

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ORACLE CORPORATION,

Petitioner,

v.

COMPETITIVE ACCESS SYSTEMS, INC.,

Patent Owner.

IPR2023-00880

U.S. Patent No. 9,350,649

PETITION FOR *INTER PARTES* REVIEW

OF U.S. PATENT NO. 9,350,649

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EXHIBIT LIST

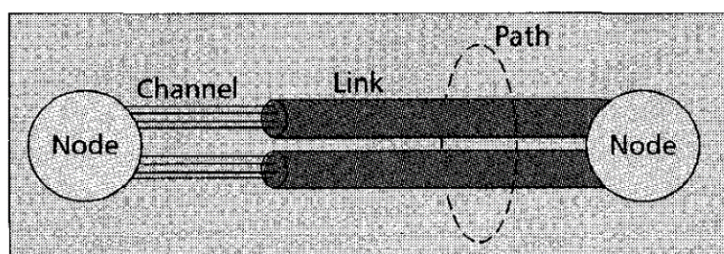
Exhibit No.	Description
1001	U.S. Patent No. 9,350,649 to Delangis (“the ’649 Patent”)
1002	Prosecution History for the ’649 Patent
1003	Declaration of Bill Lin, Ph.D.
1004	U.S. Patent Application No. 2003/0223450 to Bender (“Bender”)
1005	U.S. Patent No. 6,160,808 to Maurya (“Maurya”)
1006	Mineno (Annotated)
1007	RFC793
1008	RFC1661
1009	RFC1990
1010	EDTX 2:22-cv-287 Competitive Access Systems, Inc. v Oracle Corporation and Oracle America, Inc., Complaint
1011	EDTX 2:22-cv-287 Competitive Access Systems, Inc. v Oracle Corporation and Oracle America, Inc., Exhibit F-649 MPTCP
1012	EDTX-2:22-cv-287 Competitive Access Systems, Inc. v Oracle Corporation and Oracle America, Inc., Exhibit G-649 SD-WAN
1013	Declaration of Gordon MacPherson for Mineno
1014	Declaration of Sandy Ginoza for RFC793
1015	EDTX 2:22-cv-287 Competitive Access Systems, Inc. v Oracle Corporation and Oracle America, Inc. Competitive Access Systems, Inc.’s Disclosure of Asserted Claims and Infringement Contentions
1016	EDTX 2:22-cv-287 Competitive Access Systems, Inc. v Oracle Corporation and Oracle America, Inc., Exhibit D-801 MPTCP
1017	EDTX 2:22-cv-287 Competitive Access Systems, Inc. v Oracle Corporation and Oracle America, Inc., Exhibit E-801 SD-WAN
1018	EDTX 2:22-cv-287 Competitive Access Systems, Inc. v Oracle Corporation and Oracle America, Inc., Exhibit H-908 MPTCP
1019	EDTX 2:22-cv-287 Competitive Access Systems, Inc. v Oracle Corporation and Oracle America, Inc., Exhibit I-908 SD-WAN
1020	Cohen, Managing TCP Connections under persistent HTTP
1021	EDTX 2:22-cv-287 Competitive Access Systems, Inc. v Oracle Corporation and Oracle America, Inc., CAS’s Opposition to Oracle’s Motion to Dismiss
1022	Chen, New Approaches to Routing for Large-Scale Data Networks

Exhibit No.	Description
1023	GitHub page
1024	Gustafsson, A Literature Survey on Traffic Dispersion
1025	IEEE Xplore Article - Multiple Paths Protocol for a Cluster Type Network (Annotated)
1026	Wireless IP Network Standard
1027	U.S. Patent No. 8,370,507 to Cain (“Cain”)

I. BACKGROUND

By 2001, the Internet had exploded in popularity. Most computers had Internet access. End-user computers, called the “client,” requested data from servers, which provided an assortment of content. For example, with web browsing—a popular activity for millions—clients requested webpages/images/etc. from Internet servers. The File Transfer Protocol (“FTP”) was also widely-used for transferring files. The Internet Protocol (“IP”) was commonly used with TCP for requesting/receiving webpages from Internet servers, and for FTP. Ex-1007, 000008-9, 000011-16; Ex-1003, ¶¶3-6.

Since Internet connections were often slow, several approaches increased bandwidth by aggregating multiple connections paths together, for example using multiple dial-up modem or ISDN lines. This was known as traffic dispersion. Ex-1006, ¶¶0006-9; Ex-1024, Fig. 3:



■ **Figure 3.** *Multiple channels and links between nodes in a network.*

Ex-1003, ¶7.

For example, Multilink Point-to-Point Protocol (“MLPPP”) combined multiple physical links into one logical link. Ex-1009, 000007. Other approaches

used multiple TCP paths. *E.g.*, Ex-1006, ¶¶17. Indeed, the popular Netscape Navigator browser supported concurrent TCP connections. Ex-1020; Ex-1003, ¶¶8-9.

II. THE '649 PATENT

The '649 patent is a continuation filed in 2014, citing a 2003 parent application. The patent describes a “Residential Communications Gateway (RCG)” which “is a broadband communications device that combines all voice, data and video communications to and from a typical residence or small business for transmission over a single, or a plurality of Plain Old Telephone Service (POTS) lines[.]” Ex-1001, Abstract. The summary of the alleged invention lists various RCG features, including large display, Ethernet, Wi-Fi,¹ and support for three telephones/fax machines. *Id.*, 2:36-47.

The latter portion of the specification discusses RCGs in neighboring homes using Wi-Fi to connect to each other and then aggregate their dial-up Internet connections using MLPPP (“per RFC 1990”). *Id.*, 11:3-7. The '649 specification uses terminology from RFC1990 including, *e.g.*, its discussions of a “multilink PPP bundle,” etc. *Id.*

¹ The specification cites known networking standards and admits IEEE 802.11 was “ubiquitous[.]” Ex-1001, 4:24, 11:4-7; Ex-1003, ¶11.

In January 2013, the IETF published the Multipath TCP standard, RFC6824. Subsequently, in 2014, the Applicant filed the application for the '649 patent, with new claims that introduce new terminology from multipath TCP, for example referring to a “multipath connection” and “connection ID.” Neither term appears in the '649 specification. Ex-1003, ¶13.

Unlike the original 2003 application, which had claims directed to the RCG described in the specification, the claims of the '649 patent attempt to capture broader notions of multipath communications. However, MLPPP was already known and used, and using multiple TCP communication paths was already taught by various references including Mineno. *Supra* §I; Ex-1003, ¶¶10-14.

A. District Court Allegations

PO accused a variety of networking devices based on the alleged use of multiple connection paths, including purported support for the Multipath TCP standard. Ex-1010, ¶9, ¶45; Ex-1015, 000003-4, 000011-25, 000043-59, 000076-86; Ex-1003, ¶15.

B. Prosecution History

During prosecution, the Examiner focused on “multicast” prior art, for broadcasting media, rather than prior art MLPPP (cited in the specification) or multipath TCP (which PO now accuses). The Examiner’s search strategy included “multicast” in 22 of 28 searches, not counting searches for the inventor’s name.

Ex-1002, 000451, 000528, 000555. The only two Office Actions relied on four multicast references, with motivations to combine based on “multicast” and “multicasting service.” Ex-1002, 000442-000443, 000516-18; Ex-1003, ¶16.

The Applicant distinguished the cited art by arguing against multicasting. Ex-1002, 000468, 000538-9. The Examiner did not provide substantive analysis of Mineno, TCP, or RFC1990. Ex-1003, ¶17.

C. Priority Date

This Petition demonstrates invalidity as of October 2003 and October 15, 2002, without taking a position on whether the claims are entitled to these dates. Ex-1003, ¶18.

D. Secondary Considerations

To the extent PO attempts to argue secondary considerations, none are supported. PO cannot rely on the adoption of multipath TCP, since the ’649 specification does not mention it, and the first mention of multipath terminology was introduced in claims added in 2014—a year after the Multipath TCP standard (*supra* §II) and many years after Mineno and other multipath TCP prior art. Ex-1003, ¶21. Nor is there any evidence of nexus between the challenged claims and commercial products. At most, multipath TCP would be one feature among many—and not an important one: it is being disabled in Oracle Linux. Ex-1023; Ex-1003, ¶¶20-23.

III. IDENTIFICATION OF CHALLENGE

Petitioner requests *inter partes* review and cancelation of the challenged claims on the following grounds:

Grounds	Claims	Statutory Basis	Prior Art
1	1-12, 21-22	§103	Bender and Maurya
2	1-12, 21-22	§103	Mineno and RFC793
3	1-12, 21-22	§103	Mineno, RFC 793, RFC1990, and RFC1661

A. US2003/0223450 (“Bender”)

Bender was filed May 29, 2002; it is prior art under pre-AIA §102(e) and AIA §102(a)(1)-(2). Bender teaches MLPPP to “aggregat[e] multiple air interfaces” between a mobile station and a Packet Data Service Node (“PDSN”) that provides Internet access. Ex-1004, ¶0008, Fig. 5:

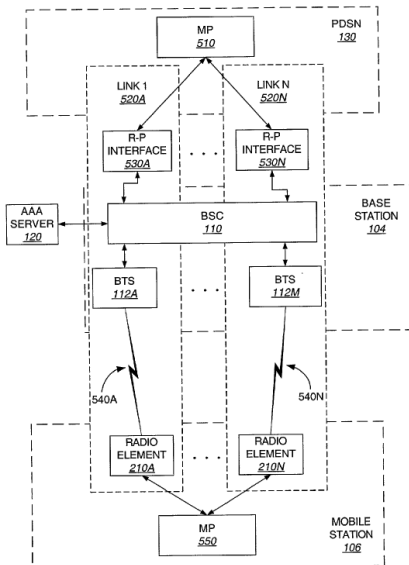


FIG. 5

Ex-1003, ¶27.

Bender is in the same field of endeavor (telecommunications and networking). *Infra* §IV. Bender is directed to telecommunications and describes various telecommunications/networking standards, including RFC1990, which the '649 patent also relies on. *Compare* Ex-1004, ¶¶0005, ¶¶0026 with Ex-1001, 11:4-7; Ex-1003, ¶28.

B. US6,160,808 (“Maurya”)

Maurya was filed December 1997; it is prior art under pre-AIA §102(a)/(b)/(e) and AIA §102(a)(1)-(2). Maurya teaches aspects of MLPPP for aggregating physical links between a client and server. Ex-1005, 6:61-66, Fig. 6A:

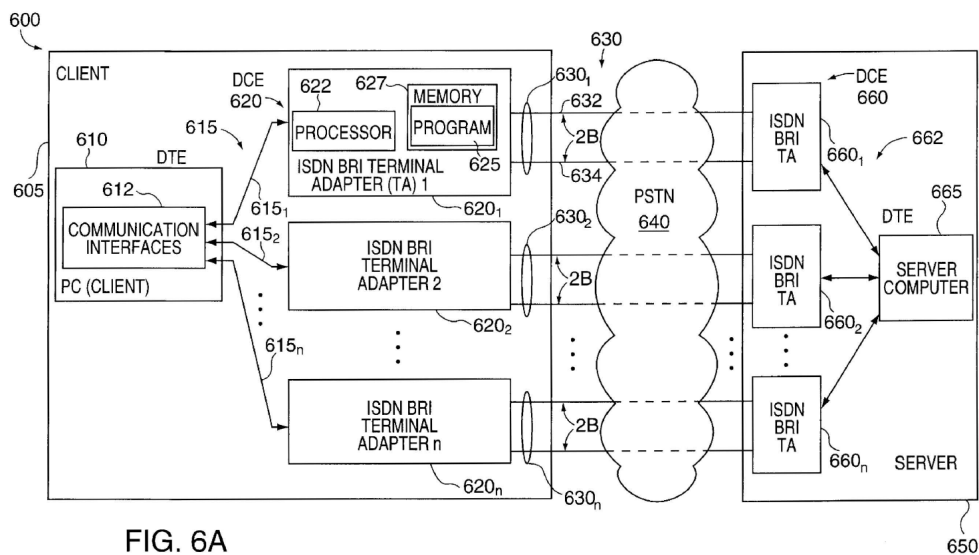


FIG. 6A

Ex-1003, ¶29.

Maurya is in the same field of endeavor because it is directed to a multilink “communications technique” (Ex-1005, 1:10-17) and relies on MLPPP. *Compare* Ex-1005, 8:60-9:13, 10:5-11:39, Fig. 5 *with* Ex-1001, 11:4-7; Ex-1003, ¶30.

C. “Multiple Paths Protocol...” to Mineno et al. (“Mineno”)

Mineno is prior art under pre-AIA §102(a)/(b) and AIA §102(a)(1) because it was published by the IEEE and publicly available in February 1999. Ex-1013. Mineno teaches a “SHAKE” protocol for “sharing multiple paths.” Laptops connected in an cluster, e.g., ad-hoc wireless network, aggregate their cellular connections to communicate with Internet servers over multiple TCP paths.

Ex-1006, ¶0003, ¶0017, Figs. 1-3:

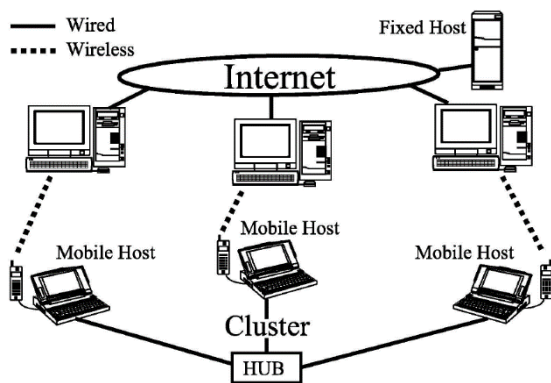


Figure 1: An Example of the System.

