	Richard O. LaMaire, et al., <i>Wireless LANs and Mobile</i>

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Exhibit No.	Description
	<i>Networking: Standards and Future Directions</i> , IBM, May 31, 1996

Petitioner Red Hat, Inc. (“Red Hat”) respectfully requests *inter partes* review of claims 1-20 (“Challenged Claims”) of U.S. Patent No. 11,582,343 (“the ’343 patent”). EX1003.

I. INTRODUCTION

The Challenged Claims of the ’343 patent are unpatentable in view of two references that were not substantively considered during its original prosecution, the Challenger and Kotzin references.

The ’343 patent is directed to a device referred to by the ’343 patent as a residential communications gateway (“RCG”). The RCG connects a residence (*e.g.*, an Internet user) to a communications network (*e.g.*, the Internet via an Internet service provider or “ISP”) “over a customer’s existing POTS line, and it doesn’t require any network infrastructure build out like DSL and Cable services.” EX1003, 3:27-29. The RCG was intended “to enhance, not replace, the existing telephone line” by aggregating bandwidth over the “last mile” of copper over which almost all residential customers received their communication services in the 2002 time frame. *Id.*, 1:30-32, 3:32-42.

Yet, as discussed below, aggregating bandwidth among devices to resolve the “last mile” or similar bandwidth issues was known in the prior art. For example, the ’343 patent acknowledges that it is merely applying RFC 1990, the PPP Multilink Protocol that was published in August 1996, to achieve a multilink

broadband connection. *Id.*, 11:28-30 (“[T]he RCG implements broadband over POTS by employing an 802.11 b/g wireless interface to configure a multilink PPP bundle-87 (per RFC 1990)[.]”). The PPP Multilink Protocol teaches the use of link aggregation to increase bandwidth. EX1038 (RFC 1990).

Against this backdrop, this Petition, supported by the Declaration of Dr. Bill Lin, Ph.D., presents two grounds based on the Challener and Kotzin references, which render the Challenged Claims obvious as discussed in detail below.

II. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED

Petitioner requests cancellation of the Challenged Claims as unpatentable under 35 U.S.C. §103.

A. Prior Art Patents And Printed Publications

Petitioner’s challenge is based on the following prior art references, which predate the earliest claimed priority date of the ’343 patent:

1. U.S. Patent Application Publication No. 2004/0001512 A1 (“Challener”) (EX1017) was filed on June 28, 2002, and published on January 1, 2004, and is thus prior art under pre-AIA 35 U.S.C. §102(e).

2. U.S. Patent Application Publication No. 2003/0026221 (“Kotzin”) (EX1018) was filed on August 2, 2001, and published on February 6, 2003, and is thus prior art under pre-AIA 35 U.S.C. §102(e).

3. U.S. Patent No. 5,878,040 (“Peirce”) (EX1044) issued on March 2, 1999, and is thus prior art under at least pre-AIA 35 U.S.C. §102(b).

4. NETWORK DESIGN PRINCIPLES AND APPLICATIONS (“Held”) (EX1020) is a textbook published by Auerbach Publications in 2000 and edited by Gilbert Held. It has been publicly available since at least June 14, 2000. EX1023, ¶ 48. Held is prior art under at least pre-AIA 35 U.S.C. §102(a) and (b).

B. Relief Requested

Petitioner requests cancellation of the Challenged Claims as unpatentable under 35 U.S.C. §103. The grounds are set forth below and supported by the declaration of Dr. Bill Lin, Ph.D.

Ground	Claims	Proposed Statutory Rejection
IA	1-20	Obvious over Challenger
IB	11	Obvious over Challenger in view of Peirce and Held
IIA	1-20	Obvious over Kotzin
IIB	11	Obvious over Kotzin in view of Peirce and Held

III. TECHNOLOGY OVERVIEW

A. Bandwidth Aggregation

Before the alleged invention of the ’343 patent, it was well-known that devices like gateways could aggregate bandwidth. It was well-know that gateways extend the connectivity of a network and help achieve greater bandwidth without

additional remote hardware or changes to the existing physical infrastructure. Ex. 1017, ¶¶[0014], [0016], Fig. 3, Ex. 1028, 6:35-40, Ex. 1029, Abstract, ¶¶[0002], [0085]; Ex. 1020 at 256. Algorithms were also developed to effectively aggregate, or “bundle,” multiple connections between source and destination. For example. Multipath TCP protocol was well known prior to the ’343 patent’s earliest priority date. For instance, the TCP/IP protocol on which Multipath TCP is based was created in the 1980s. *See* EX1030, 100-12; EX1020, 142, 281-82; EX1022, 8, 119, 124, 143-44; EX1033. And Multipath TCP was proposed as early as 1999. EX1022, 8. Multipath TCP uses two or more paths between a server and client to transmit packets between them, instead of the single path used in traditional TCP. *Id.*, Chapter 7. Additionally, TCP was recognized as helpful to provide flow control and congestion control. EX1020, 243–44. TCP was also known to employ a tuple (including source address/port and destination address/port) in order to uniquely identify a particular communication session. Ex. 1043 §2.3.

B. Bandwidth Aggregation as a Solution to the Last Mile Problem

In the late 1990s and early 2000s, the “last mile” problem—referring to the final segment of the telecommunications network connecting homes to service providers, typically via low-bandwidth copper wires—was widely recognized as a major bottleneck in residential networking, as most users were limited to Plain Old Telephone Service (POTS) lines despite the availability of high-capacity core

infrastructure like fiber optics (*see* EX1017, ¶[0004]). To address this, solutions emerged that leveraged existing infrastructure with low-cost enhancements rather than costly upgrades. For example, Challenger describes a bandwidth sharing device that allows an end user to aggregate bandwidth from multiple other devices, increasing effective bandwidth without modifying the physical network. *See Id.*, ¶[0040]. Similarly, Cook acknowledged the limitations of single communication paths to the client's interface and proposed supplementing wireline connections with wireless links, enabling parallel data transmission and higher aggregate bandwidth without the need for additional wireline installations. *See* EX1027, 1:29-33 and 50-56.

IV. THE '343 PATENT

The '343 Patent is entitled "Devices and Methods for Multipath Communications," and was issued from U.S. Patent Application No. 17/887,922. The '343 patent claims priority to Provisional Application No. 60/418,521, filed on October 15, 2002. October 15, 2002 is the earliest possible priority date for the '343 patent. Petitioner does not admit that the '343 patent is entitled to this or any priority and reserves the right to challenge the priority in this or other proceedings. Even if the '343 patent is entitled to a priority date of October 15, 2002, Challenger and Kotzin are prior art.

A. Claims

The '343 patent has 20 claims, of which claims 1 and 12 are independent. All claims are challenged herein.

B. Specification

The alleged problem in the art that the '343 patent set out to solve was that high-speed data services required expensive infrastructure enhancements to local telephone service lines to resolve “last mile” bandwidth issues. EX1003, 2:14-22. The purported solution provided is sharing and aggregating bandwidth from multiple RCGs, or broadband communications devices such as gateways or routers, which was already known in the art using prior-art protocols such as MPPP. As discussed below, however, this solution for sharing and aggregating bandwidth among multiple broadband communication devices was already proposed by Challener and Kotzin.

C. Prosecution History

The application leading to the '343 patent was filed with 20 claims. It was subsequently allowed without any substantive prosecution. The Examiner, however, did not consider the prior art references now presented in this Petition. In the Notice of Allowance, the Examiner indicated that claim 1 is “allowable over the prior art of record” since the prior art fails to teach or suggest “establishing a connection between a first device and a fourth device by concurrently using a first portion of a first bandwidth and a second portion of a second bandwidth, and

receiving a portion of the data set through a first network and a portion of the data through a second network.” EX1004, [[104]]. The Examiner indicated that claim 12 was allowable because the prior art of record fails to teach or suggest “receiving a portion of a response via a first network and a second network in response to transmitting a request to a remote device via the third connection, the third connection to the remote device via the first network and the second network having an effective bandwidth including the allocated first portion of the first bandwidth and the allocated second portion of the second bandwidth.” *Id.*

As discussed below, however, the limitations identified by the Examiner as the alleged points of novelty disclosed and rendered obvious by both Challener and Kotzin.

D. Person of Ordinary Skill in the Art

As Dr. Lin explains in his declaration, a POSITA at the time of the '343 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. EX1001, ¶¶14-50.

V. CLAIM CONSTRUCTION

Claims in an IPR are interpreted and construed under *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). For purposes of this proceeding only, terms in the Challenged Claims need not be construed.² If Patent Owner (“PO”) raises claim construction arguments, Petitioner reserves the right to respond.

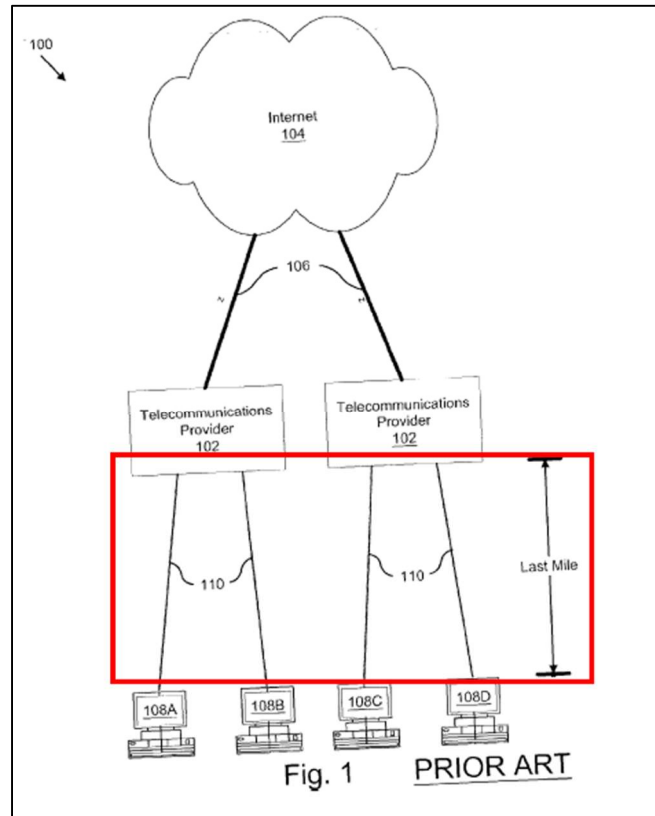
VI. OVERVIEW OF THE PRIOR ART

A. Challenger

Challenger discloses a method and apparatus for peer-to-peer bandwidth sharing to increase the bandwidth available to each user connected to the Internet where communication between a server and client is split between two separate bandwidth sharing devices on two different networks, which is what the Examiner found missing in the prior art that was considered during original prosecution. EX1017, Abstract.

² Petitioner does not present any §101 or §112 challenges herein but reserves the right to challenge the patentability under §§101 and 112 in litigation or any other appropriate forum. Nothing contained in this Petition or supporting papers is an admission or acknowledgement that the specification of the ’343 patent satisfies §§101 and 112.

Challenger explains that in the prior art, a user's access (such as the user of computer 108B in Figure 1 below) to bandwidth was limited by "last mile" communication infrastructure, as shown in Figure 1 reproduced below:



Id. Fig-1; *see also id.* ¶¶[0034]–[0036]. Challenger explains that, “[d]ue to low bandwidth capability, the last mile telecommunications lines 110 prove to be a significant bottleneck precluding broadband connectivity between the Internet 104 and the end user terminals, 108....” *Id.* ¶[0036].

To address this shortcoming, Challenger discloses “a wireless and automatic aggregation process among separate sharing entities.” EX1017, ¶[0012]; *see also id.* ¶[0014]. Challenger discloses a “bandwidth sharing device” (“BSD”) connected

to the Internet that can wirelessly connect to other bandwidth sharing devices also connected to the Internet, so that unused bandwidth can be aggregated to increase the effective bandwidth for a user. *Id.* ¶¶[0040]–[0056]. Figure 2, reproduced below, depicts how bandwidth sharing devices can be used to improve a prior art system:

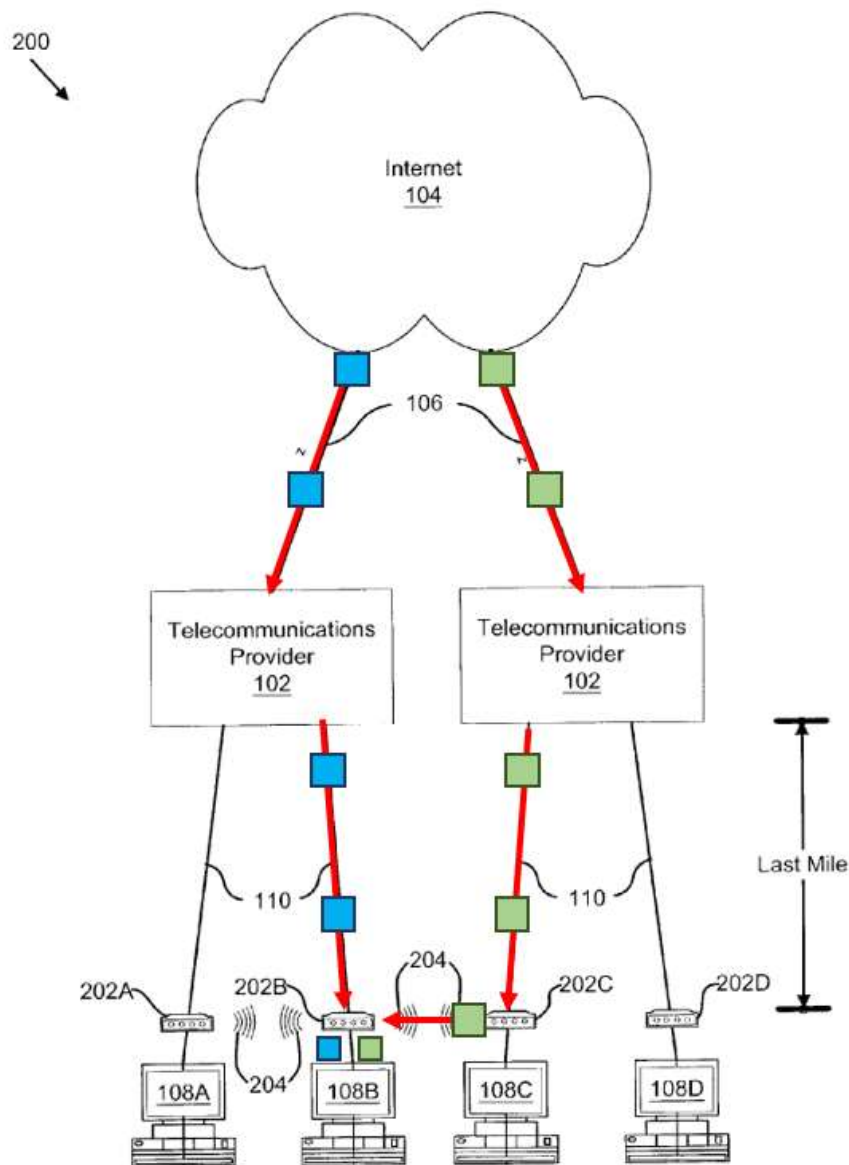
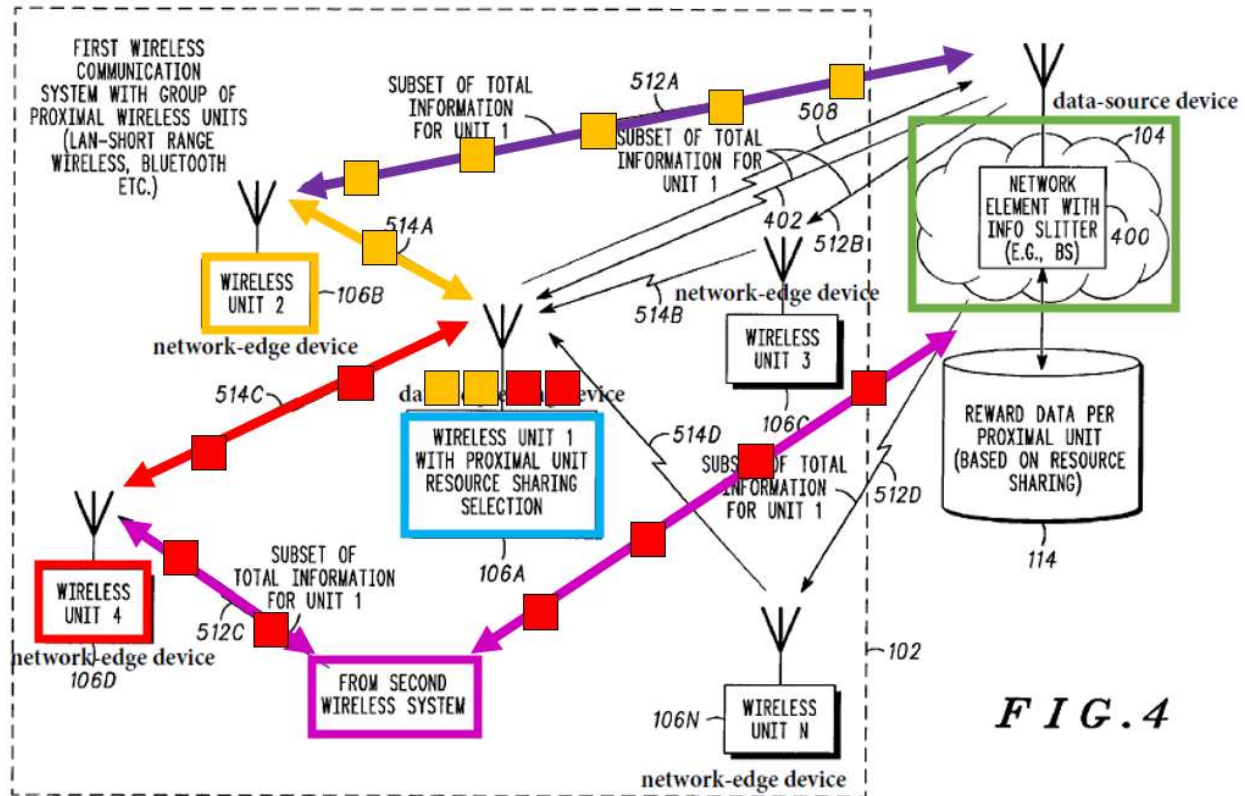


Fig. 2

Id. Fig-2. As shown in the above example, data packets from the Internet 104 destined for computer 108B are split along two networks, a first network that includes 202B's last mile connection, and a second network that includes 202C's last mile connection and its wireless connection 204 with 202B. The data packets, shown above in blue for one network and green for another, are then aggregated together at 202B and provided to computer 108B, thereby increasing the total bandwidth available to computer 108B. *Id.* ¶¶[0018], [0046]. In Challenger's nomenclature, BSD 202B is a "master" BSD, and BSD 202C is a "slave" BSD. In Challenger's system, the master BSD is in charge of automatically setting up and managing bandwidth sharing with one or more slave BSDs. *Id.* ¶¶[0017], [0020]-[0023].

B. Kotzin

Kotzin discloses a bandwidth aggregation system where the bandwidth available to a plurality of wireless units can be shared with a primary wireless unit, thereby increasing the wireless bandwidth available to the primary wireless unit. EX1018, Abstract, ¶[0024]. The primary wireless unit receives data packets from an Internet web server over two separate wireless networks, where the primary wireless unit is connected to these wireless networks via other wireless units. Kotzin explains that wireless units connect with each other so units "receive portions of the communication on behalf of the destination wireless apparatus,"



With reference to Kotzin's Figure 4 shown above, Kotzin discloses that wireless unit 1 (106A, blue) can make use of bandwidth from wireless units 2 and 4 (106B, orange 106D, red) to receive data from a device 400 on external network 104 (e.g., the Internet) (green). Internet data packets destined for wireless unit 1 can be split among two wide area networks (purple, pink) to wireless units 2 and 4, and then relayed from each of these wireless units to be aggregated by unit 1. In this manner the bandwidth available to unit 1 is increased by using, in addition to

(optionally) its own bandwidth, additional bandwidth allocated to wireless units 2 and 4. *Id.* ¶¶[0035], [0036].

C. Peirce

Peirce discloses a bandwidth sharing system where a data stream from a source to a destination is transmitted over two or more links, forming a “bundle” in one preferred embodiment relating to MLPPP, although Peirce is not limited to MLPPP. EX1044, Abstract. Each link terminates in what Peirce refers to as a “termination unit,” which in one embodiment is described as a network access server. *Id.*, Abstract, 2:43-46, 4:11-14. The termination units are all in communication with one another, such as over a local area network. *Id.* 2:43-47, 4:31-32. One of the termination units is responsible for assembling the multiple data streams into a single stream and delivering that single stream to the destination, such as a computer. *Id.* 4:46-48.

In order to coordinate this link sharing and reconstruction, the coordinating termination unit sends a “bundle mapping update packet” to each of the other termination units that includes a session identifier, and which instructs the termination units to forward packets they receive for that session to the reconstructing termination unit. *Id.* 4:62-67. In describing the “bundle mapping update packet,” Peirce explains that “[t]he identification field 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, such as by encapsulating the packets within an MPIP redirection header.” *Id.* 2:59-65. While Peirce’s preferred embodiment is an ISDN call implementation, Peirce is expressly more broadly applicable to other types of data streams and other systems and topologies: “While the following discussion is based on an ISDN implementation, it will be appreciated that the techniques are applicable to other types of communication systems (such as T-1) and other WAN topologies.” *Id.* 3:58-61.

D. Held

Held is a textbook on data networking that discloses the use of the TCP/IP routing protocol. Held discloses that at least as of the priority date of the ‘343 patent (and even earlier), the TCP/IP routing protocol was widely used for client-server communications on the Internet. EX1020, 8-11.

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

A. Ground I: Claims 1-20 Are Rendered Obvious By Challenger Alone Or In View Of Peirce And Held

1. Motivation to Combine Challenger with Peirce And Held

Although Challenger alone (Ground IA) renders the Challenged Claims obvious, a POSITA would have been motivated to combine Challenger with Peirce and Held (Ground IB) to render obvious the use of a session identifier as required

by claim 11, further rendering that claim obvious. Specific motivations to combine are discussed below in §VII.A.12.

2. Independent Claim 1

- a. [1.pre] A computer-implemented method for a first device to communicate via a wide area network, comprising the steps of:*

Challenger teaches a computer-implemented method for a first device, for example end user terminal 108B, to communicate via a wide area network, *e.g.*, the Internet. EX1017, ¶¶[0014]-[0018], [0035]-[0039], [0041]-[0043], [0046], Fig-2. The Internet is a wide area network because it is a network comprised of multiple networks spread over a wide geographical area. EX1030, 15-16, 35. Challenger’s “bandwidth sharing system” has “multiple end user terminals individually connected to the Internet” via individually allocated BSDs, “allow[ing] for multiple end user subscribers to take advantage of broadband communications on the Internet.” EX1017, ¶¶[0018], [0024].

Alternatively, Challenger’s BSD 202B, for example, when operating in “master mode” also satisfies claim 1’s requirement of a first device, because it transmits and receives packets to and from the Internet on behalf of end user terminal 108B. EX1017, ¶¶[0014]-[0018], [0037]-[0039], [0042]-[0043], Figs-2, 4.

- b. [1.1] connecting the first device to a first network having a first bandwidth via a second device;

When the claimed first device is end user terminal 108B, Challenger teaches connecting end user terminal 108B (“first device”) to a server on the Internet via the telecommunications provider of master BSD 202B. EX1017, ¶[0038]. In this mapping, BSD 202B is the claimed “second device.” The connection between 108B and 202B may “occur over land lines, as in the case of a hardwired local area network, as well as through wireless communications over wireless networks as commonly known in the prior art.” *Id.* ¶[0039]; *see also id.* ¶[0041]. The connection between master BSD 202B and its telecommunications provider takes place over link 110, which is BSD 202B’s last mile connection to its respective telecommunications provider 102. The telecommunications provider 102 in turn connects to the Internet over link 106. The multi-link network that is comprised of the connection from 108B to 202B, the connection from 202B to its respective telecommunications provider 102, the connection 106 from telecommunications provider 102 to the Internet, and the Internet connection to a web server with which 108B is in communication comprises the claimed “first network.” These links form a network because they comprise “a group of two or more computer systems linked together”—108B, 202B, the servers at telecommunication provider 102, and servers and other devices on the Internet. EX1056, 374; *see Elekta, Inc. v. Varian Med. Sys., Inc.*, IPR2016-00476, 2017 WL 2616010 (P.T.A.B. June 16,

2017) (a “communications *network*” is “*a link between two or more components* of [a system] that allows information to be shared between them” (emphasis added)); *SQWIN SA v. Walmart Inc.*, No. 4:22-CV-1040-SDJ, 2023 WL 8532385 (E.D. Tex. Dec. 8, 2023) (a network has the plain and ordinary meaning of “interconnected devices that share information”). Indeed, the claim language of dependent claim 2 confirms that a network can be comprised of multiple networks. *See* cl. 2 (“second network comprises at least one wireless network”).

The first device 108B (**green**), the second device 202B (**red**), and the links forming the claimed first network (**purple**) (“MAPPING #1”) are shown below (additional portions of the network will be located in Internet cloud 104):

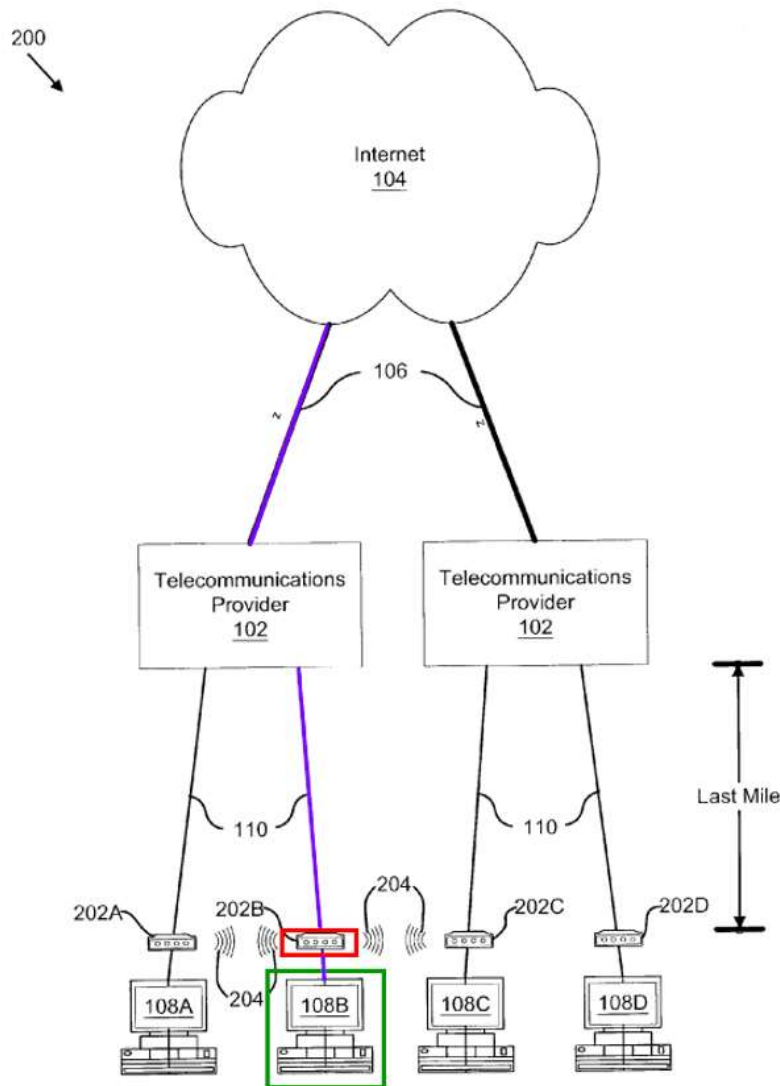


Fig. 2

EX1017, Fig. 2; *see also* Fig. 5 (step 506), ¶¶[0036]-[0038], [0046], [0058]. A POSITA would also have understood and found obvious that 202B, telecommunications provider 102, and the connection between them 110 form a network that is part of a larger network. *Id.*, Figs. 2-3, ¶¶[0002] (“The invention relates to the field of ... bandwidth aggregation and sharing of ‘last mile’

telecommunications lines,” a network, “among end-users on the Internet,” a larger network), [0035], [0040]; EX1001, ¶¶58-61.

The overall connection between an Internet server and 108B, which forms the claimed “first network,” has an associated bandwidth (the claimed “first bandwidth”) that is defined by last mile connection 110, because it has the lowest bandwidth of the multiple links. EX1017, ¶¶[0006], [0036]. As Dr. Lin explains, this bandwidth defines the total bandwidth of the entire claimed “first network” because it puts an upper bound on the total amount of data that can be transmitted to and from 108B over a given time period, *i.e.*, it forms a bottleneck. *Id.*, ¶¶[0006], [0036]; EX1001, ¶¶61-64.

Alternatively, end user terminal 108B (the claimed “first device”) can be connected to the same telecommunications provider 102 via BSD 202A’s last mile connection. 108B connects to BSD 202A via BSD 202B and its wireless connection 204 with BSD 202A. In this mapping (“MAPPING 2”), BSD 202A is the claimed “second device,” and the claimed “first network” is comprised of 108B’s connection to 202B, 202B’s wireless connection to 202A, 202A’s last mile connection 110 to its telecommunications provider 102, the connection 106 from telecommunications provider 102 to the Internet, and a server on the Internet itself. This mapping is shown below using green for the claimed “first device,” red for

the claimed “second device,” and purple for the links that form the claimed “first network”:

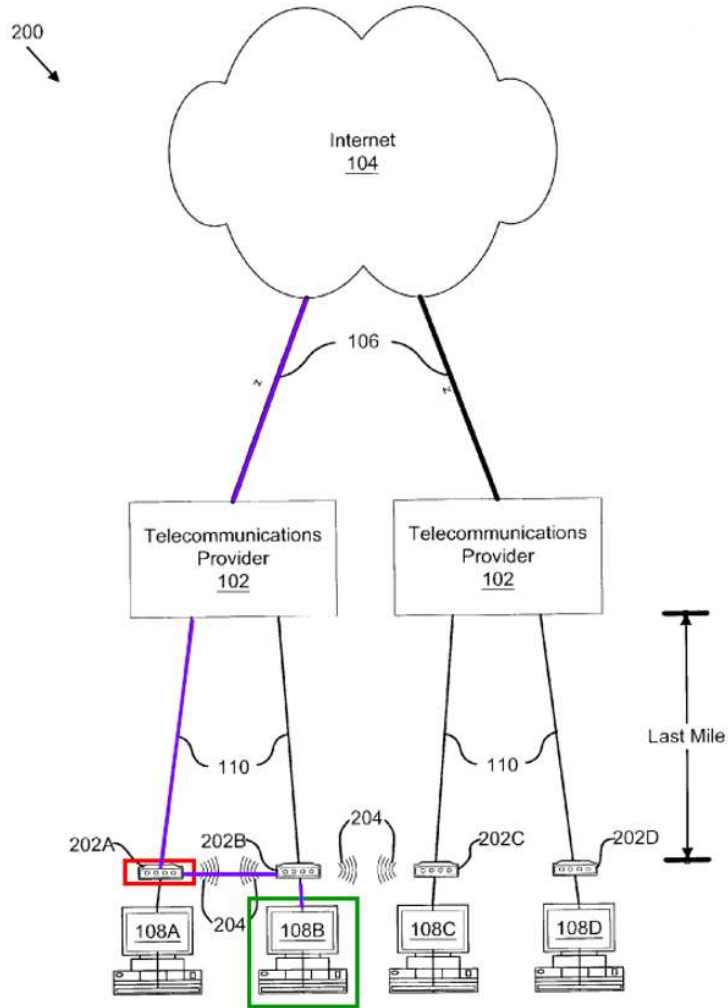


Fig. 2

EX1017, Fig. 2, ¶¶ [0037], [0038], [0046].