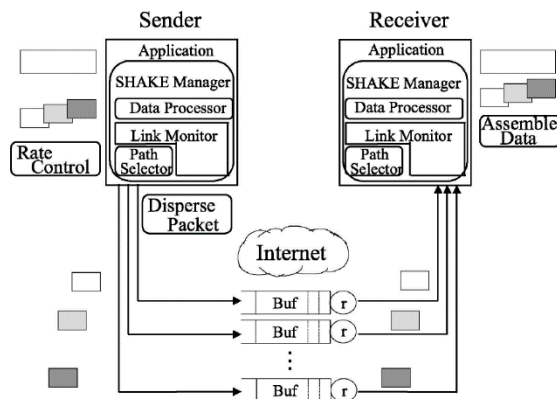


Figure 3: Illustration of SHAKE Modules.

Ex-1003, ¶¶31-32.

Mineno is in the same field of endeavor because it is directed to telecommunications bandwidth and uses networking standards. Ex-1006, ¶0001-0009, Figs. 1-3; Ex-1003, ¶33.

D. RFC793

RFC793 teaches the TCP standard. It is prior art under pre-AIA §102(a)/(b) and AIA §102(a)(1) because it was published by the IETF and publicly available no later than October 1992. Ex-1014. RFC793 is in the same field of endeavor because it is a networking protocol and was cited by the Applicant. Ex-1002, 000084; Ex-1003, ¶34.

E. RFC1990 & RFC1661

RFC1661 teaches the PPP standard. RFC1990 teaches Multilink PPP. E.g., Ex-1009, 000005-8. Both are prior art under pre-AIA §102(a)/(b) and AIA §102(a)(1) because they were published by the IETF and publicly available no later than 1994 and 1996, respectively. Ex-1008; Ex-1009.

RFC1990/RFC1661 are in the same field of endeavor; both are telecommunications/networking standards. RFC1990 was cited by the '649 specification and Applicant. Ex-1002, 000472; Ex-1003, ¶¶35-36.

F. Standing

Petitioner certifies that Petitioner is not barred or estopped from requesting this *inter partes* review and the '649 patent is IPR eligible.

G. Discretionary Analysis

This Petition's merits are compelling, which "alone demonstrates that the PTAB should not discretionarily deny institution under *Fintiv*." See June 21, 2022 Memorandum at 3-5 ("Director's Memo").

Nor would denial be warranted under *Fintiv* or §325(d). Judge Yeakel has a record of staying cases pending IPR institution decisions. *See, e.g., Meetrix IP, LLC v. Zoho Corporation*, No. 22-CV-588-LY (W.D. Tex. Feb. 28, 2023), Dkt. 43; *Netlist, Inc. v. Micron Technology, Inc. et al*, No. 22-CV-134-LY (W.D. Tex. May 11, 2022), Dkt. 68. There is no case schedule. There have been no case management conference since transfer, and the case was stayed until 4/24/2023.

Bender, Maurya, and RFC1661 were not cited or considered during prosecution. While Mineno, RFC793, and RFC1990 were cited, the file history does not include substantive analysis of these references and instead focused on other art directed to multicast for streaming media. *Supra* §II.B; Ex-1003, ¶26. Grounds based on references cited in an IDS but not considered at any length during prosecution should not serve as basis for denying institution under §325(d). *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17-18 (PTAB Dec. 15, 2017) (Informative).

IV. LEVEL OF ORDINARY SKILL IN THE ART

The field of the '649 patent is telecommunications and networking. The claims and specification describe the background and alleged invention primarily in terms of telecommunications/networking concepts and standards. Ex-1001, 1:17-2:28, 2:32-3:62; Ex-1003, ¶37.

A POSITA would have had a bachelor's degree in electrical engineering with at least three years of work experience in the field, or a master's degree with specialization in the field. A person with less education but more relevant practical experience may also meet this standard. Ex-1003, ¶¶38-39. A POSITA would have had the knowledge and skills to:

- Use computers to access webpages/data from Internet servers;
- Recognize/apply the client-server architecture;
- Use concepts from known telecommunication/networking standards, including TCP, MLPPP, IEEE 802.11, 802.3, and cellular including CDMA, etc.; and
- Design systems for routing packets through packet-switched networks.

Ex-1003, ¶40.

V. CLAIM CONSTRUCTION

A. “A method for establishing and sending data during a multipath connection” (claims 1 and 7)

This limitation, read literally, would require “[a] method for establishing ... data,” which lacks specification support and does not make sense. A POSITA would have understood this to mean “a method for establishing a multipath connection and sending data during the multipath connection.” Ex-1001, 5:2-8, 5:31-37; Ex-1003, ¶43.

B. “Multipath connection”

PO has stated that a “multipath connection” is a connection that uses multiple network connections to transfer data. Ex-1021, 000005-6, 000013, 000017-18. PO contends a “multipath connection” can be satisfied by a MLPPP connection or multipath TCP connection. *E.g., id.*; Ex-1011. The Petition applies PO’s position to show how the challenged claims are invalid. Ex-1003, ¶44.

C. “The data-source device receiving *second* multipath information about a *second* network-edge device that is capable of joining the multipath connection” (claim 3)

Claim 3 recites “second” multipath information/network-edge device, but claim 1 does not recite a “first” instance of either. A POSITA would have interpreted claim 3 to be satisfied by a data-source device receiving additional (“second”) multipath information about an additional (“second”) network-edge device that is capable of joining the multipath connection. Ex-1003, ¶45.

D. “The particular multilink connection” (claim 10)

“Multilink” is a typo that lacks antecedent basis. This Petition assumes claim 10 meant to refer to what was recited in claim 7: “the particular *multipath* connection”² of claim 7. Ex-1003, ¶46.

² All emphasis and annotations added unless stated otherwise.

VI. CHALLENGED CLAIMS

A. Ground 1

1. Motivation to Combine (“MTC”)

A POSITA would have been motivated to apply Maurya’s teachings to Bender’s. Bender teaches MLPPP. A POSITA would naturally have looked to Maurya because Maurya teaches details on how MLPPP used in the art, e.g., for establishing multilink bundles, adding/terminating links, identifying PPP peers, and transferring data (E.g., Ex-1005, 9:17-20, 13:61-17:19), for the same purpose as Bender: to increase bandwidth using MLPPP. *E.g.*, Ex-1004, ¶0005, ¶0026; Ex-1005, 3:1-13, 13:61-17:19; Ex-1003, ¶¶49-51.

Bender’s and Maurya’s teachings are complimentary. For example, Bender merges links using a common Endpoint Discriminator Option (“EDO”). Ex-1004, ¶0039, ¶0045. Maurya teaches the same approach (Ex-1005, 13:47-60), with additional details for establishing and using the bundle. Ex-1005, 7:19-10:5, 12:10-13:60, 16:8-55. The MLPPP standard provides additional motivation for this combination. *E.g.*, Ex-1009, 000019-23; Ex-1003, ¶52. Maurya also teaches details for sending data through a multilink bundle (Ex-1005, 3:14-4:65, 6:6-12, 9:56-10:5) in a manner that furthers Bender’s stated goal of increasing bandwidth. Ex-1004, ¶0040; Ex-1005, 3:14-36, 9:56-10:5; Ex-1003, ¶56. Since both references teach adding links, it would have been natural to look to the inverse operation: removing links to adjust the bundle as needed. Maurya teaches this with

link termination, a known aspect of MLPPP for link failure or the end of traffic.

Ex-1005, 3:1-14, 8:4-19, Fig. 1; Ex-1003, ¶¶55-57.

Maurya provides express motivation to combine its teachings with “any equipment ... that can generate multi-link point-to-point (PPP) packets.” Ex-1005, 6:61-66. Bender teaches *Packet* Data Service Node and mobile station equipment that generate MLPPP packets. Ex-1004, ¶¶0003-5, ¶¶0032-45, ¶¶0025-26, Figs. 5-7; Ex-1003, ¶53. Maurya states that its teachings are not limited to its exemplary embodiment; thus, a POSITA would not have constrained Maurya’s teachings to only the physical interfaces of its embodiment. Ex-1005, 17:58-61. Instead, Maurya provides broadly-applicable teachings for MLPPP, which can operate over a variety of physical links, including the MLPPP links taught by Bender. *See id.*, 6:61-66, 17:58-61; Ex-1003, ¶54. Bender also provides express motivation to apply known techniques. Ex-1004, ¶0050; Ex-1003, ¶58.

The combination would not have changed the principle of operation for either reference because Maurya applies its teachings to MLPPP generally, and Bender teaches the same approach for establishing/using an MLPPP bundle to improve bandwidth. Ex-1004, ¶0005, ¶¶0025-26, ¶¶0033-39, ¶0045; Ex-1005, 8:60-12:65, 13:47-17:19. Maurya explains that its teachings are conventional for MLPPP. Ex-1003, ¶59.

A POSITA would have had a reasonable expectation of success in combining Bender and Maurya because their teachings are complementary and used in a conventional manner. Both references teach MLPPP, and their MLPPP teachings would still be used for MLPPP. Ex-1005, 6:61-11:39, 13:61-17:61, Figs. 1-5; Ex-1004, ¶¶0005, ¶¶0025-0026, ¶¶0033-0045. The combination follows the express motivation provided by Bender and Maurya, explained above, which would have led one a POSITA to combine their teachings to arrive at the claimed invention. The combination was a natural and routine application of their teachings—well within the level of ordinary skill because MLPPP was standardized and widely used. *Supra* §IV; Ex-1009; Ex-1004, ¶¶0005; Ex-1005, 8:60-9:13. The combination uses known techniques (from Maurya) to improve similar devices (MLPPP devices) in the same way (to establish and use a multilink bundle). Ex-1003, ¶¶60-62.

2. Claim 1

[1pre] A method for establishing and sending data during a multipath connection comprising:

Ground 1 teaches [1pre]. Ex-1003, ¶¶63-74.

A method for establishing a multipath connection (multilink bundle).

Bender teaches a method for establishing a MLPPP (RFC1990) bundle by aggregating multiple wireless data links, where each link is a path in the connection between a mobile station and PDSN. *Supra* §V.B (discussing

“multipath”); *infra* §VI.A.2[1a]; Ex-1004, Abstract, ¶¶0001, ¶0004, ¶¶0007-8 (“aggregating multiple air interfaces with a *multi-link protocol*.”), ¶0016, ¶0022 (“*Data connections for mobile stations ... to PDSN 130.*”), ¶¶0026-27, ¶0045, Fig. 5:

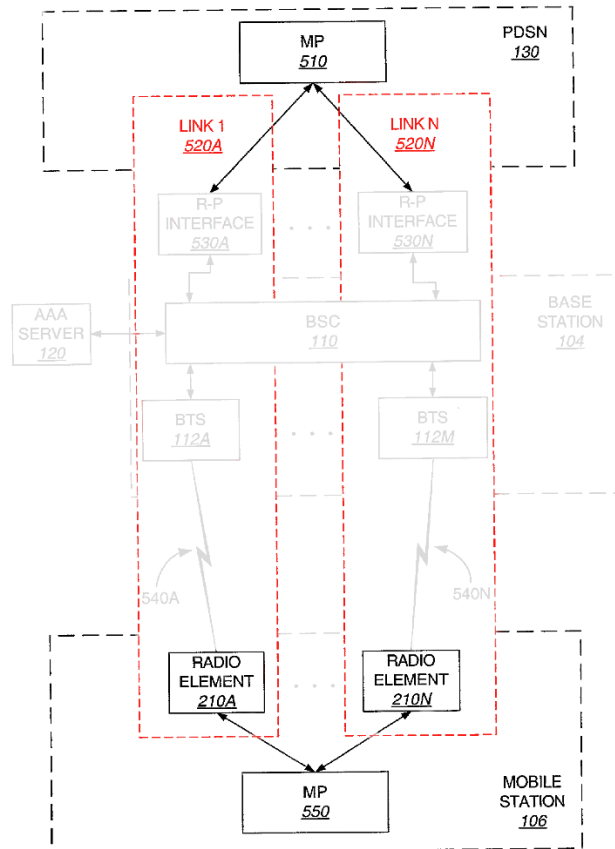


FIG. 5
(Emphasis Added)

Ex-1003, ¶¶64-66.

Maurya offers complementary teachings for establishing a “a multi-link bundle” and transmitting MLPPP packets over it, including using LCP packets for the “Establish” state. Ex-1005, Abstract, 1:28-55, 7:22-39, Fig. 1; *supra* §VI.A.1 (explaining MTC); Ex-1003, ¶¶67-68.

A method for sending data during a multipath connection. “Once these connections making up the link are established, data can flow” between mobile station and PDSN applications. Ex-1004, ¶0004, Fig. 7 (“DATA FLOWS”). Bender teaches both endpoints transmitting data using MLPPP. Ex-1004, ¶¶0004-5, ¶0020, ¶0027; Ex-1003, ¶¶69-70.

Maurya further teaches that, “[o]nce the multi-link protocol has been successfully negotiated[,]” the transmitting peer uses MLPPP to send packets distributed “between all the links in the pipe[.]” Ex-1005, 9:56-10:5, 1:59-64, 3:14-23, 8:4-19; Ex-1003, ¶¶71-73; *supra* §VI.A.1.

[1a] a data-source device receiving multipath information about each of a plurality of network-edge devices that is capable of joining a multipath connection with a data-requesting device,
--

Ground 1 teaches [1a]. Ex-1003, ¶¶75-94; *supra* §VI.A.1 (explaining MTC).

Starting from the end, Bender teaches a **data-requesting device**: a “processor” in a mobile station that comprises the multilink protocol and sends and receives requested data using the protocol. Ex-1004, ¶0032, ¶0012, ¶0025, ¶0027 (“The multi-link protocol running on processor 230 ... deliver[s] data for transmission ... and aggregat[es] data received therefrom[.]”), Fig. 2; Ex-1003, ¶76. Bender teaches the mobile station as, e.g., “a laptop with wireless modem[.]” which was known for Web browsing, where the processor requests and receives

webpage/image data from a server over the Internet, which Bender teaches or at least suggests. Ex-1004, ¶¶0043, ¶¶0032, ¶¶0004, ¶¶0027 (teaching the processor as computer with memory). Therefore, Bender teaches a data-requesting device.³ Ex-1003, ¶¶76-77.

Bender's data-requesting device is connected to **a plurality of network-edge devices**: two or more radio elements. Ex-1004, ¶¶0025-27, ¶¶0032-0042, Figs. 5, 2:

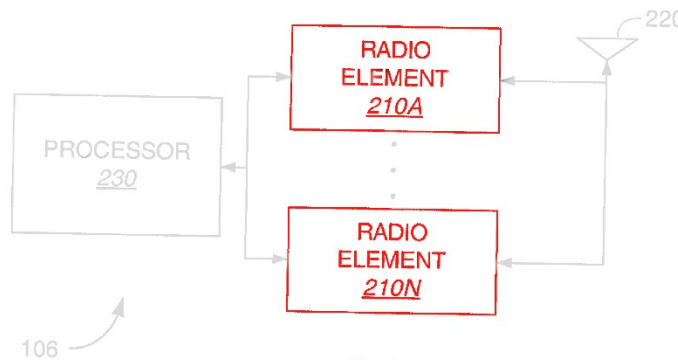


FIG. 2
(Emphasis Added)

“Each radio element can establish a wireless connection” (Ex-1004, ¶¶0025) that is used, as explained below, by the processor for accessing the network. Therefore, Bender's radio elements were at the edge of the network from the processor's and network's perspective. Bender teaches that “radio elements are known in the art” (*id.*), which would have included wireless modems/adapters, cellphones, Wi-Fi,

³ The '649 patent further confirms that a computer falls within the scope of a data-requesting device. Ex-1001, 18:44-48.

hot spot devices, Wi-MAX devices, LTE devices, GSM devices, or other known devices for communicating between mobile stations and base stations. Therefore, Bender teaches a plurality of network-edge devices.⁴ Ex-1003, ¶¶78-79.

Bender teaches its processor and radio elements as separate devices, either inside the same or separate mobile stations. Ex-1004, ¶0042. Bender applies its teachings to both scenarios and is not restricted to a particular physical arrangement, as long as the multi-link protocol on the processor “can connect with the various links 520 created[.]” *Id.*; Ex-1003, ¶¶80-81. Maurya confirms it was known and obvious for modem-type devices to either be within the same physical arrangement with a processor or separately, even if referred to as a single client-side entity. Ex-1005, 11:40-56, 7:6-13, FIG. 6A; Ex-1003, ¶¶82-83.

Each of a plurality of network-edge devices (radio elements) is capable of joining a multipath connection (multilink bundle) with a data-requesting device (processor). Bender teaches each radio element in the mobile station is capable of joining a multipath connection with the mobile station processor by forming a multilink bundle. Ex-1004, ¶0026, ¶0032, Fig. 5:

⁴ The '649 patent confirms that these types of radio elements fall within the scope of the recited network-edge device. *See* Ex-1001, 18:14-23, 18:48-55.

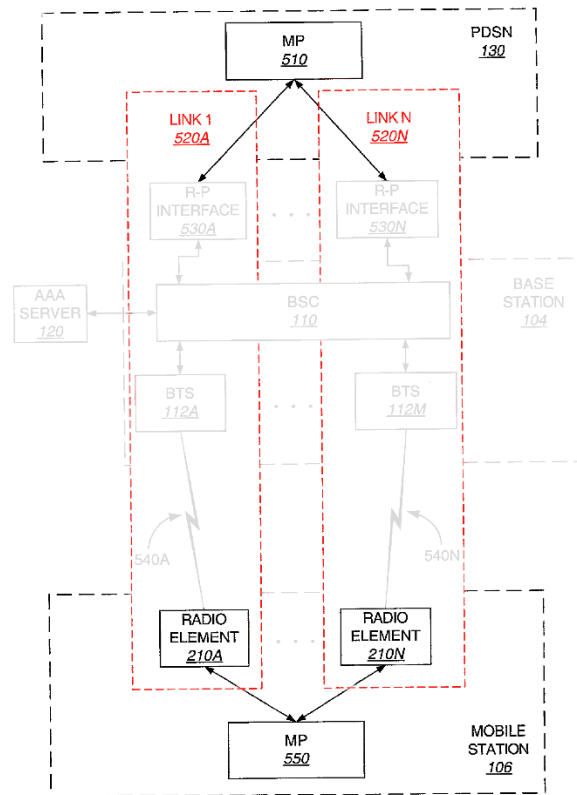


FIG. 5
(Emphasis Added)

In Figure 5, the mobile station processor runs the multilink protocol and is connected to multiple radio elements, each joined into a multilink bundle (Links 1-N) with the processor and PDSN. Ex-1004, ¶¶0032, ¶¶0027. Bender and Maurya teach a multilink bundle as a connection with multiple connection pathways aggregated into a single “communication channel”; each link is a distinct connection pathway for simultaneous data transfer. Ex-1004, ¶¶0040, ¶¶0005; Ex-1005, 2:66-3:36, 9:56-10:5; *infra* §VI.A.2[1d]; Ex-1003, ¶¶84-87.

A data-source device (PDSN) receiving multipath information (Endpoint Discriminator Option) about each of a plurality of network-edge devices.

Bender teaches the PDSN as a source of data for application running on the processor (when the mobile station receives data) and also for the external network (when the mobile station transmits data). Ex-1004, ¶0032 (“PDSN... sinks data to and sources data from a data application, or an external network such as the Internet.”).⁵ Bender teaches known PDSN, including as specified by cdma2000. Ex-1004, ¶0004; Ex-1003, ¶88.

The PDSN receives multipath information about each radio element in the mobile station. Ex-1004, ¶¶0033-0039, Figs. 6, 7. Bender teaches each radio element establishing a link with the PDSN and sends an Endpoint Discriminator Option (“EDO”). Ex-1004, ¶0039. Maurya also teaches each radio element sending an EDO to the PDSN to provide information about the particular path for that radio element, e.g., that it corresponds to a particular IP address. Ex-1005, Abstract, 2:66-3:14, 5:29-58, 9:38-50, 13:54-60, 14:14-60. The EDO is multipath information about the radio element that sent it because it includes a class-address pair for that radio element. *Supra* §V.B; Ex-1004, ¶0039, ¶0045; Ex-1005, 9:14-55. By specifying the same class-address pair, the radio elements inform the PDSN that they and their corresponding links should be merged into a multilink

⁵ The ’649 patent confirms that Bender’s PDSN falls within the scope of the recited data-source device. *See infra* §VI.A.7 (claim 6) (analysis incorporated here).

bundle. Ex-1004, ¶¶0039-0040, ¶0042, ¶¶0044-45, Fig. 5; Ex-1005, 13:54-60, 14:50-60; *infra* §VI.A.3; Ex-1003, ¶¶89-93.

[1b] each of the network-edge devices being connected to one or more networks,
--

Ground 1 teaches [1b]. Ex-1003, ¶¶95-101.

Each radio element is connected to one or more networks, e.g., internal cellular networks and external networks such as the Internet. Ex-1004, ¶0004, ¶0032, Fig. 5. Each radio element is connected to cellular network via a base station (“BTS”) (Ex-1004, ¶0021, ¶0025, ¶0032, ¶0004, Figs. 1, 5), which was common nomenclature for cellular networks, including as described in 3G standards cited by Bender. *Id.*, ¶¶0002-3. Each radio element is also connected to a PDSN, which is a node in a cellular network. *Id.*, Fig. 5, ¶0032, ¶0004 (“cdma2000 Wireless IP Network”); Ex-1003, ¶¶96-98.

Additionally, each radio element is connected, through the PDSN, to “an external network such as the Internet[.]” Ex-1004, Fig. 5, ¶0004, ¶0032; Ex-1003, ¶¶99-100.

[1c] ...

Ground 1 teaches **each of the network-edge devices (radio elements) being connected to the data-requesting device (processor) over a different connection.** Ex-1003, ¶¶102-107. The processor runs a “multi-link protocol” and

is connected to the PDSN over different links, with a separate link for each radio element. Each radio element is connected to the processor over a different connection, including different physical and/or logical connections, as shown in Figure 5. Ex-1004, ¶¶0025, ¶¶0027, ¶¶0032, Figs. 2, 5:

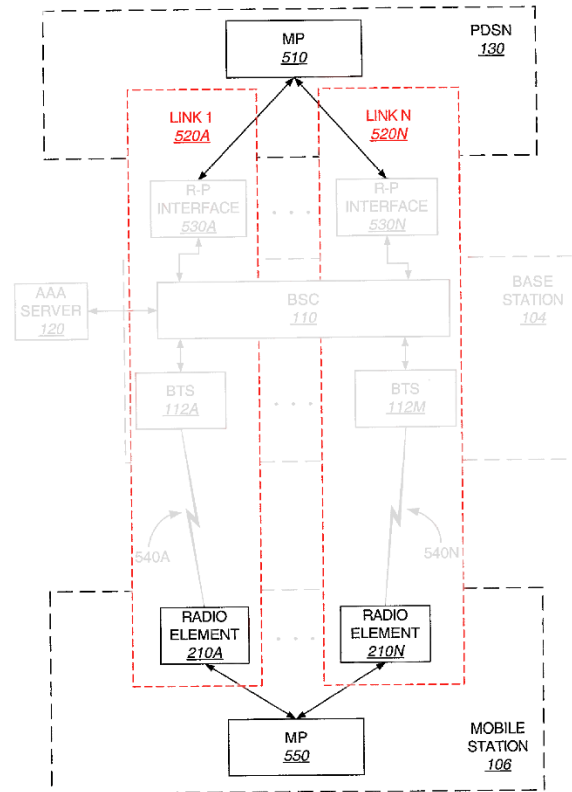


FIG. 5
(Emphasis Added)

Ex-1003, ¶¶103-104.

Each radio element is also connected to the processor over a different connection from those described in limitation [1b]. *Supra* §VI.A.2[1b]; Ex-1004, ¶¶0025, Fig. 5:

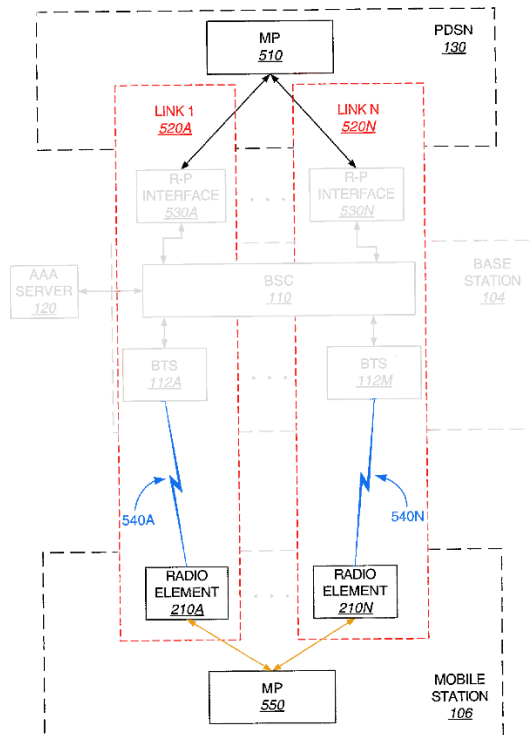


FIG. 5
(Annotations/Emphasis Added)

Ex-1003, ¶¶105-106.

[1d] ...

Ground 1 teaches [1d]. Ex-1003, ¶¶108-115; *supra* §VI.A.1 (explaining MTC).

The data-source device (PDSN) performing (i) sending different groups of data packets to different network-edge devices (radio elements) that are participating in the multipath connection (multilink bundle). The PDSN sends packets over each link to each radio element in the multilink bundle, with packets distributed between links to “aggregate” their data rates. Ex-1004, ¶0040, ¶0032, ¶0022. Therefore, Bender teaches the PDSN sending different groups of data

packets to each radio element, e.g., packet group A sent over Link 1 520A, packet group B sent over Link 2 520B, etc. Ex-1004, ¶¶0025-27, Fig. 5; Ex-1003, ¶¶109-110.

The combination with Maurya further teaches sending data packets from the server to the client computer (Ex-1005, 16:48-55), assigned “on an approximately equal basis” between all the links in the multilink bundle.⁶ Ex-1005, 3:14-53, 9:27-10:5, 9:27-30. Therefore, the combination teaches sending different groups of packets to different radio elements in the multilink bundle. Doing otherwise, by sending the same packets, would create duplicate traffic and frustrate Bender and Maurya’s shared goal of aggregating data rates. Ex-1004, ¶0040; Ex-1003, ¶¶111-114.

3. Claim 2

Ground 1 teaches claim 2. *Supra* §VI.A.1 (explaining MTC); Ex-1003, ¶¶116-123.

The method of claim 1 wherein the multipath information (EDO) includes a connection ID (class-address pair). The EDO contains a class-address pair (*supra* §VI.A.2[1a]); Bender adds links to a multilink bundle by specifying the same class-address pair for all links in the bundle. Ex-1004, ¶0026, ¶0039, ¶0045,

⁶ The ’649 patent confirms that Bender’s and Maurya’s teachings fall within the scope of the claims. The written description sends packets over the different links of a multilink PPP bundle. Ex-1001, 12:44-48.

Fig. 7. All links in a multilink bundle have the same class-address pair, which identifies the multilink connection, along with all the links within it, and it is the connection ID for the multilink bundle. Ex-1003, ¶118.