As a third alternative, the claimed “first device” can be mapped to BSD 202B and the claimed “second device” mapped to BSD 202A as follows (“MAPPING 3”):

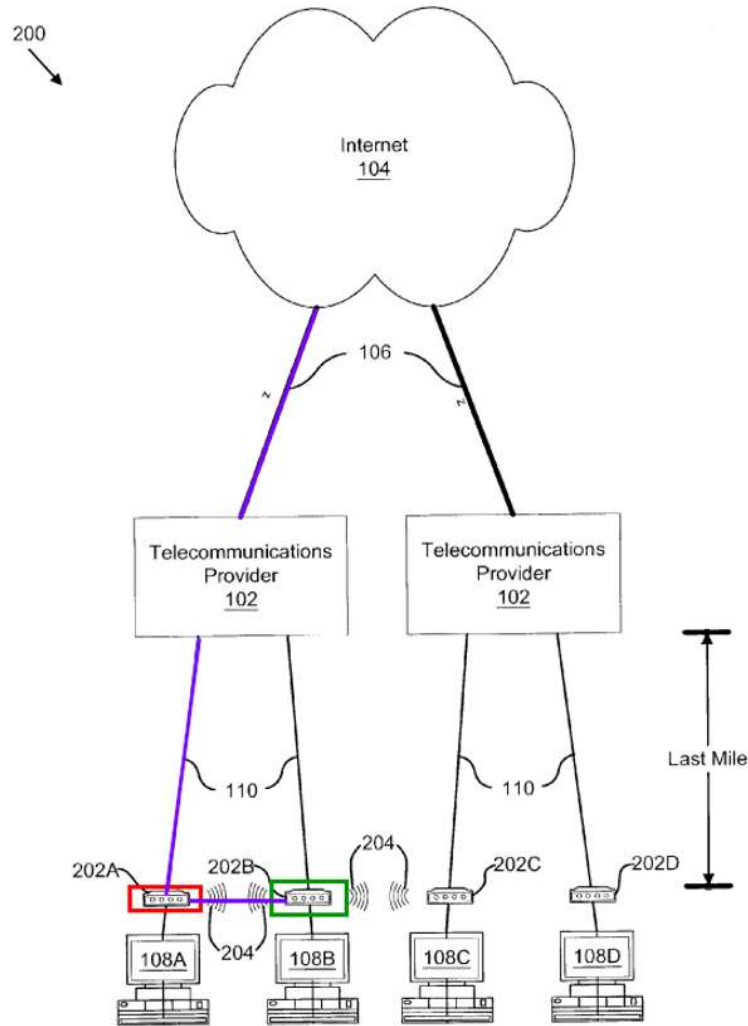


Fig. 2

EX1017, Fig. 2, ¶¶[0037], [0038], [0046].

BSD 202B can be mapped to the claimed “first device” because it is a device that communicates with a wide area network, *e.g.*, the Internet, as claimed.

EX1017, ¶¶[0037], [0038], [0046]. This MAPPING 3 is similar to MAPPING 2 except the claimed “first device” is 202B instead of 108B.

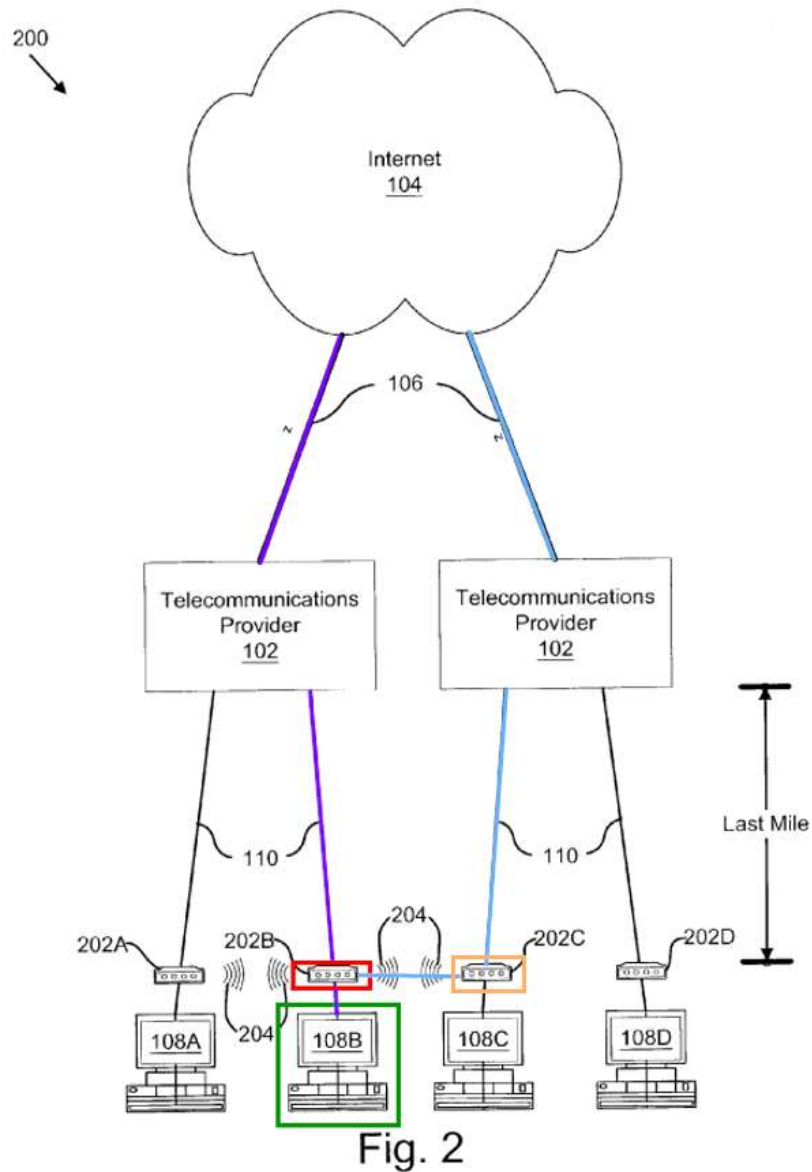
The following table summarizes these exemplary mappings:

Mapping	“First Device”	“Second Device”	“First Network”
1	End user terminal 108B	BSD 202B	The connection from 108B through BSD 202B and its telecommunications provider up to and including the Internet and the Internet server with which 108B is communication
2	End user terminal 108B	BSD 202A	The connection from 108B through BSD 202B, BSD 202A, and 202A’s telecommunications provider up to and including the Internet and the Internet server with which 108B is communication
3	BSD 202B	BSD 202A	The connection from BSD 202B through BSD 202A and 202A’s telecommunications provider up to and including the Internet and the Internet server with which 108B is communication

c. [1.2] connecting the first device to a second network having a second bandwidth via a third device;

In MAPPING 1, where Challenger’s end user terminal 108B is the claimed “first device” and where the claimed “second device” is master BSD 202B, the claimed “third device” (orange) maps, for example, to slave BSD 202C and the claimed “second network” maps to 108B’s connection to 202B, 202B’s wireless connection to 202C, 202C’s last mile connection 110 to its telecommunications

Internet, and the server on the Internet itself (blue). This is illustrated below:



EX1017, Fig. 2, ¶¶[0037], [0038], [0046].

In MAPPING 2, where Challenger’s end user terminal 108B is the claimed “first device” and where the claimed “second device” is slave BSD 202A, then the

claimed “third device” and “second network” are mapped similarly to MAPPING 1, as shown below:

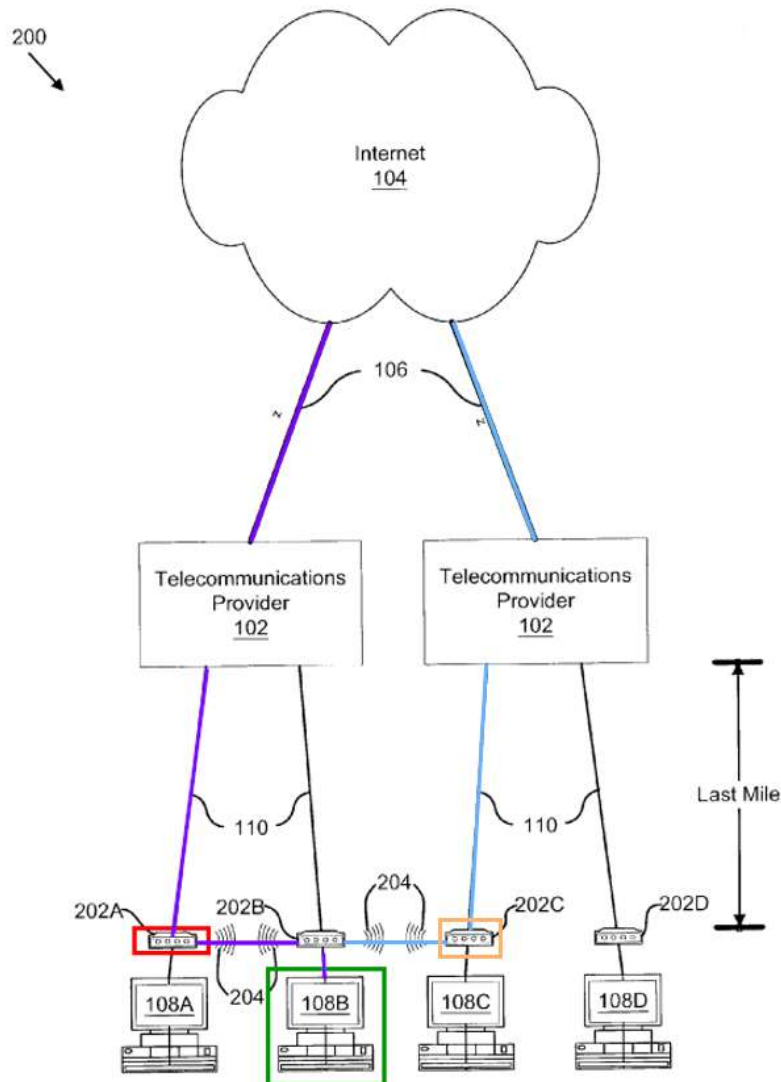


Fig. 2

EX1017, Fig. 2, ¶¶[0037], [0038], [0046].

Finally, in MAPPING 3, where BSD 202B is the claimed “first device” and BSD 202A is the claimed “second device,” then the claimed “third device” and the “second network” are mapped similarly to MAPPINGS 1 and 2:

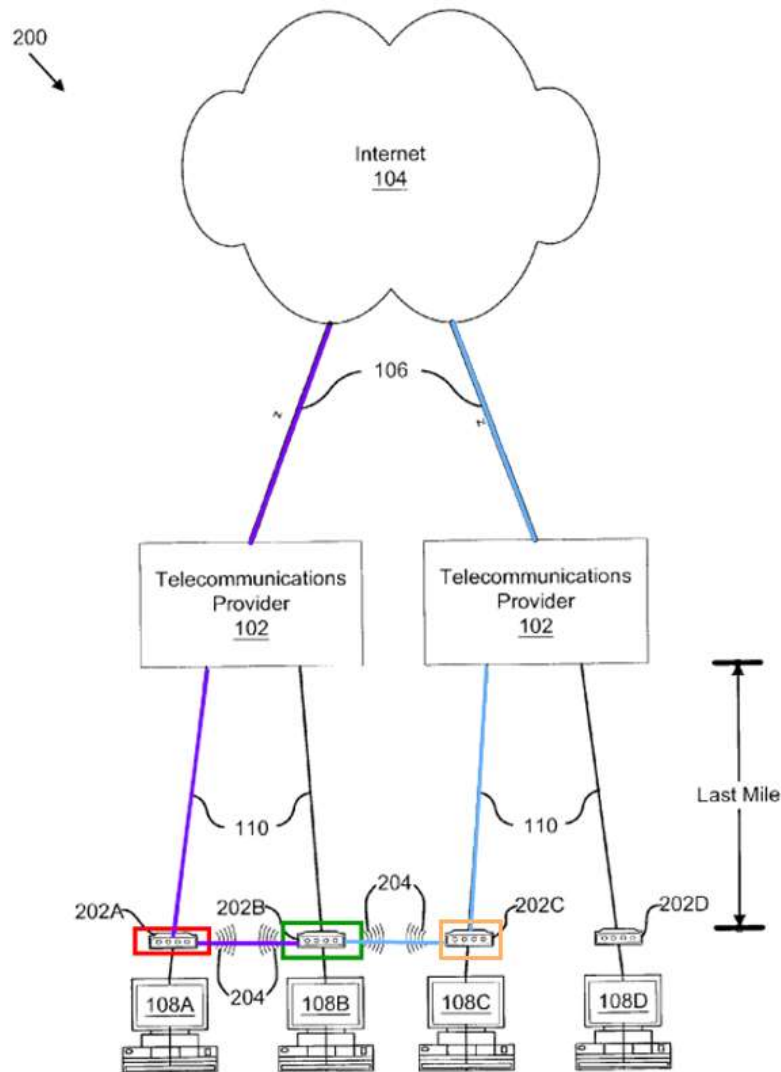


Fig. 2

EX1017, Fig. 2, ¶¶ [0037], [0038], [0046].

Challener’s “second network” has a “second bandwidth” for the same reasons that Challener’s “first network” has a “first bandwidth.” Specifically, the overall connection between 108B and the Internet server via 202C, which forms the claimed “second network,” has an associated bandwidth (the claimed “second bandwidth”) that is defined by last mile connection 110 between 202C and its

telecommunications provider. EX1017, ¶¶[0006], [0036]. As Dr. Lin explains, this bandwidth limitation will limit the total bandwidth of the entire claimed “second network” by putting an upper bound on the total amount of data that can be transmitted to and from 108B over a given time period, *i.e.*, it forms a bottleneck for the network. *Id.*, ¶¶[0006], [0036]; EX1001, ¶¶65-67.

The following table summarizes the above mappings:

Mapping	First Device	Second Device	Third Device	First Network	Second Network
1	End user terminal 108B	BSD 202B	BSD 202C	The connection from 108B through BSD 202B and its telecommunications provider up to and including the Internet	The connection from 108B through BSD 202B, BSD 202C, via wireless connection 204, and 202C’s telecommunications provider up to and including the Internet and the Internet server with which 108B is communication
2	End user terminal 108B	BSD 202A	BSD 202C	The connection from 108B through BSD 202B, BSD 202A, and 202A’s telecommunications provider up to and including the Internet	The connection from 108B through BSD 202B, BSD 202C, and 202C’s telecommunications provider up to and including the Internet and the Internet server with which 108B is communication

Mapping	First Device	Second Device	Third Device	First Network	Second Network
3	BSD 202B	BSD 202A	BSD 202C	The connection from BSD 202B through BSD 202A and 202A's telecommunications provider up to and including the Internet	The connection from BSD 202B through BSD 202C and 202C's telecommunications provider up to and including the Internet and the Internet server with which 108B is communication

- d. *[1.3] establishing a connection through which data may be transferred between the first device and a fourth device by concurrently using a first portion of the first bandwidth and a second portion of the second bandwidth, the connection having an effective bandwidth including the first portion of the first bandwidth and the second portion of the second bandwidth; and*
- i. *[1.3.i] establishing a connection through which data may be transferred between the first device and a fourth device by*

In all three mappings—where end user terminal 108B is the claimed “first device” (MAPPINGS 1 and 2) or master BSD 202B is the claimed “first device” (MAPPING 3)—Challenger discloses that data may be transferred between master BSD 202B or end user terminal 108B (a “first device”), on the one hand, and a remote Internet site (a “fourth device”) on the other, over two different networks using a portion of the bandwidth of each of the two networks, *i.e.*, the claimed first

and second bandwidth portions. These two networks and their connection to the remote site together form the claimed “connection.” EX1017, ¶¶[0038], [0046].

For example, in the case of MAPPING 1, 108B will connect to a remote Internet site via master BSD 202B, using all or some lesser portion of BSD 202B’s last-mile bandwidth (the claimed “first portion”). *Id.*, ¶¶[0038], [0046]. 108B will also connect to the remote Internet website via slave BSD 202C, using all or some lesser portion of BSD 202C’s last-mile bandwidth (the claimed “second portion”). *Id.*, ¶¶[0038], [0046]. This sharing of bandwidth by BSD 202C is set up and managed by master BSD 202B. As Challenger explains, master BSD 202B “procures connection to a local available last mile telecommunications line.” *Id.*, ¶[0019]. Master BSD “detects other [BSD]s connected to last mile telecommunications lines that are not currently in use” and configures them to operate in slave mode. *Id.* ¶[0020]. Then the master BSD “performs all functions necessary to format, transmit, receive, and reconstruct packets and messages using wireless transmission techniques known in the art.” *Id.* ¶[0021]. Accordingly, Challenger teaches establishing a connection through which data may be transferred between a remote site on the Internet (*i.e.*, a fourth device, and a first device, either master BSD 202B or end user terminal 108B) over two different networks, using a portion of the bandwidth of each network.