Maurya uses the EDO for the same purpose: an “application executing at a PC, assigns itself a unique endpoint discriminator value” and informs its terminal adapters so that “all the links... will be viewed... as part of a common bundle.” Ex-1005, 5:7-58, 13:47-14:60, 16:8-55, Figs. 6B, 7. Each adapter, “rather than assigning itself a unique endpoint discriminator value, assumes the value that has been provided to it” and “in turn, sends an LCP Endpoint Discriminator packet” containing this class-address pair, which identifies the connection and the links within. *Id.* Maurya teaches IP addresses as the class-address pair (Ex-1005, 9:38-49, 16:11-30, Fig. 4), consistent with RFC1990 which both references cite. E.g., Ex-1004, ¶0039, ¶0045; Ex-1005, 8:60-9:49, 10:5-11:39; Ex-1003, ¶¶119-120.

Connection ID that is generated by one of the data-source device (PDSN), ... **the data-requesting device** (processor) **and a network device**. The two sides of Bender’s multilink bundle are the PDSN and mobile station (Ex-1004, Fig. 5), which correspond to Maurya’s teachings of server and client, respectively. The mobile station includes a processor running a MLPPP “application” (Ex-1004, ¶0027, ¶0039, ¶0045), which corresponds with Maurya’s teaching of a client

running an application (Ex-1005, 5:29-42, 13:47-14:20, 16:8-17, Fig. 6B); Ex-1003, ¶121.

Maurya teaches the client application generating a unique endpoint discriminator value containing the class-address pair. Ex-1005, 5:7-58, 9:38-49, 13:47-14:60, 16:8-55, Figs. 4, 6B, 7. Combined with Bender, the processor runs the application and therefore generates the connection ID. Ex-1004, Figs. 2, 5. Even if the PDSN or another device on the network were to generate the connection ID, claim 2 also allows this. Ex-1003, ¶¶121-122.

4. Claim 3

Ground 1 teaches **the method of claim 1, further comprising: the data-source device (PDSN) receiving second [additional] multipath information (EDO) about a second [additional] network-edge device (radio element) that is capable of joining the multipath connection (multilink bundle) and the data-source device (PDSN) joining the second network-edge device (radio element) to the multipath connection (multilink bundle).** *Supra* §VI.C (claim construction), §VI.A.1 (explaining MTC); Ex-1003, ¶¶124-127.

The PDSN receives an EDO about each of a plurality of radio elements capable of joining a multilink bundle. *Supra* §VI.A.2[1a]. The PDSN uses the EDO to add each radio element and corresponding link into the multilink bundle. *Supra* §VI.A.2[1a], §VI.A.3; Ex-1004, ¶0026, ¶0039, ¶0045; Ex-1005, Abstract,

5:29-58, 13:54-14:60. Bender explains that this process is repeatable to add additional links to the multilink bundle (Ex-1004, ¶¶0034-35) including one example with two links (Figure 7) and another example having $N \geq 2$ links (Figure 5). Therefore, the PDSN receives additional (second) multipath information about an additional (second) network-edge device capable of joining the multilink bundle. Ex-1004, ¶¶0039, ¶¶0045; Ex-1003, ¶¶125-126.

Since this process was repeated, the additional EDO includes the same class-address pair as the multilink bundle, which causes the PDSN to join the additional radio element and corresponding link to the multilink bundle. Ex-1004, ¶¶0026, ¶¶0039, ¶¶0045; Ex-1005, Abstract, 5:29-58, 13:54-14:60. Ex-1003, ¶126.

5. Claim 4

Ground 1 teaches claim 4. *Supra* §VI.A.1 (explaining MTC); Ex-1003, ¶¶128-134.

The method of claim 1, further comprising: the data-source device (PDSN) receiving multipath information (PPP terminate packets) about which network-edge devices (radio elements) are to be removed from the multipath connection (multilink bundle). Bender and Maurya teach MLPPP, where PPP peers exchange PPP terminate/acknowledgments packets to terminate a link when communications end and “either PPP peer desires to terminate the link[.]” Ex-1005, 7:29-8:19, Fig. 1 (“Terminate” state). Therefore, the PDSN receives

either a terminate or acknowledge packet when either endpoint decides to terminate a link. *Id.* The terminate/acknowledgments packets are multipath information because they identify a link (over which the packets were exchanged) and a corresponding radio device (at the end of the link) that are to be removed from the multilink bundle in accordance with RFC1990/1661. Ex-1005, 8:4-19, 16:47-55; Ex-1003, ¶¶129-131.

The data-source device removing the network-edge devices from being associated with the multipath connection. Following an exchange of PPP terminate/acknowledgement packets, the PDSN “utilizes such acknowledgements to assure a graceful link termination” of the link, which transitions to a “Dead” state where there is “no activity.” Ex-1005, 7:22-39, 8:4-19, Fig. 1; Ex-1004, ¶0032. When terminated, the corresponding radio element is removed from the multilink bundle and no longer associated with it because the radio element no longer has an active link. *Id.* Data sent over the bundle is no longer assigned to that radio element; the radio element is no longer participating in the multilink bundle.⁷ Ex-1005, 8:4-19, Fig. 1; Ex-1003, ¶¶132-133.

⁷ The '649 specification confirms that these teachings fall within the scope of the claims, describing an RCG that is removed from “participating” in the bundle. Ex-1001, 12:66-13:14.

6. Claim 5

Ground 1 teaches **the method of claim 1, further comprising at least one of the data-source device (PDSN), the network-edge devices (radio elements) and the data-requesting device (mobile station processor) determining which of the network-edge devices are to be removed from the multipath connection (multilink bundle).** *Supra* §VI.A.1 (explaining MTC); Ex-1003, ¶¶135-139.

Maurya teaches that either PPP peer—the PDSN or radio element here—decide whether to terminate a particular link, thereby removing the corresponding radio element from the multilink bundle. *Supra* §VI.A.5 (claim 4); Ex-1005, 8:4-19 (teaching termination for “link failure” or “timeout”), Fig. 1. Either option satisfies claim 5. Ex-1003, ¶137.

Additionally, when PPP terminate/acknowledge packets are exchanged on a particular link, the PDSN, processor, and radio elements determine that the link should be terminated, causing the particular radio element for that link to be removed from the multilink bundle. Ex-1005, 8:4-19; Ex-1004, ¶0005, ¶0026, ¶0039, ¶0045; Ex-1003, ¶138.

7. Claim 6

Ground 1 teaches **the method of claim 1 wherein the data-source device (PDSN) is one of a multipath link aggregator, a network relay, a multipath link server, a server, a network switch, a network router and a device capable**

of providing multipath services. *Supra* §VI.A.1 (explaining MTC), §VI.A.2[1a] (applying Maurya’s client-server teachings to Bender’s mobile station and PDSN); Ex-1003, ¶¶140-146. The PDSN is a multipath link aggregator—it aggregates multiple links, each a distinct path, by merging them into a multilink bundle. Ex-1004, ¶0008, ¶0022, ¶0039, Figs. 5-7. It is also a server or multipath link server—it performs server functions including sourcing data from a data application and sending it through a multilink bundle to a mobile station. Ex-1004, ¶0032; Ex-1005, 3:14-53, 9:56-64, Fig. 6A. The PDSN is also capable of providing multipath services—it provides network/Internet access services over a multilink bundle to a mobile station processor. *Supra* §§VI.A.2[1a], [1d]; Ex-1004, ¶¶0022-27, ¶¶0032-0042, Figs. 2-5; Ex-1003, ¶¶142-145.

8. Claim 7

[7pre] ...

Ground 1 teaches [7pre], which is substantively identical to [1pre] and satisfied for the same reasons. *Supra* §VI.A.2[1pre]; Ex-1003, ¶¶147-148.

[7a] the data-source device receiving multipath connection requests from a plurality of data-requesting devices, each of the multipath connection requests involving a particular multipath connection to a data-requesting device;

Ground 1 teaches [7a]. Ex-1003, ¶¶149-159; *supra* §VI.A.1 (explaining MTC). Teachings for the **data-source device** (PDSN) and **data-requesting device** (mobile station processor) were explained previously. *Supra* §VI.A.2[1a].

Bender teaches **a plurality of data-requesting devices**. Ex-1004, ¶0018 (“*three mobile stations* 106.”), ¶0022 (“Data connections for *mobile stations* 106 ... to PDSN 130.”), ¶0042, Fig. 1:

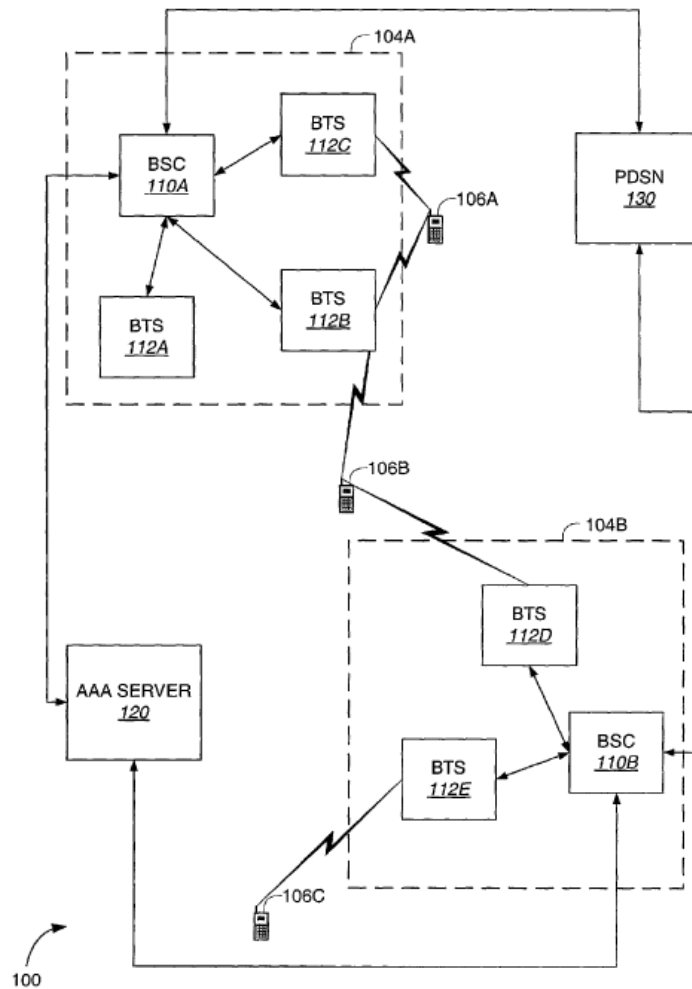


FIG. 1

Bender's mobile stations each include a processor running MLPPP. Ex-1004, ¶0025, Fig. 2; Ex-1003, ¶¶151-152.

The data-source device receiving multipath connection requests from a plurality of data-requesting devices. The PDSN receives multipath connection requests, e.g., request for multilink PPP connections via LCP Configure Requests, from mobile station processors. Ex-1004, ¶¶0026-27, ¶¶0032-0040 (describing “steps to establish a multi-link communication session” using “multi-link PPP”

including “sending a Link Control Protocol (LCP) option[.]”), ¶¶0042-45 (“The principles discussed herein translate readily to radio elements residing on multiple mobile stations 106.”), Figs. 6-7; Ex-1005, 7:19-8:59 (“Establish state” including “exchanging and acknowledging LCP Configure packets”), Figs. 1-4. The LCP Configure Request is a request for opening a MLPPP connection. Ex-1005, 9:14-49, 1:51-55, 7:34-8:59; *see also* Ex-1008, 000016-17, 000024-28, 000032 (“A Configure-Request packet is transmitted. This indicates the desire to open a connection with a specified set of Configuration Options.”), 000038; Ex-1003, ¶153.

The request comes from the mobile station processor, which initiates the request for a MLPPP connection, sent through the radio elements, and provides the EDO that goes into the LCP Configure Request. Ex-1004, ¶¶0026-27 (“The multi-link protocol running on processor 230 may use an end-point discriminator to associate each link with an aggregate bundle[.]”), ¶¶0032-0045, Figs. 6-7; Ex-1005, 7:19-8:59, 13:60-14:5, Abstract, 5:29-37, Figs. 1-4. The client processor determines the class-address pair in the EDO and is the ultimate originator of LCP Configure Request. Ex-1005, 9:14-49. Furthermore, this would have been obvious because the processor controls the radio elements and Bender teaches the processor performing “some or all of the functions of radio elements” (Ex-1004, ¶0027), which naturally would have included forming packets and configuring

links in software given the relative infrequency of LCP Configure Requests. Ex-1003, ¶¶154-156.

The PDSN receives the request and uses the class-address pair in the EDO to form the multilink bundle. *Supra* §VI.A.2[1a], §VI.A.3; Ex-1003, ¶¶163-166. The PDSN receives requests from processors in the plurality of mobile stations; Figure 1 teaches “[d]ata connections” for “three mobile stations 106” to one “PDSN 130.” Ex-1004, ¶¶0018, ¶¶0022, ¶¶0032, Figs. 1, 5. Furthermore, a many-to-one ratio would have been obvious because of the impracticality of having a dedicated PDSN for each mobile station. Ex-1003, ¶157.

Each of the multipath connection requests involving a particular multipath connection (multilink bundle) to a data-requesting device (mobile station processor) because the request includes an EDO that identifies a particular multilink bundle between the PDSN and a mobile station processor. *Supra* §VI.A.2[1a], §VI.A.3 (explaining EDO); Ex-1004, ¶¶0039, ¶¶0045; Ex-1005, 5:7-58, 13:47-14:60, 16:8-55, Figs. 6B-7. The LCP Configure Requests establish a particular multilink bundle corresponding to the class-address pair in the EDO; the bundle is a connection with multiple paths from the PDSN to a particular processor. *Supra* §VI.A.2[1a] (explaining multilink bundle connection paths); Ex-1004, ¶¶0026, ¶¶0032, Fig. 5; Ex-1005, 13:47-16:55; Ex-1003, ¶158.