The flow chart in Challenger’s Figure 7 demonstrates a method for the master BSD to receive communications from a remote Internet site, in which the remote site sends a portion of packets directly to the master BSD and sends another portion of packets to the slave BSD(s), which in turn forward those packets to the master BSD to be assembled with the remaining packets. *Id.* ¶¶[0065]-[0066]. Whenever Challenger’s remote site (“fourth device”) sends packets to the master BSD 202B or end user terminal 108B (the “first device”), Challenger’s system thus “establish[es] a connection through which data may be transferred between the first device and a fourth device.” Regardless of whether end user terminal 108B or master BSD 202B is viewed as the first device, this limitation is obvious.

- ii. *[1.3.ii] concurrently using a first portion of the first bandwidth and a second portion of the second bandwidth*

When end user terminal 106B is mapped to the “first device,” Challenger teaches that it concurrently uses the bandwidth from two different networks when communicating with a remote site. For example, in MAPPING 1, Challenger teaches connecting end user terminal 108B (first device) to master BSD 202B (second device) to join device 202B’s last-mile connection with a first bandwidth and further connecting to a slave BSD 202C (third device) to join the slave BSD’s last-mile connection and access a second bandwidth. Challenger discloses that the remote site “sends 704 some of the packets directly to the master [BSD] 202 and

sends 704 some of the packets to one or more slave [BSD]s 202.” EX1017, ¶[0065]. “Thus, some of the packets are received 706 by the Master [BSD]s 202 and some are received 708 by the one or more slave [BSD]s 202.” *Id.* ¶[0066].

Figure 7 of Challenger, which provides a flow chart of packets being sent from a remote device to an end user device, includes a single step 704 for the transmission of packets to both a master BSD and a slave BSD, which will ultimately both be received by the end user terminal. Because the packets are sent to the master and slave BSDs at the same time, the link to those devices, and consequently their bandwidths, are utilized concurrently. Step 704 of Figure 7 is clear that packets are not sent first to the master BSD, and then to the slave BSD, but are sent in a single step: “The remote site then sends 704 some of the packets directly to the master bandwidth device 202 and sends 704 some of the packets to one or more slave bandwidth sharing devices 202.” EX1017, ¶[0065]. Additionally, Challenger explains that BSD 202B operates in a master mode “*while* the bandwidth sharing devices 202A and 202C are operating in a slave mode.” *Id.*, ¶[0046]. A POSITA would have understood or at least found obvious that the word “while” signifies that the links for both the master and the slave operations are being concurrently used, as “while” and “concurrent” both mean “at the same time.” EX1001, ¶¶68-69. Further, if the links were not used concurrently, overall bandwidth would not be increased, because the 108B’s last-mile connection would

still create an unacceptable bottleneck. The benefit of Challenger's bandwidth-sharing scheme is achieved when multiple links are used in parallel. *Id.*, ¶[0006], [0013]; EX1001, ¶¶68-69.

The same is true in the upload direction. As illustrated in Figure 6, Challenger indicates that in step 605 master BSD concurrently sends packets to a remote site and also to a slave BSD, which in turn sends those packets to the remote site in step 608. As Challenger describes, "the sending method 600 includes the steps of a master bandwidth sharing device 202 generating 602 packets for transmission from the master to one or more slaves, the master bandwidth sharing device 202 *sending 604 some of the packets directly to an intended recipient at a remote site on the Internet and sending 604 an allocated portion of the packets to the slave bandwidth sharing device*, preferably with wireless communication 204." EX1017, ¶[0063].

- iii. *[1.3.iii] the connection having an effective bandwidth including the first portion of the first bandwidth and the second portion of the second bandwidth*

In each of the three above MAPPINGS, the connection between the first device (108B or 202B) and the fourth device (remote Internet site) has an effective bandwidth that is an aggregation of the allocated bandwidths provided by the two networks to which they are connected. Challenger discloses "an improved [BSD]" that "is configured to automatically and wirelessly aggregate and arbitrate

available bandwidth with a second [BSD].” EX1017, ¶[0014]; *see also id.* ¶¶[0018], [0024], [0037], [0046]. Challenger explains that its BSDs have the “capability to aggregate available bandwidth” between subscribers “for greater communications capacity and speed.” *Id.* ¶[0024].

- e. *[1.4] receiving by the first device a data set from the fourth device via the connection, wherein a portion of the data set is received through the first network and a portion of the data is received through the second network.*

Challenger discloses that the remote site “sends 704 some of the packets directly to the master [BSD] 202 and sends 704 some of the packets to one or more slave [BSD]s 202.” EX1017, ¶[0065]. As discussed with regard to MAPPINGS 1, 2, and 3 above, these packets are transmitted over two different networks. As Challenger explains, “some of the packets are received by 706 the Master [BSD]s 202 and some are received 708 by the one or more slave bandwidth sharing devices 202. The packets received by the slave [BSD]s 202 are then transmitted 710, preferably wirelessly, to the master [BSD] 202. The master [BSD] 202 then receives 712 and assembles 714 the packets.” *Id.* ¶[0066]. The master BSD then sends the assembled packets to its end user terminal. In MAPPINGS 1, 2, and 3, the master BSD is 202B and its end user terminal is 108B. Thus, in MAPPINGS 1, 2, and 3, Internet packets (the claimed “data set”) are received by both BSD 202B and 108B over two different networks.

3. Dependent Claim 2

- a. The computer-implemented method of claim 1, wherein the second network comprises at least one wireless network.*

Claim 1 is obvious. *See* §VII.A.2. In MAPPINGS 1 and 2, end user terminal 108B (first device) connects to slave BSD 202C via wireless network 204. As discussed above, this wireless network is part of the claimed “second network.” Additionally, Challenger discloses that 108B’s connection to 202B, which in turn connects wirelessly to 202C, can also be wireless. Thus, a portion of the overall “second network” is wireless. In MAPPING 3, 202B’s connection to 202C is also wireless. EX1017, Fig-2; EX1001, ¶70. *See* §VII.A.2.c.

4. Dependent Claim 3

- a. The computer-implemented method of claim 2, wherein the wireless network comprises a cellular network.*

Claim 2 is obvious, as described above. *See* §VII.A.3. Challenger explains that “in the preferred embodiment, the communications between the end user terminals 108 and the [BSD]s 202 can occur over . . . wireless communications over wireless networks as commonly known in the prior art.” EX1017, ¶[0039]. As Dr. Lin explains, cellular networks were a well-known form of wireless networks at the time. EX1001, ¶¶71-72. Accordingly, a POSITA would have understood or found obvious that the wireless network (wireless network 204) may comprise a cellular network. *Id.* The same is true of the direct connection between 108B and

202B, which is also part of the claimed “second network.” *Id.*; EX1017, Fig. 2, ¶[0041] (“The bandwidth sharing device 202 also includes a . . . data connection terminal 308, to which the end user terminal 108 is connected. Once again, the preferred embodiment allows the use of hardwired and/or wireless connections between the data connection terminal 308 and the end user terminal 108.”).

5. Dependent Claim 4

- a. The computer-implemented method of claim 1, wherein the first network is selected from the group consisting of a public wired network, a private wired network, a public wireless network, and a private wireless network.*

Claim 1 is obvious. *See* §VII.A.2.

A network can be available and accessible only to selected users with use of a firewall (*i.e., private*) or may alternatively be available to all users (*i.e., public*). EX1001, ¶¶71-72. In MAPPINGS 1 and 2, the first network comprises last mile connections 110, which are part of a telecommunications provider’s private wired network and only accessible to subscribers (*i.e., private*). EX1017, ¶¶[0012], [0024]. Additionally, in MAPPING 2 and 3, connection 204 is a private wireless network shared by the BSDs. *Id.*, ¶[0038]. In all MAPPINGS, the network includes the Internet, which a POSITA would have understood to comprise an amalgamation of multiple interconnected networks and includes public wired networks, private wired networks, a public wireless network, and private wireless networks. *Id.*, ¶[0046]; EX1001, ¶73.

6. Dependent Claim 5

- a. The computer-implemented method of claim 1, wherein the second device is selected from the group consisting of a residential communications gateway, a cable modem, a digital subscriber line modem, a wireless device, a neighborhood access point device, and a cellular modem.*

Challener discloses claim 1, as described above. See §VII.A.2. In MAPPINGS 1, 2, and 3, the second device is BSD 202A or 202B. EX1017, ¶¶[0038]-[0039], [0042], [0044] Each of Challener's BSD's connects wirelessly to other BSDs, and thus BDS 202A and 202B are wireless devices as claimed. Additionally, Challener's BSD is "a stand-alone unit with standard data and voice interconnections with typical telephone, computer, and service provider equipment and connectors." *Id.*, ¶[0016]. The BSD includes a telecommunications line connection terminal, a voice connection terminal, and a logic unit:

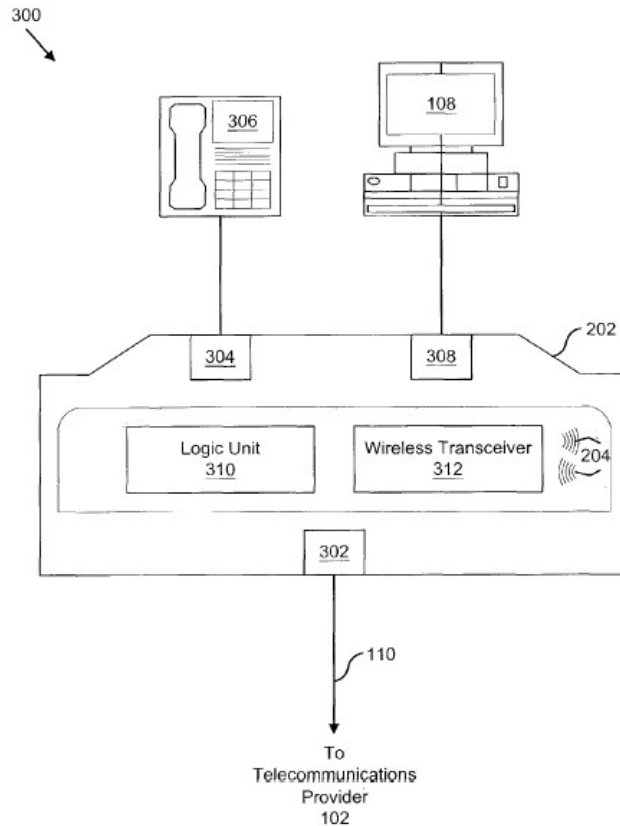


Fig. 3

Id. ¶¶[0040]-[0042], Fig. 3. A POSITA would have understood that a device with these components constitutes a residential communications gateway, because it provides Internet broadband to subscribers in their homes. Additionally, each BSD connects end users to a telecommunications provider across last mile connections—a well-known use of routers by 2002.

7. Dependent Claim 6

- a. The computer-implemented method of claim 1, wherein the third device is selected from the group consisting of a residential communications gateway, a cable modem, a digital subscriber line modem, a wireless device, a*

neighborhood access point device, and a cellular modem.

Claim 1 is obvious. *See* §VII.A.2. In MAPPINGS 1, 2, and 3, the third device is also a BSD and therefore a wireless device, RCG or modem for the reasons described in reference to dependent Claim 5. *See* §VII.A.6.

8. Dependent Claim 7

- a. The computer-implemented method of claim 1, wherein the second network comprises the Internet.*

Claim 1 is obvious. *See* §VII.A.2. In each of MAPPINGS 1, 2, and 3, the claimed “second network” includes the Internet. *See* §VII.A.2.c.

9. Dependent Claim 8

- a. The computer-implemented method of claim 1, wherein the first network comprises a private network.*

Claim 1 is obvious. *See* §VII.A.2. In MAPPINGS 1, 2, and 3, the claimed “first network” includes a telecommunications provider network, which is a private network. *See* §VII.A.2.b.

10. Dependent Claim 9

- a. The computer-implemented method of claim 1, wherein the first portion of the first bandwidth comprises substantially all the first bandwidth.*

Claim 1 is obvious. *See* §VII.A.2. Challenger teaches that a BSD may use all or less than all of the bandwidth available to it. EX1017, ¶¶[0050], [0051]. When a BSD uses all of the bandwidth available to it, the claimed “first portion” is “substantially all the first bandwidth.” For example, Challenger teaches that in

MAPPING 1, master BSD 202B is “allowed to use the entire amount of bandwidth available on a last mile telecommunications line 110.” *Id.* ¶[0050]. Similarly, in MAPPINGS 2 and 3, BSD 202A may share all of its available bandwidth with 108A and 202B, respectively. EX1017, ¶¶[0049], [0050].

11. Dependent Claim 10

- a. The computer-implemented method of claim 1, wherein the step of connecting the first device to a first network having a first bandwidth via a second device includes the first network having current available bandwidth equal to or in excess of a minimum bandwidth.*

Claim 1 is obvious. *See* §VII.A.2. In MAPPING 1, a POSITA would have understood that 108B will only be able to connect to the Internet through BSD 202B (the claimed “first network”) when 202B’s connection to its telecommunications provider has sufficient bandwidth to allow that connection, *i.e.*, an excess of a minimum bandwidth. *See* EX1017, ¶¶[0035], [0036]; EX1001, ¶76. Similarly, in MAPPINGS 2 and 3, a POSITA would have understood that BSD 202A will not share its bandwidth with 108B and 202B if it has insufficient bandwidth to do so. EX1017, ¶¶[0046], [0048]; EX1001, ¶76.

12. Dependent Claim 11

- a. The computer-implemented method of claim 1, further comprising the step of assigning a session identifier to the connection.*

Claim 1 is obvious. *See* §VII.A.2, VII.B.2. Challenger allows a slave BSD to share its bandwidth with two master BSDs at the same time. EX1017, ¶[0049].

Accordingly, a POSITA would have understood that the slave BSD needs a session ID to distinguish between packets meant for one master BSD as opposed to another. EX1001, ¶¶77-84

As Dr. Lin explains, one straightforward example of such a session ID is simply an arbitrary or randomly generated number. EX1001, ¶77. The use of arbitrary or randomly generated numbers for tracking sessions was well known in the art as of 2002. For example, randomly generated session IDs have been used with web-based based applications since at least 2001. These session IDs were typically generated by the web server and stored in a cookie in order to “to associate[] a group of online actions with a specific user.” EX1001, ¶78 (citing EX1056 at 3). As another example, as early as 1998, the Real Time Streaming Protocol (RTSP, RFC2326), used a randomly generated session ID included in the packet headers of packets send between client and server. EX1001 ¶79. Similar random session IDs are used in the Session Initiation Protocol (SIP, EX1046 (RFC 2543)) from 1999, and the Dynamic Host Configuration Protocol from 1997 (DHCP, EX1047 (RFC 2131), §2 (using a random number “Transaction ID” that is “used by the client and the server to associate messages and responses between a client and a server”)). EX1001 ¶79. The tuple used in TCP/IP is a session identifier that would already be present in Challenger’s system, and that would have been known and obvious to a POSITA. *Id.*

A POSITA would also have been motivated to use HTTP and URLs as taught by Held with Challenger given Challenger's express teaching of communication with Internet sites. EX1017, ¶¶[0002], [0018], [0046], [0063]-[0066], Figs. 6, 7. As Held explains, the Internet is "a ubiquitous network of applications based on the TCP/IP. Started as a text-based network for scientific communication, the Internet grew dramatically in the late 1980s and 1990s, once not-text-only applications became available.[] The Internet now reaches about half a billion computers, most of which are connected to it through the telephone network." EX1020, 142. Given Challenger's express teaching of Internet Web communications and Held's teaching that use of TCP/IP for Internet communications is "ubiquitous," it would have been obvious to a POSITA to use TCP/IP (which uses the tuple session identifier) when communicating with an Internet site in Challenger. EX1001, ¶80. Challenger specifically discloses the use of TCP/IP for communications among BSDs. EX1017, ¶¶[0015], [0052]. TCP/IP makes use of a tuple comprised of source IP address/port number, destination IP address/port number (and protocol identifier) to uniquely identify a communication session. As RFC 2663 (the 1999 standard addressing network address translation used in Internet communications) explains, "TCP/UDP sessions are uniquely identified by the tuple of (source IP address, source TCP/UDP port, target IP address, target TCP/UDP port)" (UDP is a separate protocol that uses the same

tuple as TCP). EX1043 §2.3. TCP/IP runs underneath the HTTP protocol that is used to browse web pages. EX1030, 363 (HTTP is “[t]he TCP/IP protocol for transferring World Wide Web pages across the Internet or an intranet.”).