[7b] ...

Ground 1 teaches **the data-source device (PDSN) associating a connection ID (class-address pair) to each multipath connection request.** *Supra* §VI.A.1 (explaining MTC); Ex-1003, ¶¶160-163. The connection ID and multipath connection requests were explained above. *Supra* §VI.A.3, §VI.A.8[7a]. The PDSN associates a connection ID to each multipath connection request, which includes an EDO that contains a class-address pair. *Id.*; Ex-1004, ¶¶0026-45; Ex-1005, 5:7-58, 13:47-16:55. The PDSN extracts the class-address pair and associates it with the request and corresponding link (on which it was received) to merge that link into the multilink bundle identified by the class-address pair. *Id.*; Ex-1003, ¶¶161-162.

[7c] ...

Ground 1 teaches [7c]. Ex-1003, ¶¶164-169.

The data-source device using multipath information about each of a plurality of network-edge devices that is capable of joining in a particular multipath connection to a particular data-requesting device. This portion tracks the language of [1a], which Ground 1 teaches. *Supra* §VI.A.2[1a]; Ex-1003, ¶165.

The PDSN also **uses** the multipath information about each radio element to join each radio element to the multilink bundle specified by the class-address pair

in the EDO. *Supra* §VI.A.2[1a], §VI.A.3; Ex-1004, ¶¶0026, ¶¶0039, ¶¶0045; Ex-1005, Abstract, 5:29-58, 13:54-14:60. The PDSN repeats this until “each radio element has been processed.” Ex-1004, ¶¶0034-35; Ex-1003, ¶166.

Each of the plurality of radio elements is capable of joining in a **particular** multipath connection to a **particular** mobile station processor because the PDSN communicates with each mobile station processor using a particular multilink bundle identified by a unique class-address pair. *Supra* §VI.A.2[1a], §VI.A.3, §VI.A.8[7a]; Ex-1004, ¶¶0018, ¶¶0022, ¶¶0032, ¶¶0040, Figs. 1, 5-7. The radio elements for a particular mobile station are capable of joining the particular multipath connection to the processor for that particular mobile station. *Id.*; Ex-1003, ¶167.

The particular multipath connection has a particular connection ID: a unique class-address pair in the EDO that identifies the bundle. *Supra* §VI.A.2[1a], §VI.A.3, §VI.A.8[7a]; Ex-1004, ¶¶0026, ¶¶0039-45; Ex-1003, ¶168.

[7d] ...

Ground 1 teaches **the data-source device** (PDSN) **notifying each of the network-edge devices** (radio elements) **that is participating in the particular multipath connection** (multilink bundle) **associated with the particular connection ID** (class-address pair). *Supra* §VI.A.1 (explaining MTC); Ex-1003, ¶¶170-172.

The PDSN responds to LCP Configure Requests by sending LCP Configure Positive Acknowledgement (ACK), which “specifies that options... in the Configuration Request were... all accepted[,]” or LCP Configure Negative Acknowledgement (NACK) to the radio element. Ex-1005, 8:25-9:21; Ex-1004, ¶¶0026, ¶¶0039, ¶¶0045. ACK is a notification that the request was accepted; NACK is a notification of rejection. *Id.*; *see also* Ex-1008, §5.2. This is repeated for each radio element to be merged in the particular multilink bundle associated with the class-address pair specified in the request—the PDSN joins each radio element into the bundle and in doing so, notifies each radio elements. Ex-1005, 8:60-9:20; *supra* §VI.A.2[1a], §VI.A.3, §VI.A.8[7a]; Ex-1003, ¶171.

[7e] ...

Ground 1 teaches **the data-source device (PDSN) sending data associated with the particular connection ID (class-address pair) to the network-edge devices (radio elements) participating in the particular multipath connection associated with the particular connection ID.** *Supra* §VI.A.1 (explaining MTC); Ex-1003, ¶¶173-175. The particular multipath connection is associated with a particular connection ID. *Supra* §VI.A.8[7a]-[7b], §VI.A.3.

The PDSN sends data—“on an approximately equal basis” (Ex-1005, 9:27-10:5, 3:14-53; *supra* §VI.A.2[1d])—to the radio elements participating in the multilink bundle associated with a particular class-address pair, which all share the

same class-address pair. Ex-1004, ¶¶0004-0005, ¶0022, ¶0026, ¶¶0032-45; Ex-1005, 3:1-5:58, 13:54-60. Data is aggregated by the mobile station processor, which assigned the class-address pair to the bundle. Ex-1004, ¶¶0025-0027.

Therefore, the PDSN uses the class-address pair to send data to the processor over a multilink bundle, and the sent data is associated with the class-address pair of the bundle. Ex-1003, ¶174.

9. Claim 8

Claim 8 includes language from [1d]. Ground 1 teaches the shared language (*supra* §VI.A.2[1d]) and the different language: the data-source device sending different groups of data packets to different network-edge devices that are participating in the **particular** multipath connection **associated with the particular connection ID**. The PDSN sends data to the radio elements participating in the particular multilink bundle associated with the particular class-address pair. *Supra* §§VI.A.8[7d]-[7e], §VI.A.3; §§VI.A.2[1a], [1d]; Ex-1003, ¶¶176-178.

10.Claim 9

Claim 9 is nearly identical to claim 4. Ground 1 teaches the shared language, explained above (*supra* §VI.A.5) and the different language below. *Supra* §VI.A.1 (explaining MTC); Ex-1003, ¶¶179-182.

Ground 1 teaches receiving **identification of the** radio elements to be removed from the **particular** multilink bundle. PPP peers exchange PPP terminate packets/acknowledgments before terminating a link. Ex-1005, 7:29-8:19, Fig. 1. The packets identify a link (over which they were exchanged) and corresponding radio element to be removed from the multilink bundle because the PPP terminate/acknowledge exchange assures graceful link termination, thereby removing the link and radio element from the particular bundle having the same class-address pair. Ex-1005, 8:4-19, 16:47-55; Ex-1004, ¶0032; *supra* §VI.A.5; §VI.A.3, §VI.A.8[7c]; Ex-1003, ¶¶180-181.

The PDSN removes the **identified** radio elements from the **particular** multilink bundle. *Supra* §VI.A.5; Ex-1003, ¶181.

11.Claim 10

Ground 1 teaches **the method of claim 7, further comprising the data-source device (PDSN) notifying the data-requesting device (processor) when all data has been sent over the particular [multipath] connection** (multilink bundle). *Supra* §V.D (claim construction), §VI.A.1 (explaining MTC); Ex-1003, ¶¶183-185.

Beginning/ending flags in segment headers identify the first and last segments of the MLPPP data stream. Ex-1005, 10:37-11:28, 15:7-11, Fig. 5. The

ending flag is a notification from the PDSN to the processor that all data has been sent over the particular multilink bundle. Ex-1003, ¶184.

Additionally, the PDSN notifies the mobile station processor when all data has been sent over the particular multilink bundle by sending termination packets. Ex-1005, 8:4-19 (“*If PPP traffic has concluded* and either PPP peer desires to terminate the link...”); *supra* §VI.A.5-6 (explaining termination); Ex-1003, ¶185.

12.Claim 11

Ground 1 teaches claim 11 for the same reasons explained for claim 6. *Supra* §VI.A.7; Ex-1003, ¶¶186-187.

13.Claim 12

Ground 1 teaches claim 12 for the same reasons explained for claim 2. *Supra* §VI.A.3; Ex-1003, ¶188.

14.Claim 21

[21pre] A method for creating and using a multipath connection, comprising the steps of:

Ground 1 teaches [21pre]. Ex-1003, ¶¶189-192. The method was explained for claim 1 (*supra* §VI.A.2[1pre]) and further comprises steps explained below (*infra* §§VI.A.14[21a]-[21d]).

Creating a multipath connection was explained previously, as part of the process for establishing a multilink bundle. *Supra* §§V.A.2[1pre]-[1a], §VI.A.3 (claim 2), §§VI.A.8[7a]-[7c]; e.g., Ex-1004, Fig. 5:

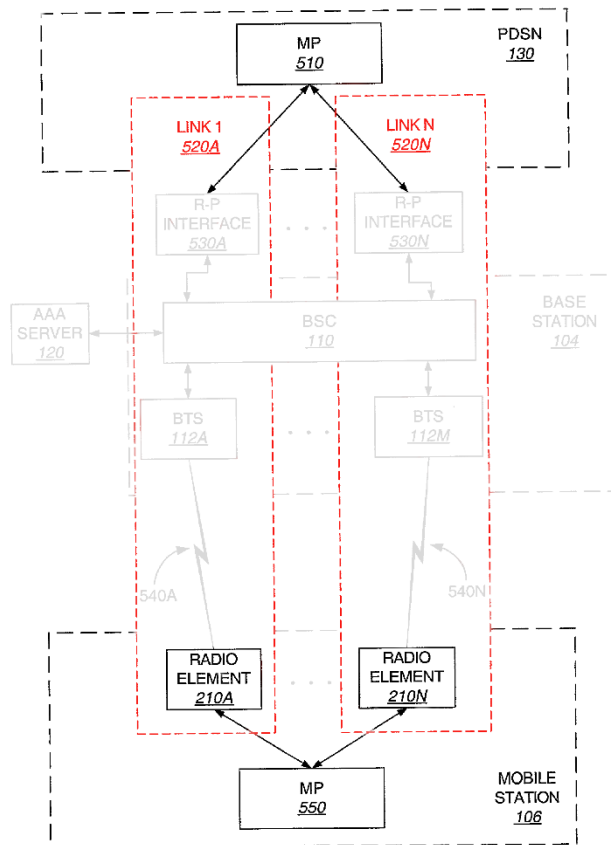


FIG. 5
(Emphasis Added)

Ex-1003, ¶190.

Ground 1 teaches **using a multipath connection**, e.g., by sending data over a multilink bundle. *Supra* §VI.A.2[1pre]-[1a], [1d]; Ex-1003, ¶191.

[21a] ...

Ground 1 teaches [21a]. *Supra* §VI.A.1 (explaining MTC); Ex-1003, ¶¶193-199.

A data-requesting device (processor) sending first multipath control information (EDO) to or through a first network-edge device (radio element).

The data-requesting device and first network-edge device were explained above.

Supra §VI.A.2[1a]. The processor uses EDO “to associate each link with an aggregate bundle” by sending the same class-address pair to each radio element in the mobile station. Ex-1004, ¶¶0025-26, ¶0039, ¶0045. It was obvious for the processor to send the EDO because the processor controls the multilink protocol in the mobile station, where all radio elements must use the same class-address pair in the EDO. *Id.* Maurya teaches a client sending an EDO to its network terminal adapters (radio elements for Ground 1) via “Endpoint Discriminator packets.” Ex-1005, 14:22-37, 16:9-17; Ex-1003, ¶¶194-195.

The first multipath control information indicates that the first network-edge device will join the multipath connection (multilink bundle). The EDO includes a class-address pair that identifies a multipath bundle and is used to join the radio element to that bundle. *Supra* §VI.A.2[1a], §VI.A.3; Ex-1004, ¶0026, ¶0039, ¶0045, Fig. 7; Ex-1005, Abstract, 5:29-58, 9:38-50, 13:54-14:60. When sent to a radio element, the EDO indicates that it will join the multilink bundle. Ex-1003, ¶196.

The data-requesting device being connected over a first connection to the first network-edge device. Ground 1 teaches a plurality of radio elements, each connected to the processor over a different connection; one connection to one radio element (e.g., 210A) is a first connection/device. *Supra* §§VI.A.2[1a]-[1c]; Ex-1004, ¶0032, Fig. 5:

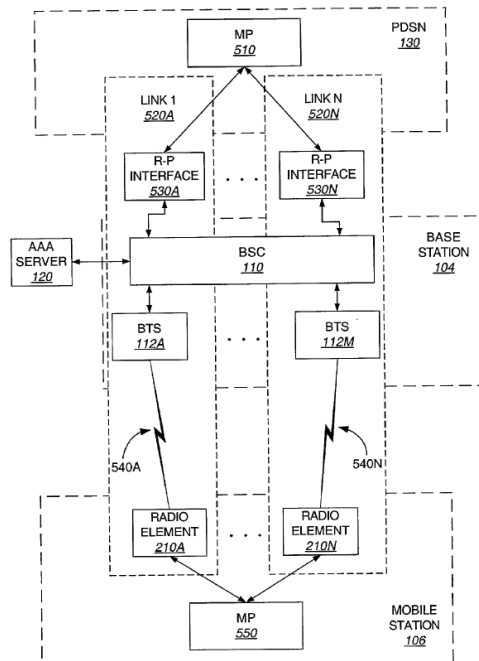


FIG. 5

Ex-1003, ¶¶197-198.

[21b] ...

Ground 1 teaches [21b]. Ex-1003, ¶¶200-202.

The first portion of [21b] is identical to [21a] but recites “second” instead of “first.” Any one of the plurality of network-edge devices and corresponding connection satisfies the “first” device/connection; any other device and corresponding connection satisfies the “second,” for reasons explained previously.

Supra §VI.A.14[21a], §§VI.A.2[1a]-[1c]. Bender explains that its teachings are

repeated for each radio element in a multilink bundle. Ex-1004, ¶¶0034-35;

Ex-1003, ¶200.