Given Challenger’s express teaching of Internet communication and the need to differentiate different communication sessions for purpose of data sharing, a POSITA would have been motivated to use the TCP/IP tuple, for example the tuple between 108B and the Internet web site, for this purpose since it would already exist in Challenger’s system when running TCP/IP. EX1001, ¶80. A POSITA would have understood and found obvious, for the primary flow between Challenger’s master BSD and the Internet server with which it is communicating, to include the TCP/IP tuple as part of the data payload in communications associated with that session—including the messages exchanged with the bandwidth-sharing units. *Id.*, ¶¶80-81. The bandwidth-sharing wireless units would thereby be able to identify a specific multilink communication session. EX1043.

The use of a session identifier would also have been obvious to a POSITA in view of Peirce. Peirce, which also discloses a system for bandwidth sharing, discloses a mechanism for identifying and coordinating data streams on a per-session basis, namely a “bundle mapping update packet” that includes a session identifier in the form of an “identification field [that] 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." EX1044, 2:59-64 (emphasis added). This packet includes a bundle ID that identifies the session. *Id.* 2:57-65. As Dr. Lin explains, the use of a session ID as taught by Peirce would have been compatible with Challener's disclosed architecture, and the session ID would be included with all data packets as a coordinating reference that ensures 108B receives all packets destined for it while at the same time satisfying Challener's express teaching that the wireless units may share bandwidth with multiple other devices at the same time. EX1001, ¶¶82-84.

Peirce and Challener both relate to using multiple links between a source and destination to send a split data stream that is reconstructed into a single data stream at the destination. EX1017, Abstract; EX1044, Abstract. Given this architectural and functional similarity, a POSITA would have found it obvious to use Peirce's mechanism to keep track of Challener's packets. EX1001, ¶¶82-84. As Dr. Lin explains, using a mechanism such as Peirce's session ID with Challener would have been obvious to try, and nothing more than combining prior art elements according to known methods and applying a known technique to a known device ready for improvement, both to yield predictable result. *Id.* Further, given that packet-based communications were well known in the art, a POSITA would have had a reasonable expectation of success in implementing such a common and

well-known technology with Challenger using routine computer programming techniques. *Id.*.

13. Independent Claim 12

- a. [12.pre] A communication device capable of providing broadband communications services comprising:*

In MAPPINGS 1 and 2, end user device 108B is a device, *e.g.*, a computer, that allows users to connect to the Internet using broadband. EX1017 ¶¶[0006], [0034]. Likewise, in MAPPING 3, master BSD 202B also provides a broadband connection to a user of 108B. *Id.*

- b. [12.1] a first connection via a first device to a first network having a first bandwidth including an allocated first portion of the first bandwidth;*

See limitation 1.1. *See* §VII.A.2.b. In each of MAPPINGS 1, 2, and 3, the first device (108B or 202B) connects to a first network via a second device (202B or 202A) where a portion of the network's bandwidth is allocated to the first device. EX1017, ¶¶[0006], [0036]-[0038].

- c. [12.2] a second connection via a second device to a second network having a second bandwidth including an allocated second portion of the second bandwidth; and*

See limitation 1.2. *See* §VII.A.2.c. In each of MAPPINGS 1, 2, and 3, the first device (108B or 202B) connects to second network via a second device (202C), where a portion of the network's bandwidth is allocated to the first device. EX1017, ¶¶[0006], [0036]-[0038].

- d. *[12.3] a third connection to a remote device via the first network and the second network, the third connection having an effective bandwidth including the allocated first portion of the first bandwidth and the allocated second portion of the second bandwidth;*

See limitations 1.3 and 1.4. See §§VII.A.2.d, VII.A.2.e. In each of MAPPINGS 1, 2, and 3, the first device (108B or 202B) connects to a remote Internet site, claim 1's "fourth device." This connection is a composite connection over both networks, where packets sent between the first and fourth devices are split over the two legs of this connection. EX1017, Fig. 2.

- e. *[12.4] wherein, in response to transmitting a request to the remote device via the third connection, the communication device receives a response from the remote device wherein a portion of the response is received via the first network and a portion of the response is received via the second network.*

See limitation 1.4. See §VII.A.2.e. In each of MAPPINGS 1, 2, and 3, when Challenger's first device (108B or 202B) requests a download from an Internet web server, for example the download of a file, the server's response will be split into groups of packets, where one group (portion) is transmitted over the first network and received by the first device, and where the other group (portion) is transmitted over the second network. EX1017, Fig. 2.

14. Dependent Claim 13

- a. *The communication device of claim 12, wherein the second network comprises at least one wireless network.*

See claims 2 and 12. See §§VII.A.3, VII.A.13.

15. Dependent Claim 14

- a. The communication device of claim 12, wherein the wireless network comprises a cellular network.*

See claims 3 and 12. See §§VII.A.4, VII.A.13.

16. Dependent Claim 15

- a. The communication device of claim 12, wherein the first network is selected from the group consisting of a public wired network, a private wired network, a public wireless network, and a private wireless network.*

See claims 4, 5 and 12. See §§VII.A.5, VII.A.6, VII.A.13.

17. Dependent Claim 16

- a. The communication device of claim 12, wherein the first connection is made to a first connection device selected from the group consisting of a residential communications gateway, a cable modem, a digital subscriber line modem, a wireless device, a neighborhood access point device, and a cellular modem and the second connection is made to a second connection device selected from the group consisting of a residential communications gateway, a cable modem, a digital subscriber line modem, a wireless device, a neighborhood access point device, and a cellular modem.*

See claims 6 and 12. See §VII.A.7, VII.A.13.

18. Dependent Claim 17

- a. The communication device of claim 12, wherein the first network comprises a private network and the second network comprises the Internet.*

See claims 7, 8 and 12. See §§VII.A.8, VII.A.9, VII.A.13.

19. Dependent Claim 18

- a. The communication device of claim 12, wherein the first portion of the first bandwidth comprises substantially all the first bandwidth.*

See claims 9 and 12. See §§VII.A.10, VII.A.13.

20. Dependent Claim 19

- a. The communication device of claim 12, wherein the allocated first portion of the first bandwidth meets or exceeds a minimum bandwidth.*

See claims 10 and 12. See §§VII.A.11, VII.A.13.

21. Dependent Claim 20

- a. The communication device of claim 12, wherein the third connection includes an assigned session identifier.*

See claims 11 and 12. See §§VII.A.12, VII.A.13.

B. Ground II: Claims 1-20 Are Obvious Over Kotzin Alone Or In View Of Peirce And Held

1. Motivation to Combine Kotzin with Peirce And Held

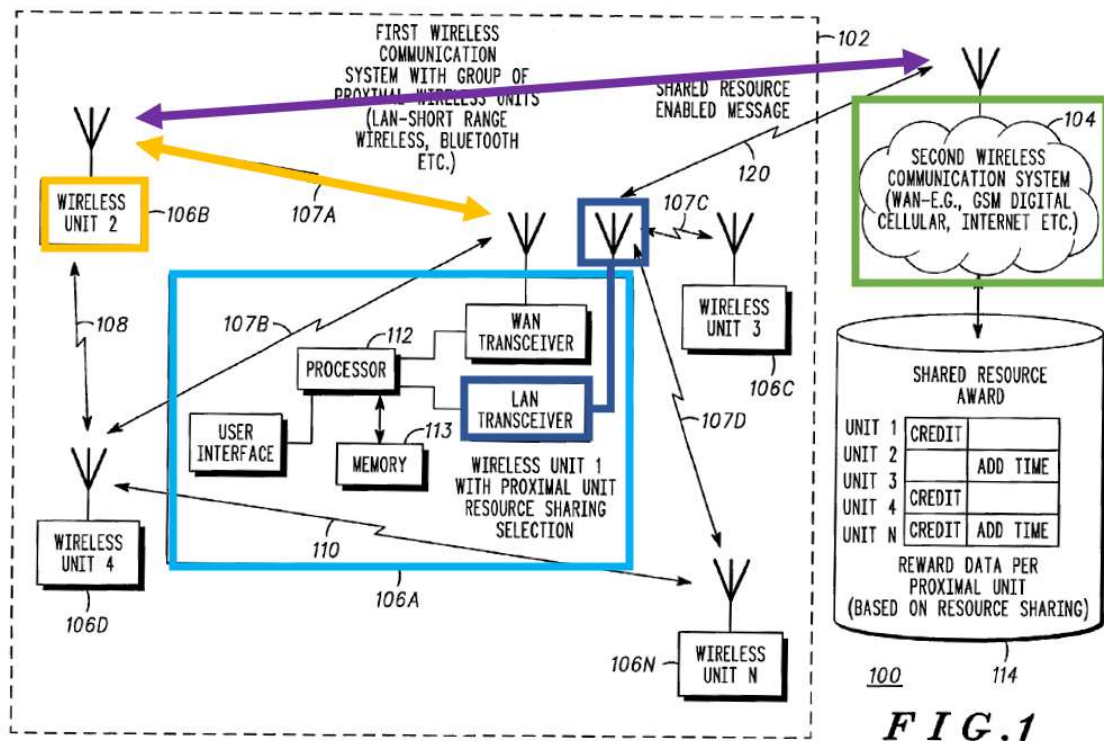
Although Kotzin alone (Ground IA) renders the Challenged Claims obvious, a POSITA would have been motivated to combine Kotzin with Peirce and Held (Ground IB) to render obvious the use of a session identifier as required by claim 11, further rendering that claim obvious. Specific motivations to combine are discussed below in §VII.B.12.

2. Independent Claim 1

- a. [1.pre] A computer-implemented method for a first device to communicate via a wide area network,*

comprising the steps of:

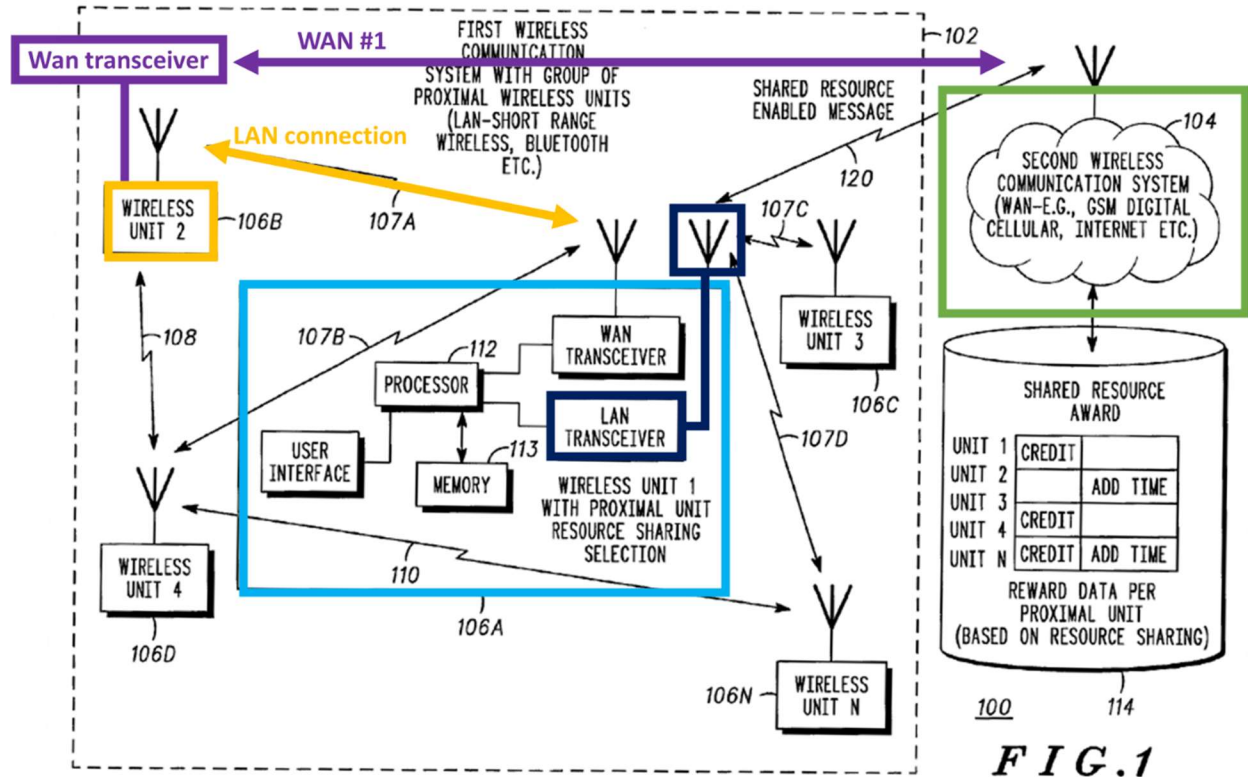
Kotzin discloses a proximal wireless unit (first device), for example 106A, that communicates via a wide area network. Kotzin discloses that wireless unit 106A communicates wirelessly with “a wide area network (WAN) communication system 104 such as a digital cellular communication system, the Internet, or any other suitable communication system.” EX1018 ¶[0022]. As shown below in Figure 1, Kotzin’s wireless unit 1 (106A, light blue) includes a LAN transceiver (dark blue) that allows it to connect to one or more other wireless units (*e.g.*, unit 2, 106B, orange), which in turn use their WAN transceivers to connect (purple) unit 1 to a wide area network such as the Internet (green):



EX1018, Fig 1; *see also id.*, ¶[0022]. Kotzin further explains that the wireless units including 106A include “a processing apparatus 112, such as a digital signal processor, microprocessor, discrete logic or any other suitable circuitry that provides the proximal unit resource sharing selection” and may “execute instructions that are stored in memory.” EX1018, ¶[0023]. A POSITA would have understood or, at the very least, found it obvious that such components confirm that Kotzin’s method is computer implemented. EX1001, ¶85.

b. [1.1] connecting the first device to a first network having a first bandwidth via a second device;

As shown below in Figure 1, Kotzin explains that wireless unit 1 (also referred to as 106A) (blue, first device) can connect to a first wide area network (“WAN #1,” the claimed “first network,” purple) via wireless unit 2 (orange, “second device”). Like any data network, a POSITA would have understood and found obvious that WAN#1 has an associated bandwidth, which is the claimed first bandwidth. EX1001, ¶86. Wireless unit 1 uses its LAN transceiver (dark blue) to connect to wireless unit 2 using LAN connection 107A; wireless unit 2 in turn connects to WAN#1 using its WAN transceiver. This is illustrated below:



EX1018, Fig. 1, ¶[0022]. Kotzin explains that each of the wireless units shown in Figure 1 includes “a wireless local area network communication transceiver, such as a Bluetooth™-based transceiver” and the wireless units “are operative to communicate using a wireless local area network protocol with wireless unit 106a via wireless LAN communication links 107a-107d.” *Id.* ¶[0022]. “Each of the wireless units communicates in a peer-to-peer arrangement with each other using the wireless local area network communication transceivers.” *Id.* As shown in Figure 1, wireless unit 2 is in close enough proximity to unit 106A to allow wireless local area connection. *Id.* Each unit, including unit 2, further has a WAN transceiver which can be used to connect to WAN #1. *Id.* Accordingly, by

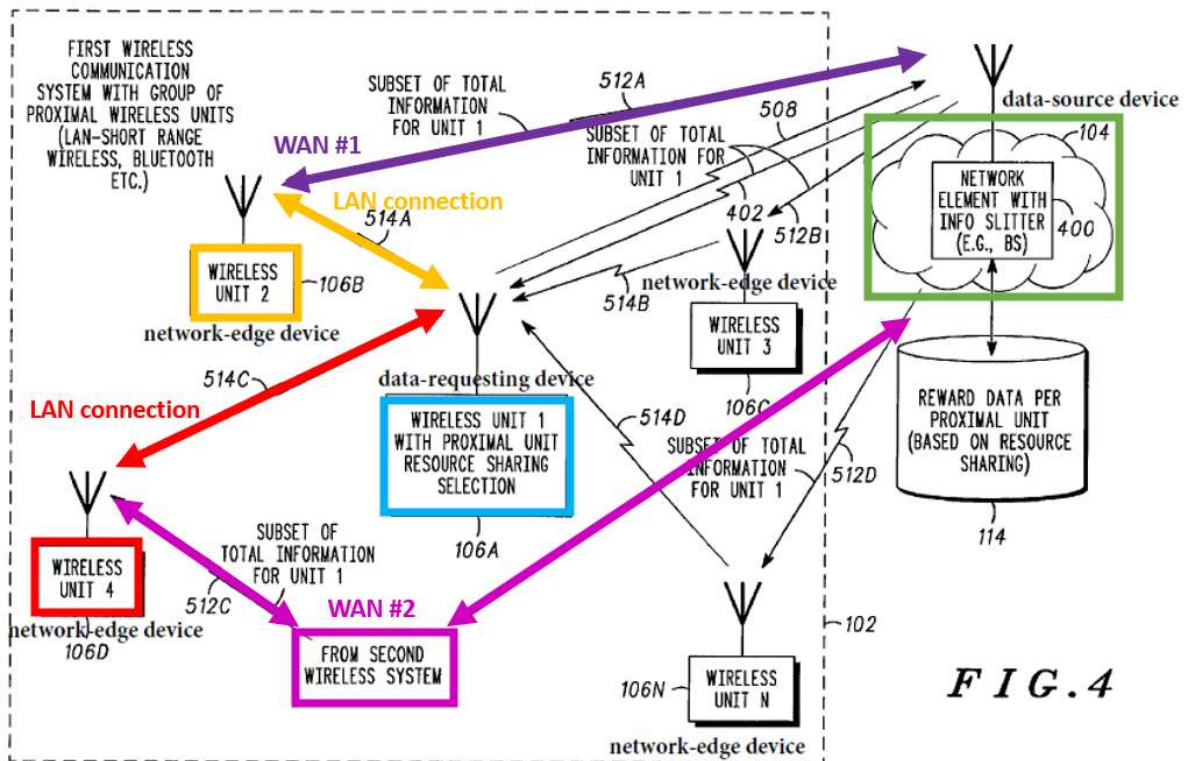
connecting to wireless unit 2 over the LAN, wireless unit 106A (first device) connects to WAN #1 (the first network) via unit 2's WAN transceiver.

To effect this connection, Kotzin explains that wireless unit 1 “carries out local communication via the wireless short range communication system to determine which of the wireless apparatus 106b-106n is within range of the wireless unit 106a,” effectively sending query messages to determine which proximal units are within range. *Id.*, ¶[0037]. Wireless unit 1 “sends additional shared resource participation queries 504a-504d to each of the wireless apparatus 106b-106n,” each of which respond to “indicate the amount of wireless resources that they are willing to allocate to this particular communication or session,” thus identifying the bandwidth available over the network including the first device, the second device, and the first network. *Id.* ¶¶[0037]-[0038]; *see also id.*, Fig. 5. Each of the wireless units participating in bandwidth sharing forward packets over the LAN that they receive on behalf of unit 1 (106A) over the WAN. *Id.*, Fig. 4, ¶¶[0035], [0036].

c. [1.2] connecting the first device to a second network having a second bandwidth via a third device;

Although in its main embodiment all of Kotzin's wireless units connect to the Internet via the same WAN, Kotzin discloses an alternate embodiment where some wireless units can be connected to the Internet via a different WAN. As Kotzin explains, “the wireless apparatus 106a-106n may be subscriber radios on

completely different WAN systems. In such an example, the coordination with a distribution of the information may be handled by one or more network elements from each of the differing systems using a coordinating entity in the network.” EX1018, ¶[0035]. This alternate embodiment is shown in Figure 4, where unit 4 (red) is connected to a second WAN, WAN#2 (pink):



Id., Fig. 4, ¶[0035]³.

This limitation is met when unit 1 (orange, “first device”) is connected to WAN #2 (pink, “second network”) via unit 4 (red, “third device”). Wireless unit 1

³ Annotations were added to Figure 4.

“sends additional shared resource participation queries 504a-504d to each of the wireless apparatus 106b-106n,” each of which respond to “indicate the amount of wireless resources that they are willing to allocate to this particular communication or session,” thus identifying the bandwidth available over the second network via the third device. *See* §§VII.B.2.b. Like any data network, a POSITA would understand and find obvious that WAN#2 has an associated bandwidth, which is the claimed second bandwidth. EX1001, ¶86.

- d. *[1.3] establishing a connection through which data may be transferred between the first device and a fourth device by concurrently using a first portion of the first bandwidth and a second portion of the second bandwidth, the connection having an effective bandwidth including the first portion of the first bandwidth and the second portion of the second bandwidth; and*
 - i. *[1.3.i] establishing a connection through which data may be transferred between the first device and a fourth device by*

Kotzin discloses that wireless unit 1 may communicate wirelessly with network element 400. Kotzin expressly discloses that network element, in one embodiment, may be an Internet web server 400: “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[.]” EX1018, ¶[0035].

Kotzin's web server is the claimed "fourth device." Petitioner relies on this web-server embodiment for the remainder of this analysis.

When unit 2 connected to WAN #1 and unit 4 connected to WAN #2 agree to provide requested data to wireless unit 1 from an Internet Web server, such as cnn.com for example, a two-link connection is established by which data can be transmitted from Internet web server 400 to wireless unit 1. This two-link connection is established using a messaging protocol illustrated in Figure 5, where unit 1 uses a series of messages including 504, 508, 510, and 512 to recruit unit 2, unit 4, and the Internet Web server into being part of the multilink connection.

For example, Kotzin explains that when Unit 1 requests data from an Internet web server, the device on the WAN, such as a WAN base station, will send a bandwidth amount message 402 (red) to unit 1. EX1018, ¶[0037]. Unit 1 then determines which additional wireless devices can participate in the communication with the WAN so that it can share bandwidth with other wireless devices to which it is connected via messages 504 (orange) and 506 (pink). *Id.* Unit 1 then sends a bandwidth distribution message 508 (blue) to the Internet web server to notify it as to which wireless units will participate in the connection. *Id.* ¶[0039], Fig. 5. In step 510, unit 1 sends each of the participating units 2, 3, 4, and N "a partial bandwidth request" (yellow) "indicating an amount of data to be received" by each unit from the WAN. *Id.*, ¶[0040], Fig. 5. In step 512, each of

those units “communicates via a control message or any other suitable scheme”
(green) with the WAN “to receive the portion of the bandwidth” destined for unit
1. *Id.*, ¶[0040], Fig. 5.

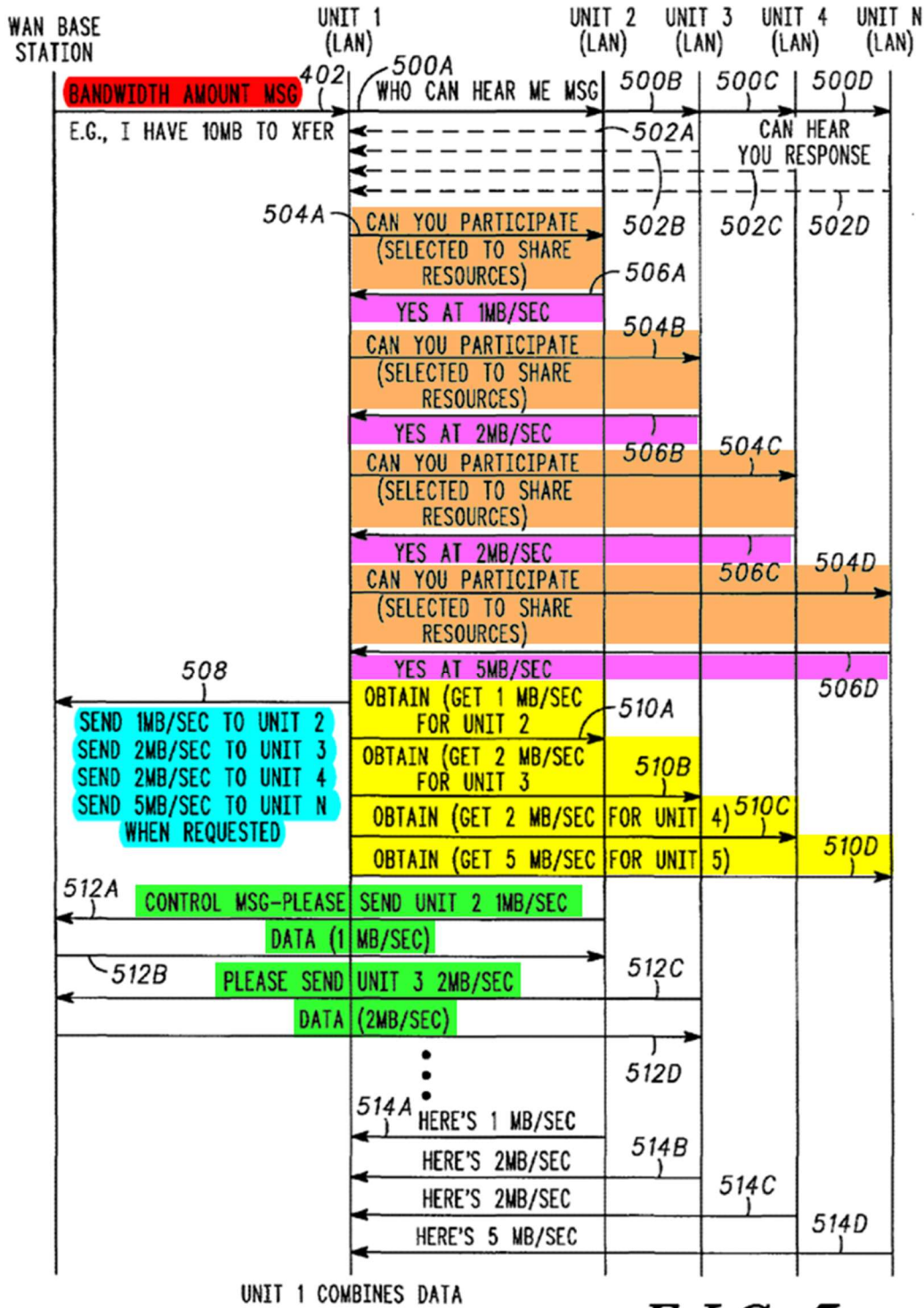


FIG. 5

Id. Fig. 5 (identifying the amount of bandwidth available for use for each device participating in the connection).

- i. *[1.3.ii] concurrently using a first portion of the first bandwidth and a second portion of the second bandwidth*

Kotzin's WAN #1 and WAN # 2 are separate and uncoordinated networks and a POSITA would have understood and found obvious that internet sends data packets over these networks at the same time. *See* § VII.A.2.d.iii; EX1001, ¶¶87-88. Kotzin teaches that "portions of the communication" from Internet web server 400 are "split . . . for distribution among the participating proximal wireless apparatus," including the apparatuses forming the first and second networks. EX1018, ¶[0036]; *see also id.*, at Figs. 4-6. Kotzin further teaches that these different portions of the communication correspond to "differing portions of the bandwidth for the destination apparatus," *e.g.*, the first device. *Id.* ¶[0041]. Kotzin thus teaches that wireless unit 1 concurrently uses the bandwidth allocated to wireless unit 2 (on WAN #1) and wireless unit 4 (on WAN #2) to receive data from Internet web server 400. It is through sending the packets concurrently over WAN #1 and WAN #2 that the overall bandwidth is increased. *See id.*

- i. *[1.3.iii] the connection having an effective bandwidth including the first portion of the first bandwidth and the second portion of the second bandwidth*

When an Internet Web site or the like (fourth device) sends data to wireless unit 1 (first device) via wireless units 2 and 4, it is over the connection that has been established between all of the claimed devices such that the overall effective

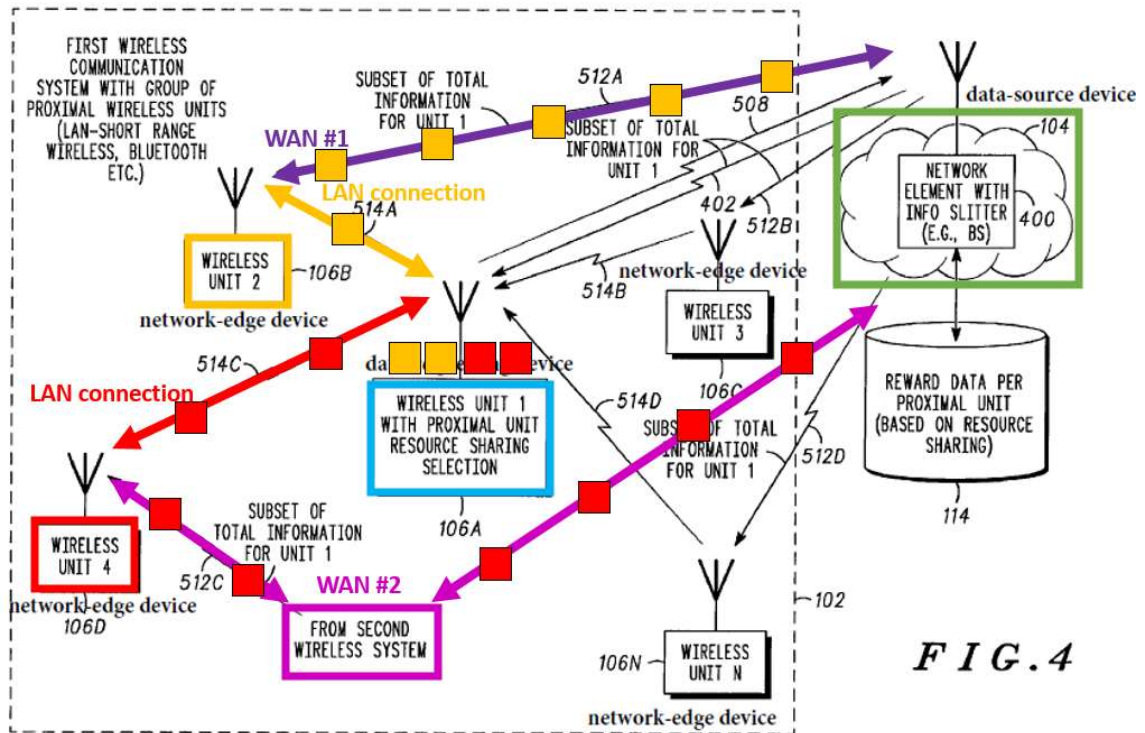
bandwidth is an aggregate of the individual links through units 2 and unit 4. *See* EX1018, ¶[0035]. As Kotzin explains, “one megabit per second can be sent to the wireless apparatus 106b, two megabits per second can be sent to wireless apparatus 106c, two megabits per second can be sent to wireless apparatus 106d, and five megabits per second can be sent to wireless apparatus 106n. Thus, in a period of about ten seconds or less, the destination unit can receive the total message of ten megabits.” *Id.*, ¶[0039].

- e. [1.4] receiving by the first device a data set from the fourth device via the connection, wherein a portion of the data set is received through the first network and a portion of the data is received through the second network.*

Kotzin teaches that “portions of the communication” are “split ... for distribution among the participating proximal wireless apparatus,” including the apparatuses forming the first and second networks. EX1018, ¶[0036]; *see also id.*, Figs. 4-6. Kotzin further teaches that these different portions of the communication correspond to “differing portions of the bandwidth for the destination apparatus,” *e.g.*, the first device. *Id.*, ¶[0041].

As shown in Figure 4, Kotzin discloses receiving a data set from a device such as an Internet web server 400 (green, fourth device) on the WAN (purple, first network) and through the second WAN (pink, second network) via the connection

between the first (blue), second (orange), and third (red) devices identified for elements [1.1]-[1.3].



Id., Fig. 4; *see also id.*, Fig. 5, ¶¶[0035]–[0041]; §§VII.B.2.b–VII.B.2.d. As explained in Sections VII.B.2.b and VII.B.2.c, Kotzin teaches that wireless unit 2 and wireless unit 4 may be on different wide area networks. *See* §§VII.B.2.b–VII.B.2.c. Each of these wireless units thereby receives information from Internet web server 400 over their respective WANs, and transmits its portion of data to wireless unit 1 via a LAN. *See generally* §VII.B.2.d. Accordingly, by transferring data to unit 1 via units 2 and 4, the first device receives a data set from the fourth device wherein a portion is received through the first network (WAN #1) and a portion is received through the second network (WAN #2).

3. Dependent Claim 2

- a. The computer-implemented method of claim 1, wherein the second network comprises at least one wireless network.*

Claim 1 is obvious. *See* §VII.B.2. WAN #2 is disclosed as a wireless access system including a cellular network, which is a wireless network. Indeed, all of Kotzin’s units communicate with the WAN using a wireless transceiver. EX1018, ¶[0022].

4. Dependent Claim 3

- a. The computer-implemented method of claim 2, wherein the wireless network comprises a cellular network.*

See claim 2. *See* §VII.B.3.