The data-requesting device capable of receiving different data over the first connection and the second connection at the same time. Data sent over the multilink bundle is divided between links and sent in parallel to aggregate bandwidth. *Supra* §§VI.A.2[1c]-[1d]. This means the mobile station processor is capable of receiving different data over the first and second connections at the same time—otherwise the bandwidth would not be aggregated. Ex-1004, ¶¶0025-27, ¶0040; Ex-1005, 3:14-53, 6:66-7:6, 9:56-10:5. Furthermore, this would have been obvious given the common goal for Bender/Maurya to receive data in parallel for increased bandwidth. *Id.*; Ex-1003, ¶201.

[21c] ...

Ground 1 teaches **after the first network-edge device** (radio element) **joins the multipath connection** (multilink bundle), **the data-requesting device** (processor) **receiving first data over the first connection from the first network-edge device.** *Supra* §VI.A.1 (explaining MTC); Ex-1003, ¶¶203-206.

“Once multiple links 520 are formed, and merged, then... [a]t this point, data can flow over the virtual link[.]” Ex-1004, ¶0040, ¶0004, ¶¶0025-27, Fig. 5. After the first radio element joins (is merged into) the multilink bundle, the mobile station processor receives first data from the link, over the first connection with that first radio element. *Id.*; Ex-1005, 3:14-53, 9:56-10:5; *supra* §VI.A.2[1d], §VI.A.14.[21c]; Ex-1003, ¶¶204-205.

[21d] ...

[21d] tracks the language of [21c] but replaces “first” network-edge device/connection with “second.” Ground 1 teaches a *plurality* of network-edge devices and corresponding connections. *Supra* §§VI.A.14[21a]-[21b], §§VI.A.2[1a]-[1c]. Any one device/connection satisfies the “first”; any other device/connection satisfies the “second.” *Id.* Therefore, the analysis from [21c] also applies to the “second” network-edge device/connection here because Bender/Maurya’s teachings apply to all radio elements and their corresponding connections. *Supra* §VI.A.14[21c]. Data received over the second connection is different from data received over the first. *Supra* §§VI.A.14[21b]-[21c], §§VI.A.2[1c]-[1d]; Ex-1003, ¶¶207-209.

15.Claim 22

Ground 1 teaches **the method as in claim 21, wherein the first network-edge device (e.g., radio element) is connected to a network, and wherein the second network-edge device (e.g., radio element) is connected to the network or a different network.** *Supra* §VI.A.1 (explaining MTC); Ex-1003, ¶¶210-213. Each radio element is connected to one or more networks, e.g., internal cellular networks and external networks such as the Internet. *Supra* §VI.A.2[1b]; Ex-1004, ¶¶0004, ¶¶0021, ¶¶0025, ¶¶0032, Figs. 1, 5. Each radio element is connected to a different base station:

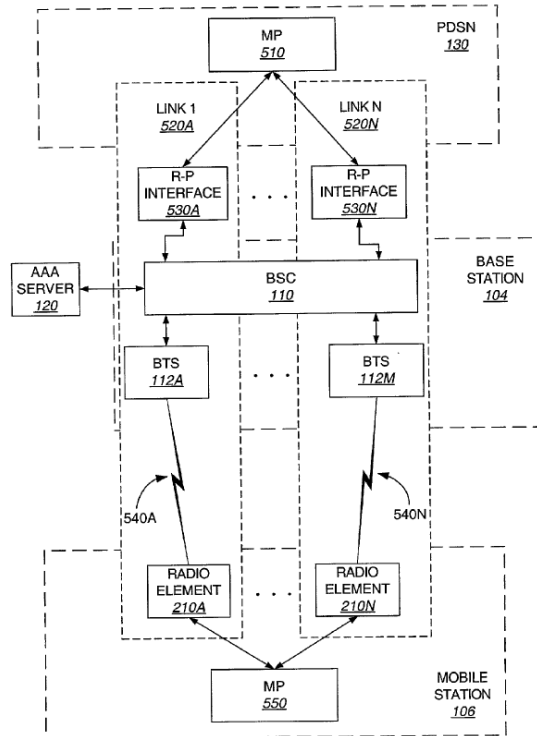


FIG. 5

Therefore, the second radio element is connected to either the same or a different network.

B. Grounds 2-3

1. Motivation to Combine

Mineno and TCP. Mineno teaches a SHAKE protocol running over TCP.

Ex-1006, ¶0017, Fig. 2. Therefore, a POSITA would have been motivated to apply teachings from the TCP standard, e.g., to establish (via the three-way handshake), use, and close TCP connections. Ex-1007, 000033-34, 000036-38; Ex-1003, ¶¶215-216.

This would not have changed the principle of operation of either reference, and a POSITA would have had a reasonable expectation of success in making the

combination, because Mineno already uses TCP. A POSITA with would have been more than capable of using TCP because it would have been a basic skill in computer networking/telecommunications, and a requirement for working with the Internet. *Supra* §IV. This was a combination of prior art elements according to known methods to yield predictable results. Ex-1003, ¶¶217-218.

Mineno, TCP, and MLPPP teachings (RFC1990/1661). A POSITA would have been further motivated to apply teachings from RFC1990/1661, which together describe MLPPP.⁸ Ground 3 starts with Mineno and TCP as the base, and combines MLPPP teachings from RFC1990/1661 for additional details. Mineno provides express motivation for this, referring to RFC1990/1661 as “Related Works” and pointing to MLPPP as a known example of network resource aggregation to “improve the performance and efficiency” using “a number of physical lines ... as a single logical line.” Ex-1006, ¶¶0006-0008. Both teach forms of traffic dispersion. Ex-1009, 000007 (“[C]ombining multiple physical links into one logical link[.]”); Ex-1006, ¶¶0001-8, ¶¶0011-13, Fig. 3; Ex-1003, ¶¶219-220.

Mineno uses PPP as part of its network stack (Ex-1006, Fig. 2); therefore, a POSITA would naturally have looked to teachings and concepts from RFC1661

⁸ RFC1661 introduced PPP. RFC1990 added multilink features, hence multilink PPP. Ex-1009, 000009-13, 000029. Their teachings were meant to be used together. Ex-1003, n.18.

(PPP) and RFC1990 (MLPPP). Given their common goals and use of traffic dispersion, RFC1990/1661 teachings complimented Mineno, including for establishing, using, and terminating links and bundles. *E.g.*, Ex-1009, 000007-24 (using aggregated bundle by splitting packets between links); Ex-1003, ¶¶221-227.

For example, RFC1990/1661 teaches ways to establish and aggregate multiple links together, including initialization and configuration via Configure Request messages with EDO information⁹ for aggregating multiple links. Ex-1009, 000007-8, 000019-23; Ex-1008, 000013, 000021, 000028, 000034. Applied to Mineno, it was obvious to likewise use a configure request to initiate a SHAKE connection between two hosts, with an identifier for the logical connection between them. *See* Ex-1006, ¶¶0001-2, ¶¶0013-17, Figs. 1-2. This would have provided a simple way for Mineno's hosts to distinguish the paths in one logical connection from another. *See* Ex-1009, 000007, 000019-23. Using IDs was common in networking and human society due to its simplicity. *See* Ex-1007, 000011, 000016-18, 000090. Mineno already teaches this with link numbers; the combination was a known and obvious way to address a known issue of distinguishing between connections. Ex-1003, ¶¶222-223.

⁹ RFC1990/1661 teach EDO with magic numbers or IP addresses, which were natural fits for Mineno, which likewise used link numbers and IP addresses. Ex-1006, ¶0016, ¶¶0031-32, Fig. 2; Ex-1009, 000019-23.

Additionally, Mineno teaches monitoring host Internet connections for disconnections and taking appropriate action. Ex-1006, ¶¶0019-0024, ¶¶0033-35. RFC1990/1661 teach a natural and obvious response: remove the disconnected host (Link Termination) so that packets are not lost. E.g., Ex-1008, 000012, 000015, 000022-23. Applied to Mineno, a POSITA would have been motivated to likewise exchange termination packets to terminate a path that is no longer active, to avoid packet loss. *See* Ex-1006, ¶¶0019-0024, ¶¶0033-35. This was a known and obvious way to address the known issue of disconnected Internet service. Ex-1003, ¶¶226-227.

Ground 3 would not have changed the principle of operation of any reference, and a POSITA would have had a reasonable expectation of success in making the combination, because their respective teachings would have been applied in a conventional manner, consistent with the teachings of each. First, RFC1990/1661's teachings would still have been used for establishing, utilizing, and terminating aggregated communications. *See* Ex-1006, Fig. 3. Ground 3's use of connection requests and IDs was common in networking and on the Internet, consistent with Mineno's teachings. Second, RFC1990/1661's teachings for using aggregated connections, by distributing packets, was conventional, and Mineno already teaches this with its path selector. Ex-1006, ¶¶0006, ¶¶0014-17, ¶¶0024-28. Third, RFC1990/1661's teachings for terminating particular connections would be

used in combination with Mineno for the same purpose: to terminate particular connections—a natural response to Mineno’s teaching of monitoring disconnections. Ex-1003, ¶¶228.

Indeed, the combination follows motivation from Mineno itself. Ground 3 applies *teachings* from RFC1990/1661 with teachings from Mineno, which as Mineno explains, are “Related Works” because they teach the concept of “Traffic Dispersion” over multiple aggregated connections. Ex-1006, ¶¶0006-9. As such, purported implementation differences would not be relevant to the combination. A POSITA would have been more than capable of applying teachings from known networking standards, e.g., RFC1990/1661, consistent with basic networking concepts. *Supra* §IV. This was a combination of prior art elements according to known methods to yield predictable results, using known techniques (from RFC1990/1661) to improve similar methods (related works) in the same way. Ex-1006, ¶¶0006-0009; Ex-1003, ¶¶229-231.

2. Claim 1

[1pre] A method for establishing and sending data during a multipath connection comprising:

Grounds 2-3 teach [1pre]. Ex-1003 ¶¶269-279. Mineno teaches a method for establishing a multipath connection between a sender and receiver/destination host, and sending data using “multiple paths” between them. *E.g.*, Ex-1006, ¶¶0003, ¶¶0001, ¶¶0017-18, Figs. 2-3:

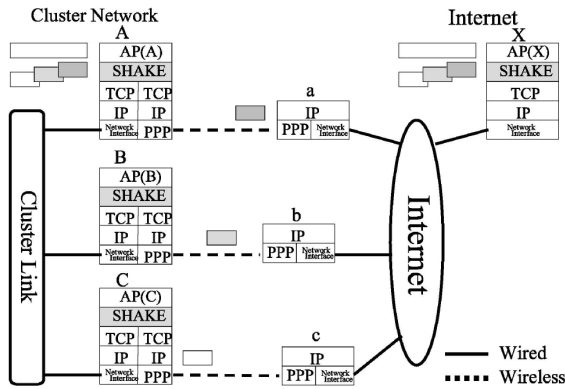


Figure 2: SHAKE Protocol Stack.

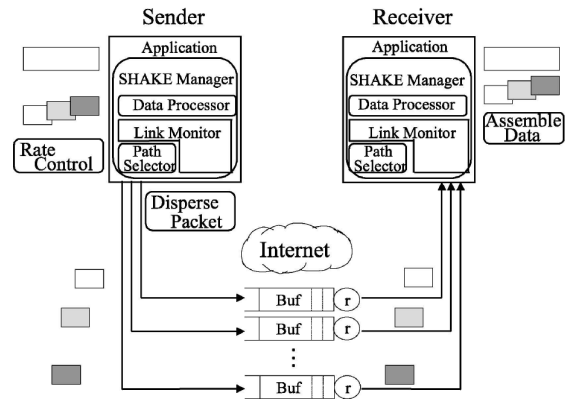


Figure 3: Illustration of SHAKE Modules.

Mineno describes a scenario where mobile hosts are connected together into a cluster, e.g., using ad-hoc Wi-Fi, and access the Internet using relatively slow cellphone connections. Ex-1006, ¶¶0001-4, ¶¶0016, ¶¶0042, ¶¶0047, Fig. 1:

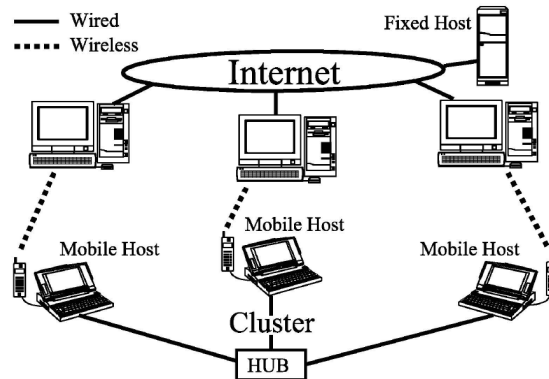


Figure 1: An Example of the System.

Mineno teaches a “SHAKE” protocol “for sharing multiple paths in a cluster type network” where each laptop can use the other laptops’ connections to send/receive data. *Id.*, ¶¶0001, ¶¶0010-18, ¶¶0024-29, ¶¶0031-42, ¶¶0048-49; Ex-1003, ¶¶232-233.

SHAKE distributes packets between links, sending packets through other mobile hosts, which relay packets to the destination. Ex-1006, ¶¶0024-35, Figs. 1-3 (annotating exemplary multipath connection between sender Internet host X and receiver host A):

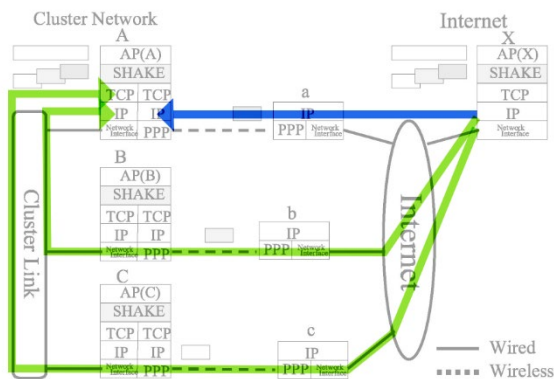


Figure 2: SHAKE Protocol Stack.
(Annotations/Emphasis Added)

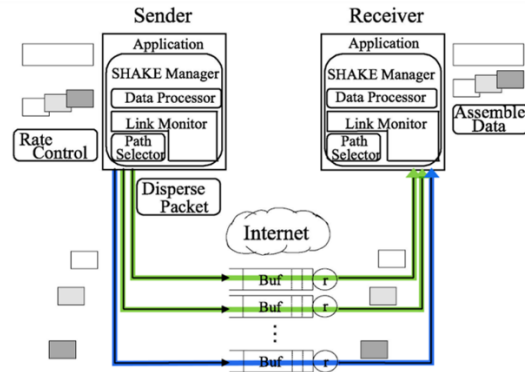


Figure 3: Illustration of SHAKE Modules.
(Annotations/Emphasis Added)

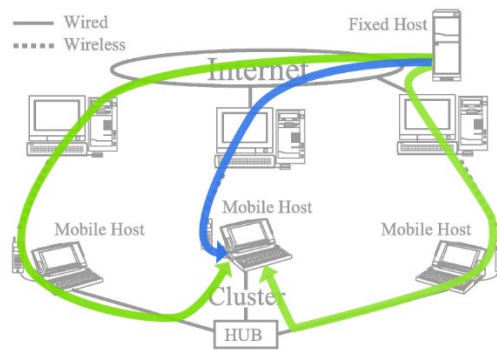


Figure 1: An Example of the System.
(Annotations/Emphasis Added)

Ex-1003, ¶¶234-235.

Additionally, Mineno establishes TCP connections between hosts and uses them to send data over multiple paths between Sender and Receiver. Ex-1006, ¶¶0001-4, ¶¶0010-18, ¶¶0024-29, ¶¶0033-36, ¶0048, Figs. 1-3. TCP teaches

additional details on establishing connections between hosts and sending data bidirectionally using TCP. *Supra* §VI.B.1 (explaining MTC); Ex-1007, 00005, 000013, 000016, §1.5, §§2.7-2.8, §3.4, §3.7, Figs. 7-8; Ex-1003, ¶¶236-238.

Ground 3 further teaches the concept of establishing links and using multiple physical links as one logical link. Ex-1009, 000005-12, 000015-26; Ex-1008, 000005-10, 000013, 000021, 000028, 000034; *supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶239-241.

The method of Grounds 2-3 further comprise the steps described below.
Infra §VI.B.2[1a]-[1d].

[1a] a data-source device receiving multipath information about each of a plurality of network-edge devices that is capable of joining a multipath connection with a data-requesting device,
--

Grounds 2-3 teach **a data-source device** (a Sender host being a fixed host; alternatively, a mobile host) **receiving multipath information about each of a plurality of network-edge devices** (other mobile hosts) **that is capable of joining a multipath connection with a data-requesting device** (a destination host, such as a mobile host requesting data from the fixed host; alternatively, a fixed host requesting data from a mobile host). *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶243-269.

Mineno/TCP teach a symmetrical, bidirectional SHAKE protocol implemented on mobile and fixed hosts with multipath data transfer between a

“Sender” and “Receiver,” which can be any of the hosts. Ex-1006, ¶¶0001-4, ¶¶0010-42, ¶0048, Figs. 1-3, 6-10; Ex-1007, 000016. Figures 2-3 teach an example of Internet server X as Sender and a mobile host as receiver, with exemplary white/grey packets (annotated with different colors below) transmitted over the paths. Figure 3 shows the white packet travelled furthest from the Sender, meaning the Sender is Internet host X Figure 2.

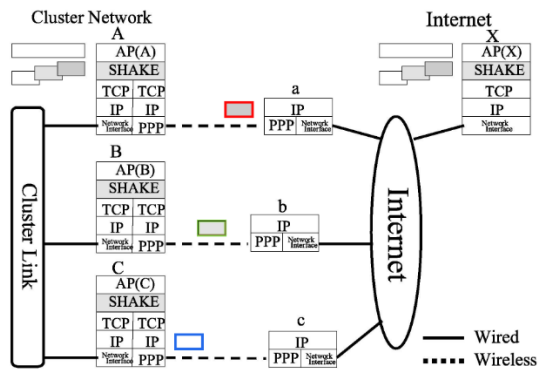


Figure 2: SHAKE Protocol Stack.
(Emphasis Added)

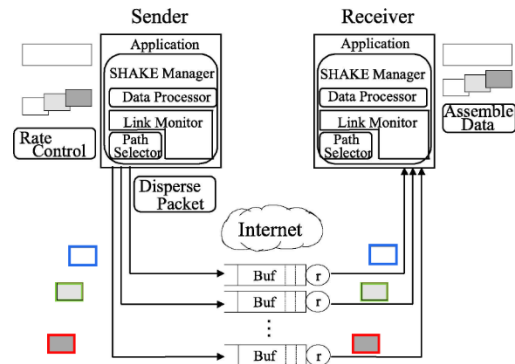


Figure 3: Illustration of SHAKE Modules.
(Emphasis Added)

Mineno satisfies [1a] with data sent from fixed to mobile host and, alternatively, in the inverse direction from mobile to fixed host. Ex-1003, ¶¶244-245.

A data-source device. Mineno teaches a “fixed host” (a.k.a. “server” or “Internet” host) as Sender, sending data to a Receiver mobile host over the Internet. Ex-1006, ¶¶0001-2, ¶¶0010-18, ¶¶0031-32, ¶¶0037-42, Figs. 1-3, 8-10. As Mineno explains, laptops were used to access the Internet to transfer files/data. *Id.* This was common for client computers by the relevant timeframe. Ex-1007,

000007-8, 000013-15, 000086 (teaching Internet host computers); *supra* §I.

Alternatively, Mineno also teaches a mobile host as the Sender, thus data-source device.¹⁰ Ex-1006, ¶¶0017-25, ¶0031, ¶¶0037-48, Figs. 3, 6-10; Ex-1003, ¶¶246-250.

The data-source device receiving multipath information (from report and control packets, and stored in the path information table) **about each of a plurality of network-edge devices** (other mobile hosts). Each host, including the Sender host, receives multipath information, e.g., routing information, about each of the other hosts. All hosts implement SHAKE, which includes a link monitoring module that receives report and control packets and uses them to form a “path information table” about other hosts. Ex-1006, ¶¶0015-27 (“Each host has a table which relates host with link number.”), ¶0028 (“control packet which is only used to form a cluster and make a link table”), ¶0032-36, ¶0048, Figs. 2, 4-5. The path information table contains the full path to other hosts (“*end-to-end* path information”) and “performs a role as a routing table” for sending data packets simultaneously over multiple available connection paths from sender to receiver, through the other mobile hosts. *Id.*, ¶0033-36, ¶¶0024, Figs. 1-3; *supra* §V.B. For example, when the Internet host is the Sender, it routes packets to the Receiver

¹⁰ The '649 patent confirms that Mineno's Sender host falls within the scope of a data-source device. *Infra* §VI.B.7 (claim 6); Ex-1003, ¶249.

host A through the other mobile hosts because it received end-to-end multipath information for routing packets from one end to the other through mobile hosts B and C:

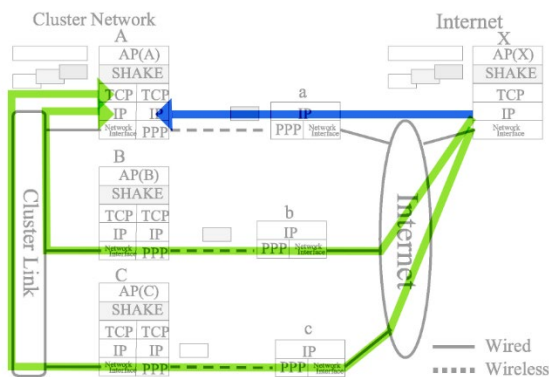


Figure 2: SHAKE Protocol Stack.
(Annotations/Emphasis Added)

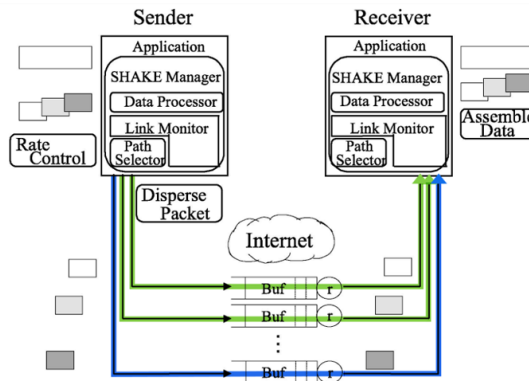


Figure 3: Illustration of SHAKE Modules.
(Annotations/Emphasis Added)

Id., ¶¶0001-4, ¶¶0013-18, ¶¶0026-28, ¶¶0044-45; Ex-1003, ¶¶251-252, ¶¶260-262.

Additionally, the multipath information includes “information like theoretical bandwidth, round-trip delay, and receiving rate” about the paths through each mobile host, which is used to make routing decisions. Ex-1006, ¶¶0033-36, ¶¶0026-28. Report packets are “used to report communication status” and contains path information:

Packet ID	Link Number	Unused
Packet Length		
ST1		
RT1		
RT2		
Receiving Rate		

Figure 5: Report Packet Format.

Ex-1025; Ex-1006, ¶¶0017, ¶¶0026. The link number field contains information about multiple paths. Ex-1006, ¶¶0027 (“Each host has a table which relates host with link number”). Other report fields contain multipath information for estimating status/delay for communication paths to relay hosts by the link monitoring module. Ex-1006, ¶¶0019-23; Ex-1003, ¶¶253-256, ¶¶261-262.

RFC1990/1661 further teach a multipath connection and providing multipath information to a server, such as EDO including a class-address pair, e.g., IP address or magic number. *Supra* §V.B, §[1pre]; Ex-1009, 000008, 000019-23; *infra* §VI.B.3. RFC1990/1661 teach one endpoint, typically the client, sending the EDO to another, typically a server (*id.*), therefore, the combination teaches hosts receiving multipath information, e.g., the use of a connection ID. *Infra* §VI.B.3; Ex-1003, ¶¶257-258.

A plurality of network-edge devices. Each of the other mobile hosts—other than the destination/receiver—is a network-edge device. Multiple mobile hosts are connected using a local network, e.g., Ethernet or Wi-Fi, each able to act as a relay with its own Internet connection. Ex-1006, ¶¶0001-4, ¶¶0010-18, ¶¶0024-28, ¶0031, ¶¶0033-47, Figs. 1-3. Mobile hosts use SHAKE to send/receive packets through the other mobile hosts in the cluster—each is a network-edge

device,¹¹ sitting on the edge of the cluster network and acting as a relay. *Id.* For example, when **A** is the Receiver, **B** and **C** are network-edge devices:

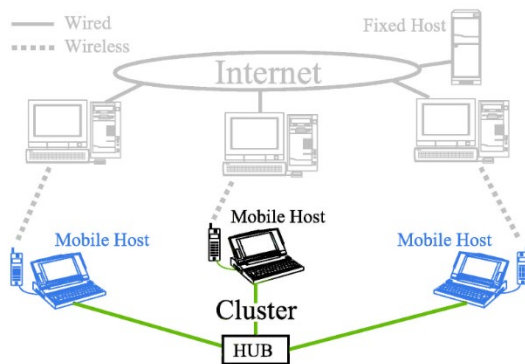


Figure 1: An Example of the System.
(Emphasis Added)

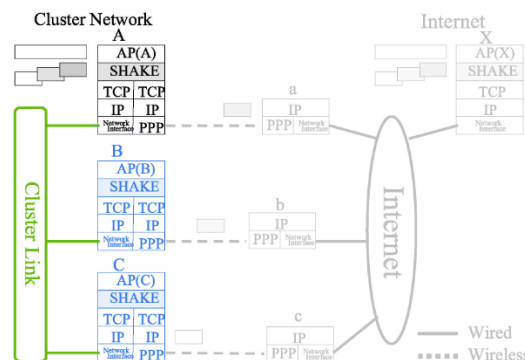


Figure 2: SHAKE Protocol Stack.
(Emphasis Added)

Ex-1006, ¶¶0001-4, ¶¶0010-29, ¶¶0031-48, Figs. 1-3, 6-10; Ex-1003, ¶¶263-264.

Each of the network-edge devices is capable of joining a multipath connection with a data-requesting device. Each other host in the cluster is capable of joining a multipath connection with the Receiver host, allowing their Internet connections—each part of a distinct connection pathway—to be aggregated for simultaneous data transfer. Ex-1006, ¶¶0001-4, ¶¶0010-18, ¶¶0024-42, ¶¶0048, Figs 2-3; *supra* §VI.B.2[1pre]; *infra* §VI.A.2[1d]; Ex-1003, ¶265.

¹¹ Mineno teaches the other mobile hosts route packets act as *routers* or *network switches* and are *devices capable of providing multipath services*; they have *cell phone* and/or *modem*; they are *computers, tablets, consumer electronic devices, Internet-ready devices, and networking devices* including *Wi-Fi/cellular devices*. Ex-1006, 0001-4, 0010-18, 0024-28, 0031-47, Figs. 1-3, 6-10. The '649 patent confirms these as network-edge devices. Ex-1001, 18:14-22.

Data-requesting device.¹² Mineno teaches a mobile host as a device that requests data from an Internet server. Hosts request data packets through the cluster and receive data packets through a multipath SHAKE connection over TCP. This includes a mobile host (e.g., laptop) requesting data, e.g., webpages or FTP files, from a server over the Internet. Ex-1006, ¶¶0001-3, ¶0004, ¶¶0015-18, ¶¶0031-32, Figs. 1-3. The Internet was widely used and laptops were routinely used to request data from websites. *Id.*; *supra* §I. This would have been obvious because Web browsing was ubiquitous and common, even for non-technical laptop users. Ex-1003, ¶266, ¶268.