5. Dependent Claim 4

- a. The computer-implemented method of claim 1, wherein the first network is selected from the group consisting of a public wired network, a private wired network, a public wireless network, and a private wireless network.*

Claim 1 is obvious. *See* §VII.B.2. Kotzin teaches that the first network, WAN #1, is selected from a group that consists of “a digital cellular communication system, the Internet, or any other suitable communication system.” EX1018 ¶¶[0022], [0035]-[0037], [0040] (describing operation of LAN 102 and cellular base station transmitting over cellular network), Figs. 1, 4. As such, Kotzin teaches that the first network is selected from a group that consists of a cellular network, which is a wireless private network. EX1001, ¶89. Additionally, the

Internet is the amalgamation of multiple interconnected networks and includes public wired networks, private wired networks, a public wireless network, and private wireless networks. *Id.*, ¶¶58-59.

6. Dependent Claim 5

- a. The computer-implemented method of claim 1, wherein the second device is selected from the group consisting of a residential communications gateway, a cable modem, a digital subscriber line modem, a wireless device, a neighborhood access point device, and a cellular modem.*

Claim 1 is obvious, as described above (see §VII.B.2), and Kotzin further teaches that unit 2 (the “claimed second device”) is a wireless device, as discussed above. See §VII.B.2; EX1018, Figs. 1, 4.

7. Dependent Claim 6

- a. The computer-implemented method of claim 1, wherein the third device is selected from the group consisting of a residential communications gateway, a cable modem, a digital subscriber line modem, a wireless device, a neighborhood access point device, and a cellular modem.*

Unit 4 (the claimed “third device”) is a wireless device. EX1018, ¶¶[0017], [0022], Fig. 1.

8. Dependent Claim 7

- a. The computer-implemented method of claim 1, wherein the second network comprises the Internet.*

Claim 1 is obvious. See §VII.B.2. As described in §VII.B.2.c, the first and second network may be two different WANs that include the Internet, *e.g.*, “a

digital cellular communication system, the Internet, or any other suitable communication system.” EX1018, ¶[0022].

9. Dependent Claim 8

- a. The computer-implemented method of claim 1, wherein the first network comprises a private network.*

Claim 1 is obvious. *See* §VII.B.2. Additionally, for the reasons noted above with respect to claim 4, the first network can comprise a private network, such as a private cellular network or other private WAN. EX1018, ¶¶[0035]-[0037], Figs. 1, 4.; *see* §VII.B.5.

10. Dependent Claim 9

- a. The computer-implemented method of claim 1, wherein the first portion of the first bandwidth comprises substantially all the first bandwidth.*

Claim 1 is obvious. *See* §VII.B.2. Kotzin further explains that, upon initiating shared use of 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.” EX1018, ¶[0038]. Thereafter, “each of the participating wireless units 106b-106n receive portions of a communication destined for the wireless apparatus 106a” according to the amount of bandwidth they indicated they would be willing to donate. *Id.*, ¶[0040]. A POSITA would have understood and found obvious that a participating wireless unit may be willing to donate “substantially all” of its bandwidth. EX1001, ¶90. Indeed,

donating as much bandwidth as possible is incentivized for these units—the users of the units can thereby be assigned “reward data.” EX1018, ¶[0025] (“each wireless unit in the wireless local area network that has agreed to allow sharing of its local area network wireless resources is assigned reward data 116 to compensate the users of the wireless units for participating in the aggregation which increases the efficiency of the operator's system.”).

11. Dependent Claim 10

- a. The computer-implemented method of claim 1, wherein the step of connecting the first device to a first network having a first bandwidth via a second device includes the first network having current available bandwidth equal to or in excess of a minimum bandwidth.*

Claim 1 is obvious. *See* §VII.B.2. Kotzin further explains that wireless unit 2 will be unable to join in the connection without a current available bandwidth equal to or in excess of a minimum bandwidth. EX1018, Fig. 9 (“Of the proximal wireless unit[s] in LAN, determine which have **available wireless resources**”—*i.e.*, bandwidth—“to receive same information from WAN”). Kotzin explains that when additional bandwidth is required, a unit may recruit other units to meet a minimum necessary bandwidth which must be met by the recruited units. EX1018, ¶[0028] (“Accordingly, if a wireless unit, such as wireless unit 106d, wishes to send large amounts of data while also having a telephone call, but does not have the **necessary bandwidth** to perform both operations, data (or voice) may be

communicated to the wide area network 104 via the wireless unit 106a on behalf of the wireless unit 106d.”) As such, if a single unit is recruited, it must meet that entire necessary bandwidth. When two or more units are recruited, their aggregated bandwidth must meet that minimum. *See Id.*, ¶¶[0037]-[0038] (aggregated bandwidth from recruited units sums to bandwidth requested by recruiting unit).

12. Dependent Claim 11

- a. The computer-implemented method of claim 1, further comprising the step of assigning a session identifier to the connection.*

Claim 1 is obvious. *See* §VII.B.2. A POSITA would have understood and found obvious that Kotzin’s multilink connections are assigned a session identifier to correlate packets for a given session. EX1001, ¶91. Indeed, Kotzin explicitly notes that bandwidth is shared between wireless units only “for a given communication session.” EX1018, ¶[0021]. Kotzin’s system must therefore include a way to identify a particular session, thereby allowing the wireless units to identify and engage only in the specific sessions they have agreed to participate in. As discussed in detail in Section VII.A.11, it would have been obvious to a POSITA that such a session ID may be simply an arbitrary or randomly generated number. EX1001, ¶91.

The session identifier tuple used in TCP/IP would additionally have been known and obvious to a POSITA, and already present in Kotzin’s system. EX1001,

¶92. Kotzin specifically describes communication with Internet web servers. EX1017, ¶¶[0003], [0022], [0035], Fig. 1. As Held explains, the Internet is “a ubiquitous network of applications based on the TCP/IP. Started as a text-based network for scientific communication, the Internet grew dramatically in the late 1980s and 1990s, once not-text-only applications became available. The Internet now reaches about half a billion computers, most of which are connected to it through the telephone network.” EX1020, 142.

Given Kotzin’s express teaching of Internet Web communications and Held’s teaching that use of TCP/IP for Internet communications is “ubiquitous,” and given the need to differentiate communication sessions when sharing data, it would have been obvious to a POSITA to use TCP/IP (which uses a tuple session identifier) when communicating with an Internet site in Kotzin. EX1001, ¶¶80-81.

As discussed in detail in Section VII.A.11, TCP/IP (which runs underneath HTTP, used for browsing web pages) makes use of a tuple comprised of source IP address/port number, destination IP address/port number (and protocol identifier) to uniquely identify a communication session. A POSITA would have understood and found obvious for the primary flow between Kotzin’s wireless unit and the Internet server with which it is communicating, to include the TCP/IP tuple as part of the data payload in communications associated with that session—including the messages exchanged with the wireless units. EX1001, ¶92. The bandwidth-sharing

wireless units would thereby be able to identify a specific multilink communication session. EX1043.

It also would have been obvious to POSITA to incorporate Peirce's teaching of a session identifier into Kotzin, as explained in Section VII.B.1 above.. Peirce, which also discloses a system for bandwidth sharing, discloses an express mechanism for identifying and coordinating data streams on a per-session basis, namely a "bundle update packet" that includes a session identifier in the form of an "identification field [that] 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." EX1044, 2:59-65. This packet includes a bundle ID that identifies the session. *Id.* 2:57-65. The use of a session ID as taught by Peirce would have been compatible with Kotzin's disclosed architecture, and the session ID would be included with all data packets as a coordinating reference that ensures 108B receives all packets destined for it while at the same time satisfying Kotzin's express teaching that the wireless units may share bandwidth with multiple other devices at the same time. Data packets in Peirce's system include a bundle ID in the transport layer protocol payload, which in the case of Peirce's disclosure is UDP. EX1044, 5:60-6:21. Given Kotzin's express teaching of the need for a session identifier, it would have been obvious to a

POSITA to incorporate Peirce's teaching of a session identifier into the TCP layer payload that the other wireless units reference when they receive data from Internet Web server 400, and based upon which they forward the data to UNIT 1. EX1001, ¶¶ 93-96.

Peirce and Kotzin both relate to using multiple links between a source and destination to send a split data stream that is reconstructed into a single data stream at the destination. EX1017, Abstract; EX1044, Abstract. Given this architectural and functional similarity, a POSITA would have found it obvious to use Peirce's mechanism to keep track of Kotzin's packets. EX1001, ¶95. As Dr. Lin explains, using a mechanism such as Peirce's session ID with Kotzin would have been obvious to try, and nothing more than combining prior art elements according to known methods and applying a known technique to a known device ready for improvement, both to yield predictable result. EX1001, ¶96. Further, given that packet-based communications were well known in the art, a POSITA would have had a reasonable expectation of success in implementing such a common and well-known technology with Challenger using routine computer programming techniques. *Id.*.

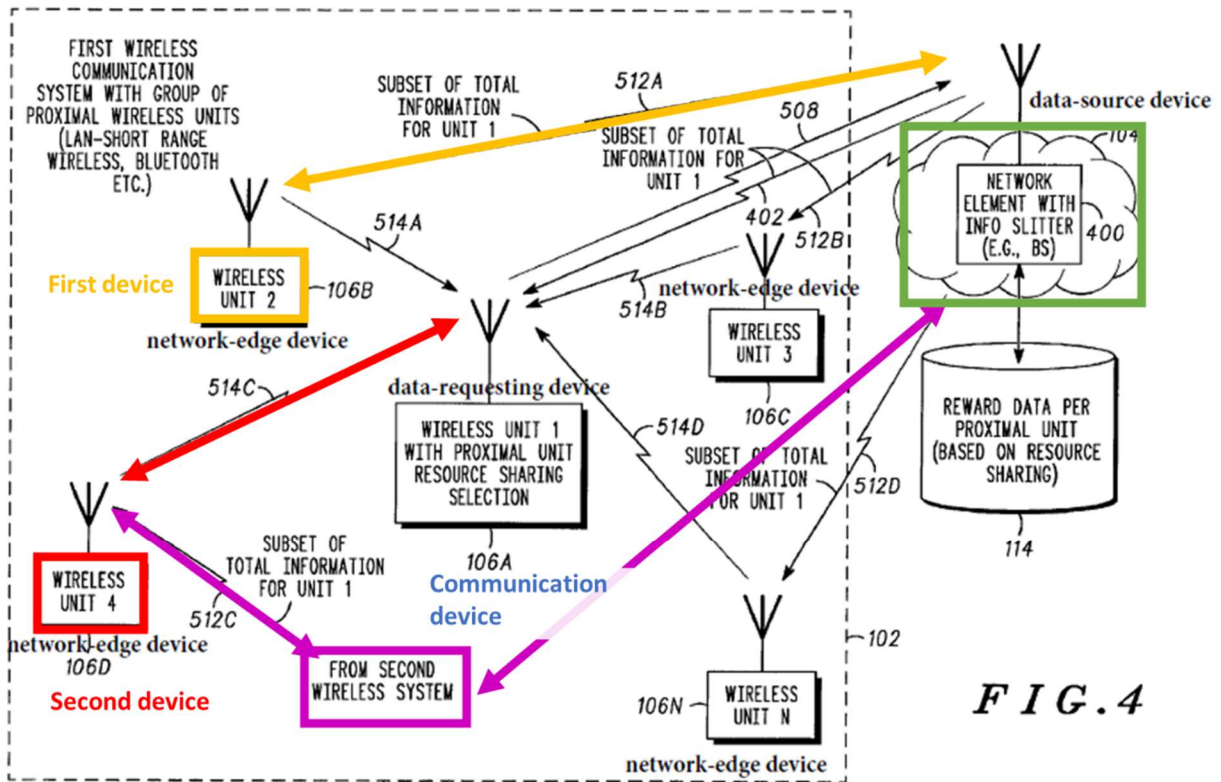
13. Independent Claim 12

- a. [12.pre] A communication device capable of providing broadband communications services comprising:*

As discussed with respect to the preamble to claim 1 (see VII.B.2.a) Kotzin teaches a communication device capable of providing broadband communications services. EX1018 ¶[0006], Fig. 4; *see also id.* ¶¶[0011], [0035]–[0041].

- a. [12.1] a first connection via a first device to a first network having a first bandwidth including an allocated first portion of the first bandwidth;*

As discussed with respect to the limitation 1.1 (see §VII.B.2.b) Kotzin discloses an embodiment in which Unit 1 (*i.e.*, the communication device) receives data from a WAN #1 through another unit, for example Unit 2. EX1018, Figs. 4–5, ¶¶[0035], [0039]. As illustrated below, Kotzin teaches a first device (unit 2, 106B) (orange), connected to a first network (WAN 400, *e.g.*, an Internet web server) (green) having a first bandwidth including an allocated first portion of the first bandwidth:



EX1018, ¶[0006], Fig. 4. Like any data network, a POSITA would understand and find obvious that WAN#1 has an associated bandwidth, which is the claimed first bandwidth (*see* §VII.B.2.b), and that a device on that network will be allocated a portion of that bandwidth. *Id.*, ¶[0039]; EX1001, ¶97. Kotzin explains that “the method includes identifying to the wide area network which local area network units ... will participate in sharing of the resources,” including “the maximum bandwidth that was provided by each of the proximal wireless units” as available for sharing. EX1018, ¶[0039]. Each participating unit communicates with the WAN “to receive *the portion of the bandwidth* of the communication that is destined for the wireless apparatus 106a.” *Id.*, ¶[0040]. For example, a portion of

the bandwidth can be *allocated* to units such that “one megabit per second can be sent to the wireless apparatus 106b, two megabits per second can be sent to wireless apparatus 106c,” and so on. *Id.*, ¶[0039]. As noted, “the wireless apparatus 106a itself may also participate in receive a portion of the message destined for it,” a portion of bandwidth is, in that case, also *allocated* to unit 1. *Id.*, ¶[0039]. Upon communication with participating units, the WAN transmits “to each of the participating wireless units,” including in the embodiment noted above, unit 2, “subsets of the total information destined for the wireless apparatus 106a.” *Id.*, ¶[0040]. These subsets are transmitted over the bandwidth *allocated* to each participating unit, including unit 1 (for example, “one megabit per second” for unit 2, “two megabits per second” for unit 3, and so on). *Id.*, ¶[0039].

This is illustrated in Figure 5 below. Kotzin explains that when Unit 1 requests data from an Internet web server, Unit 1 “sends additional shared resource participation queries 504a-504d to each of the wireless apparatus 106b-106n,” each of which respond to “indicate the amount of wireless resources that they are willing to allocate to this particular communication or session,” thus identifying the bandwidth available over the first network via the first device (Unit 2). For example, in Fig. 5, Unit 2 has an allocated bandwidth of 1 MB/s.

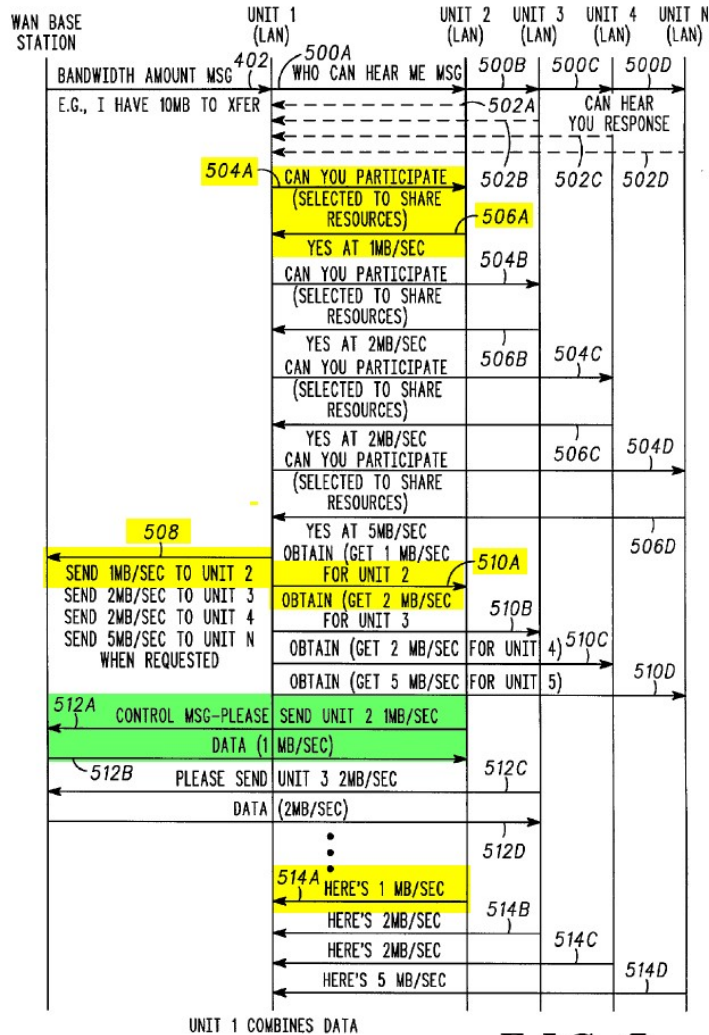


FIG. 5

Id. Fig. 5 (identifying the amount of bandwidth available for use for each device participating in the connection).

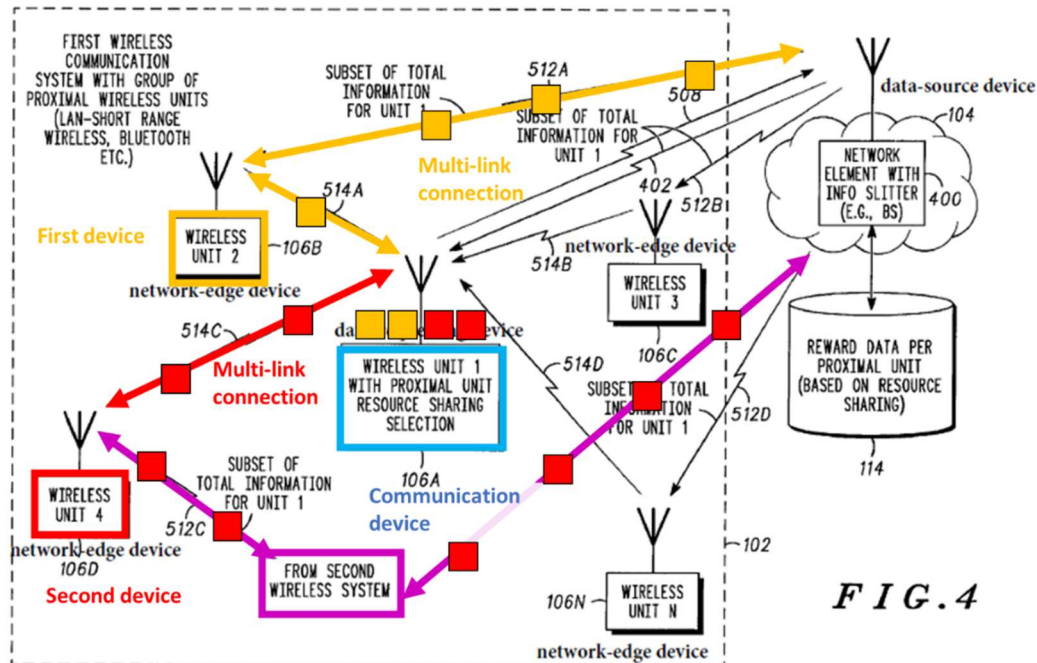
- a. [12.2] a second connection via a second device to a second network having a second bandwidth including an allocated second portion of the second bandwidth; and

As discussed with respect to the limitation 1.2 (See §VII.B.2.c) Kotzin teaches that Unit 1 (“communication device”) (blue) is connected to a second

network—WAN #2. A second device (unit 4, 106D) (red) is connected to a second network (pink) having a second bandwidth including an allocated second portion of the second bandwidth. EX1018 ¶[0006], *See also* VII.B.13.a. Fig. 4. Like any data network, a POSITA would have understood and found obvious that WAN#2 has an associated bandwidth, which is the claimed second bandwidth. *See* VII.B.13.a.

- a. *[12.3] a third connection to a remote device via the first network and the second network, the third connection having an effective bandwidth including the allocated first portion of the first bandwidth and the allocated second portion of the second bandwidth;*

See limitations 1.3 and 1.4. *See* §§VII.B.2.d, VII.B.2.e. 106A's connection to Internet web server 400 is a multi-link connection over both WANs, where packets sent between 106A and Internet Web server 400 are split over the two networks. EX1018, Fig. 4. Both allocated bandwidths add together to form an effective bandwidth. *Id.*, ¶[0039] (“one megabit per second can be sent to the wireless apparatus 106b, two megabits per second can be sent to wireless apparatus 106c, two megabits per second can be sent to wireless apparatus 106d, and five megabits per second can be sent to wireless apparatus 106n. Thus, in a period of about ten seconds or less, the destination unit can receive the total message of ten megabits.”). This data is transferred to 106A using the same rate (514a-d in Figure 5) (orange).



Id., Fig. 4.

- a. [12.4] wherein, in response to transmitting a request to the remote device via the third connection, the communication device receives a response from the remote device wherein a portion of the response is received via the first network and a portion of the response is received via the second network.

As illustrated below, Kotzin teaches that when “communication device” unit 1 transmits a request for data transmission to the Internet web server 400 after setting up the multi-link connection using messages 400, 500, 502, 504, 506, 508, 510, and 512 (orange), (see EX1018, Fig. 5), the Internet web server 400 responds sending a portion of the response via the first network (WAN #1, connected directly to unit 1) and a portion via the second network (WAN #2, associated with unit 4). EX1018 ¶[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.”); *see also id.* ¶¶[0036]-[0041] (describing how unit 1, “106a,” is the “destination unit” and how “other wireless apparatus 106b-106n ... have agreed to participate to share their short range wireless resources [and] are used to retransmit portions of the communication that have been split by the wide area network 104” in response to a request for data from unit 1).

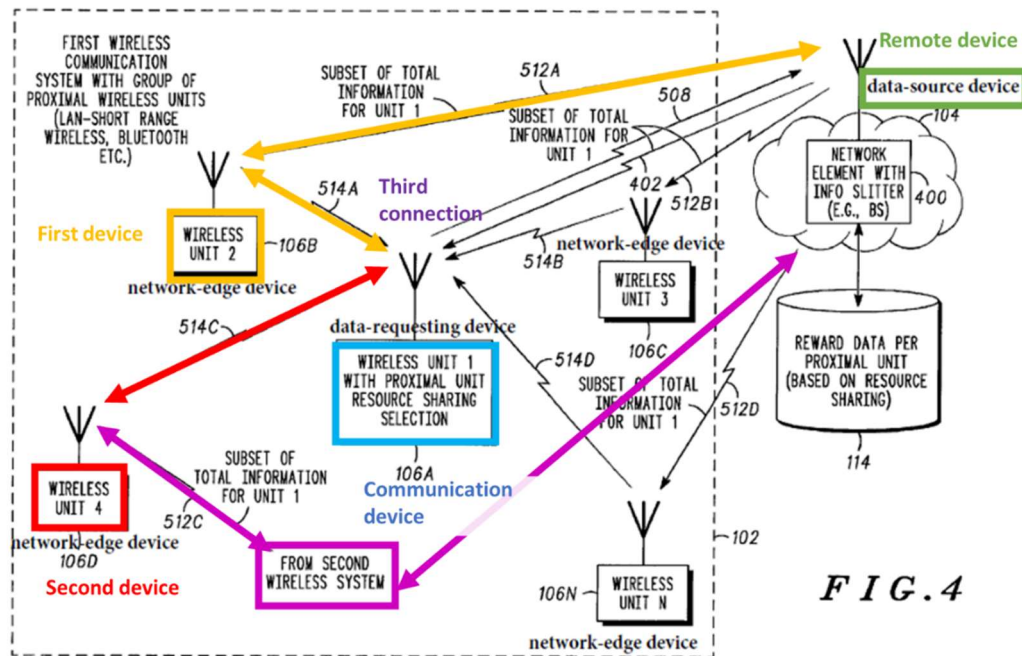


FIG. 4

EX1018 ¶[0006], Fig. 4; *see also* §VII.B.2.e.

14. Dependent Claim 13

- a. *The communication device of claim 12, wherein the second network comprises at least one wireless network.*

See claims 2 and 12. *See* §§VII.B.3, VII.B.13.

15. Dependent Claim 14

- a. The communication device of claim 12, wherein the wireless network comprises a cellular network.*

See claims 3 and 12. See §§VII.B.4, VII.B.13.

16. Dependent Claim 15

- a. The communication device of claim 12, wherein the first network is selected from the group consisting of a public wired network, a private wired network, a public wireless network, and a private wireless network.*

See claims 4 and 12. See §§VII.B.5, VII.B.13.

17. Dependent Claim 16

- a. The communication device of claim 12, wherein the first connection is made to a first connection device selected from the group consisting of a residential communications gateway, a cable modem, a digital subscriber line modem, a wireless device, a neighborhood access point device, and a cellular modem and the second connection is made to a second connection device selected from the group consisting of a residential communications gateway, a cable modem, a digital subscriber line modem, a wireless device, a neighborhood access point device, and a cellular modem.*

See claims 5, 6 and 12. See §§VII.B.6, VII.B.7, VII.B.13.

18. Dependent Claim 17

- a. The communication device of claim 12, wherein the first network comprises a private network and the second network comprises the Internet.*

See claims 7, 8 and 12. See §§VII.B.8, VII.B.9, VII.B.13.

19. Dependent Claim 18

- a. The communication device of claim 12, wherein the first portion of the first bandwidth comprises substantially all the first bandwidth.*

See claims 9 and 12. See §§VII.B.10, VII.B.13.

20. Dependent Claim 19

- a. The communication device of claim 12, wherein the allocated first portion of the first bandwidth meets or exceeds a minimum bandwidth.*

See claims 10 and 12. See §§VII.B.11, VII.B.13.

21. Dependent Claim 20

- a. The communication device of claim 12, wherein the third connection includes an assigned session identifier.*

See claims 11 and 12. See §§VII.B.12, VII.B.13.

VIII. SECONDARY CONSIDERATIONS

Petitioner is unaware of any evidence of alleged secondary indicia that would support non-obviousness of the '343 patent. To the extent Patent Owner subsequently presents such evidence, Petitioner respectfully requests the right to respond.

IX. MANDATORY NOTICES

As set forth below and pursuant to 37 C.F.R. §42.8(a)(1), the following mandatory notices are provided as part of this Petition.

A. Real Party in Interest Under 37 C.F.R. §42.8(b)(1)

Red Hat, Inc. is the real party in interest for Petitioner.

B. Related Matters

Red Hat has filed a complaint for declaratory judgment in *Red Hat, Inc. v. Competitive Access Systems, Inc.*, 5-24-cv-00505-D-BM. This case may affect, or be affected by, decisions in these proceedings.

C. Lead and Back-Up Counsel Under 37 C.F.R. §42.8(b)(3)

Pursuant to 37 C.F.R. §42.8(b)(3), Petitioner provides the following designation of counsel:

Lead Counsel	Back-Up Counsel
Todd M. Friedman (Reg. No. 42,559) tfriedman@kirkland.com 601 Lexington Ave. New York, NY 10022 Phone: (212) 446-4800 Fax: (212) 446-4900	Yimeng Dou (Reg. No. 69,770) yimeng.dou@kirkland.com 695 Town Center Dr, Suite 1700 Costa Mesa, CA 92626 Phone: (714) 982-8822 Fax: (714) 982-8844 James E. Marina (Reg. No. 41,969) jmarina@kirkland.com 601 Lexington Ave. New York, NY 10022 Phone: (212) 446-4786 Fax: (212) 446-4900 Brandon H. Brown (to seek <i>pro hac</i> <i>vice</i> admission) bhbrown@kirkland.com 555 California Street, Suite 2700 San Francisco, CA 94104 Phone: (415) 439-1400 Fax: (415) 439-1500 W. Todd Baker (Reg. No. 45,265) todd.baker@kirkland.com KIRKLAND & ELLIS LLP 1301 Pennsylvania Ave., N.W. Washington, D.C. 20004 Phone: 202-389-3135 Fax: 202-389-5200

D. Service Information Under 37 C.F.R. §42.8(b)(4)

Red Hat concurrently submits a Power of Attorney, 37 C.F.R. §42.10(b), and consents to electronic service by email at Red_Hat_III@kirkland.com.

X. PAYMENT OF FEES UNDER 37 C.F.R. §42.103

The undersigned authorizes the Office to charge the fee set forth in 37 C.F.R. §42.15(a)(1) for this Petition to Deposit Account No. 506092, consistent with the requested review of 20 claims, and any additional fees that may be due in connection with this Petition to be charged to the above-referenced deposit account.

XI. GROUNDS FOR STANDING UNDER 37 C.F.R. §42.104(A)

Petitioner hereby certifies that the '343 patent is available for IPR and that the Petitioner is not barred or estopped from requesting IPR challenging the Challenged Claims on the grounds identified herein. Neither Petitioner, nor any party in privity with Petitioner: (i) has filed a civil action challenging the validity of the Challenged Claims; (ii) has been served a complaint alleging infringement of the '343 patent more than one year prior to the present date; or (iii) is estopped from challenging the claims on the grounds identified in the Petition. The Challenged Claims also have not been the subject of a prior IPR or a finally concluded district court litigation.

XII. DISCRETIONARY DENIAL IS NOT APPROPRIATE

To the extent Patent Owner contends that discretionary denial is appropriate for any reason, Petitioner intends to oppose such arguments pursuant to the bifurcated briefing process set forth in the March 26, 2025 Stewart Memorandum.

XIII. CONCLUSION

Petitioner requests *inter partes* review of the Challenged Claims; there is a reasonable likelihood they are obvious in view of the Grounds presented above.

Dated: August 1, 2025

Respectfully submitted,

/Todd M. Friedman/

Todd M. Friedman (Reg. No. 42,559)

tfriedman@kirkland.com

601 Lexington Ave.

New York, NY 10022

Phone: (212) 446-4800

Fax: (212) 446-4900

Yimeng Dou (Reg. No. 69,770)

yimeng.dou@kirkland.com

695 Town Center Dr, Suite 1700

Costa Mesa, CA 92626

Phone: (714) 982-8822

Fax: (714) 982-8844

James E. Marina (Reg. No. 41,969)

jmarina@kirkland.com

601 Lexington Ave.

New York, NY 10022

Phone: (212) 446-4786

Fax: (212) 446-4900

Brandon H. Brown (to seek *pro hac vice*
admission)

bhbrown@kirkland.com

555 California Street, Suite 2700

San Francisco, CA 94104

Phone: (415) 439-1400

Fax: (415) 439-1500

W. Todd Baker (Reg. No. 45,265)

Petition for *Inter Partes* Review of U.S. Patent No. 11,582,343

todd.baker@kirkland.com
KIRKLAND & ELLIS LLP
1301 Pennsylvania Ave., N.W.
Washington, D.C. 20004
Phone: 202-389-3135
Fax: 202-389-5200

Attorneys for Petitioner Red Hat, Inc.

CERTIFICATE OF COMPLIANCE

This Petition complies with the type-volume limitations as mandated in 37 C.F.R. §42.24, totaling 13,796 words. Counsel has relied upon the word count feature provided by Microsoft Word.

/Todd M. Friedman /

Todd M. Friedman (Reg. No. 42,559)

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing document will be served on August 4, 2025, via overnight delivery directed to the attorney/agent of record for the patent as identified on USPTO Patent Center at the following address:

The Law Office of Clay McGurk
P.O. Box 1488
Orange, CA 92856

A courtesy copy is also being served via electronic mail and FTP on August 1, 2025 on the attorneys of record listed below for the following related matter:

Red Hat, Inc. v. Competitive Access Systems, Inc. Case No. 5:24-cv-505 (EDNC)

Gavin B. Parsons
N.C. State Bar I.D. No. 28013
Post Office Box 33009
Raleigh, NC 27636-3009
Email: gparsons@wardandsmith.com

B. Scott Eidson, #57757MO
Timothy D. Krieger, #57832MO
Julie C. Scheipeter, #65978MO
Zachary T. Buchheit, #71816MO
7700 Forsyth Blvd., Suite 1100
St. Louis, MO 63105
Email: scott.eidson@stinson.com
Email: tim.krieger@stinson.com
Email: Julie.scheipeter@stinson.com
Email: Zachary.buchheit@stinson.com

Adrianna M. Chavez, #035011AZ
1850 N. Central Ave., Suite 2100

Petition for *Inter Partes* Review of U.S. Patent No. 11,582,343

Phoenix, AZ 85004
Email: adrianna.chavez@stinson.com

Judith S. Araujo, #54102CO
1144 Fifteenth St., Suite 2400
Denver, CO 80202
Email: judith.araujo@stinson.com

/Todd M. Friedman /
Todd M. Friedman (Reg. No. 42,559)