Alternatively, Mineno teaches data transfer in the inverse direction, with the laptop sending data to the fixed host, which would then be the data-requesting device. Ex-1006, ¶0015, ¶¶0037-47, Figs. 6-10; Ex-1003, ¶267.

[1b] each of the network-edge devices being connected to one or more networks,
--

Grounds 2-3 teach **each of the network-edge devices** (other mobile hosts) **being connected to one or more networks**. *Supra* §VI.B.1 (explaining MTC). Each mobile host, including relay hosts, are connected to an “outside network (like

¹² Mobile hosts include *computers* and *tablets*; each has a *cell phone* and is a *networking*, and *Wi-Fi*, and *mobile communication device*. Ex-1006, 0001-4, 0016, 0031, 0037-47, Figs. 1-3, 6-10. The '649 specification confirms these are data-requesting devices. Ex-1001, 18:44-48; Ex-1003, ¶268.

Internet)” through a cellular connection. Ex-1006, ¶¶0001-5, ¶¶0011-17, ¶¶0019-25, ¶¶0029-42, ¶0048, Figs. 1-3:

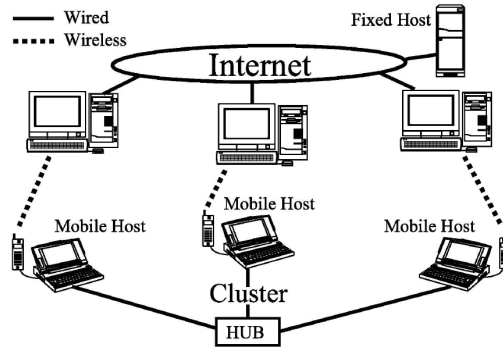


Figure 1: An Example of the System.

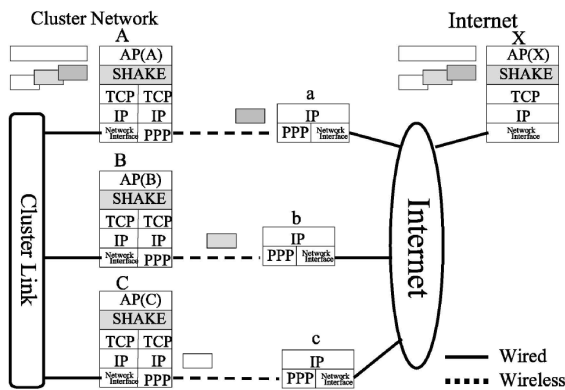


Figure 2: SHAKE Protocol Stack.

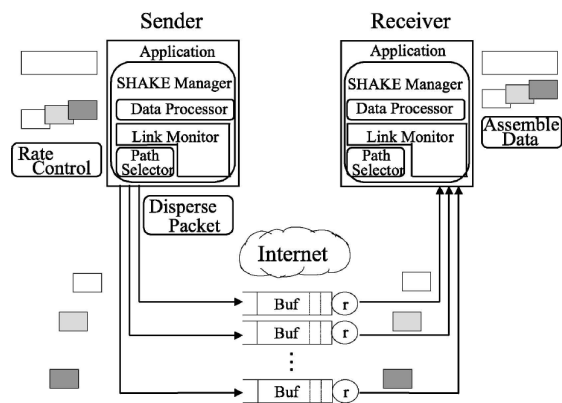


Figure 3: Illustration of SHAKE Modules.

Ex-1003, ¶¶271-273.

[1c] and each of the network-edge devices being connected to the data-requesting device over a different connection; and

Grounds 2-3 teach **each of the network-edge devices being connected to the data-requesting device (destination/receiver host) over a different connection.** *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶275-278. Each mobile

host has a different connection to the cluster network, e.g., via Ethernet or wireless LAN. Ex-1006, ¶¶0031-32, ¶¶0037-42, Figs. 1-2, ¶¶0014-16. For example, when host A is the receiver, the other mobile hosts are the network-edge devices. *Supra* §VI.B.2[1a]. Host A is connected to B over one connection and to C over a different connection. Ex-1006, Figs. 1-2:

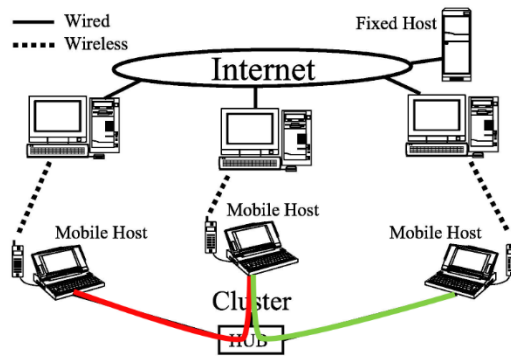


Figure 1: An Example of the System.
(Annotations/Emphasis Added)

Ex-1003, ¶¶275-276.

Each network-edge device is also connected to the data-requesting device over a different connection from those described in [1b] (to the one or more networks). Each of the other mobile hosts is connected to the data-requesting device over a connection to the cluster network (explained above), which is different from the cellular connection to the Internet/outside network. *Supra* §VI.B.2[1b]. “Each relay host in the cluster has two network interfaces: one is used to communicate with outside network, and the other is assigned the local

private IP address before forming a cluster.” Ex-1006, ¶¶0014-16, Figs. 1-2; Ex-1003, ¶277.

[1d] ...

Grounds 2-3 teach **the data-source device (Sender) performing (i) sending different groups of data packets to different network-edge devices (other mobile hosts) that are participating in the multipath connection.** *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶279-287.

The Sender host sends data packets to the other (non-destination) mobile hosts in the cluster that are participating in the multipath connection—each path in the SHAKE connection corresponds to a different mobile host. *Supra* §§VI.B.2[1pre], [1a]. The Sender host sends different groups of data packets down each path, to each mobile host. Ex-1006, ¶¶0002-5, ¶¶0019-28, ¶¶0031-32, ¶¶0033-36, Figs. 2-3 (greyscale indicating different data sent to each mobile host; colors added for emphasis):

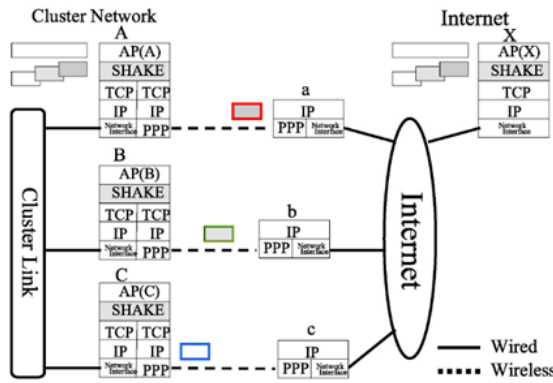


Figure 2: SHAKE Protocol Stack.
(Emphasis Added)

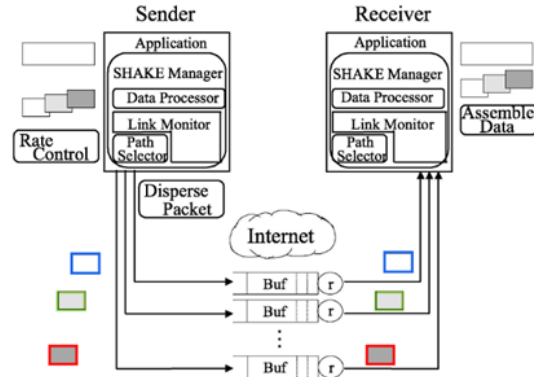


Figure 3: Illustration of SHAKE Modules.
(Emphasis Added)

Ex-1003, ¶¶280-281.

SHAKE sends different groups of data packets with different “Link Number[s]” through each path (Ex-1006, ¶¶0026-28, Figs. 4-5), for example, group B being the data packets to host B, group C being the data packets sent to host C, etc. This allows SHAKE to aggregate the mobile hosts’ Internet connections. *Id.*, ¶¶0001-3, ¶¶0011, ¶¶0037-47; Ex-1003, ¶¶282-283.

TCP further teaches sending data packets to hosts. Ex-1007, 00007, 000013-14, 000035-36. For Ground 3, RFC1990 further teaches endpoints sending different groups of data packets to different network-edge devices. Ex-1009, 000007-9, 000011-12, 000015-19. Mineno explains this was a known approach for increasing bandwidth using traffic dispersion. Ex-1006, ¶¶0006-9; Ex-1003, ¶¶284-286.

3. Claim 2

Grounds 2-3 teach claim 2. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶288-295.

The method of claim 1, wherein the multipath information includes a connection ID, e.g., Mineno's link number. Ex-1006, ¶¶0026-28, ¶¶0033-36, Figs. 4-5. Before sending packets, SHAKE hosts insert a SHAKE header, which includes a "link number" (Ex-1006, ¶0026, Figs. 4-5) that identifies a connection (*id.*, ¶¶0026-28, ¶¶0033-35). "Each host has a table which relates host with link number." Ex-1006, ¶0027. SHAKE hosts use the link number to route the packet to the destination host. *Id.* Therefore, the link number identifies the connection between the sender and destination hosts. *Id.*, ¶0027, ¶0033-36; Ex-1003, ¶289.

The combination with RFC1990 further teaches using an ID to identify the multiple links in a bundle. *Supra* §VI.B.1. RFC1990/1661 teach an EDO that includes a class-address pair (e.g., IP address, magic-number) that distinguishes links in one bundle from others. Ex-1009, 000019-23. "The aggregate link, or bundle, *is named by the pair of identifiers for two systems connected by the multiple links.*" Ex-1009, 000008. Applied to Mineno, the combination teaches using an ID (e.g., IP address or magic-number) for Mineno's multipath connection and including it in the multipath information exchanged between Mineno's hosts, so that hosts can populate their host/routing tables and route packets to their

intended destination. Furthermore, Mineno teaches adding new hosts to a cluster (Ex-1006, ¶0033), and it would have been obvious for the new host to present an identifier to allow other hosts to distinguish its connections from others. *See* Ex-1009, 000020, 000023; Ex-1003, ¶¶291-293.

A connection ID is **generated by one of the data-source device (Sender), one of the plurality of network-edge devices (other mobile hosts), the data-requesting device (Receiver/destination) and a network device**. Mineno teaches that the link number is added to headers; it is therefore generated by the Sender host. Ex-1006, ¶0026, Figs. 4-5. Moreover, claim 2 allows any of Mineno's three host types—Sender, Receiver, or other mobile host—to generate the connection ID. Even if the link number were somehow generated by some other device on the network, this would still satisfy claim 2, which allows a “a network device.” Ex-1003, ¶290, ¶294.

4. Claim 3

Grounds 2-3 teach claim 3. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶296-301.

The data-source device (Sender) receiving second multipath information about a second network-edge device (additional mobile host) that is capable of joining the multipath connection. Grounds 2-3 teach a Sender receiving multipath information about each of the other mobile hosts capable of joining the

multipath SHAKE connection. *Supra* §VI.B.2[1a]. Mineno teaches additional “new” mobile hosts joining the cluster and multipath connection. Ex-1006, ¶0033, ¶¶0014-16, , Fig. 3. “[W]hen some new hosts are added to the cluster,” fixed and mobile hosts receive multipath information via report and control packets to update routing tables with “new sections” about the new hosts, in the manner explained previously. Ex-1006, ¶0033, ¶0036; *supra* §VI.B.2[1a]. New mobile hosts are capable of joining the multipath connection via the SHAKE protocol; the ellipses in Figure 3 teach additional paths—corresponding to additional mobile hosts—beyond those shown in Figures 1-2. *Id.*, Fig. 3; Ex-1003, ¶¶297-298.

Additionally, information received by the hosts through the SHAKE management module is multipath information. The module “realizes the shared multilink procedure by using multimedia through multiple paths to form a logical path.” Ex-1006, ¶0029. It “check[s] among hosts” and keeps “an additional window of SHAKE ... opened for the request of *forming a cluster*”, which SHAKE uses for its multipath connection. *Id.*, ¶0036; Ex-1003, ¶299.

The data-source device joining the second network-edge device to the multipath connection. Additional mobile hosts are added to routing tables as they join the cluster. Ex-1006, ¶0033, ¶¶0014-18, ¶0026. The Sender uses the routing tables to select paths to use for the multipath connection; therefore, the Sender

joins paths, and the corresponding mobile host for each path, to the multipath connection. Ex-1006, ¶¶0033-34, ¶0024, Fig. 3., ¶0026-29; Ex-1003, ¶300.

5. Claim 4

Grounds 2-3 teach claim 4. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶302-311.

The data-source device (Sender) receiving multipath information (control packets, report packets, and/or disconnection reports) **about which network-edge devices are to be removed from the multipath connection.** The Sender receives multipath information about which mobile hosts have been disconnected from the Internet, indicating that they should be removed from the multipath connection. The link monitoring module “monitors the status of communication paths” through the mobile relay hosts, including whether the path has been disconnected (“cut”) (Ex-1006, ¶0019, ¶0024, ¶¶0033-35) from control packets, report packets, or “disconnection report[s]”. Ex-1006, ¶0033, ¶0024. The Sender chooses paths—through the mobile hosts—based on network conditions and the disconnection report. Ex-1006, ¶¶0019, ¶¶0024-25, ¶0028, ¶¶0033-34. The SHAKE management module in each host further “ensur[es] communication paths.” Ex-1006, ¶0029. Therefore, the Sender receives information about relay hosts that have lost their Internet connection, which is multipath information about

which paths should be removed from the multipath SHAKE connection. Ex-1006, ¶¶0016, ¶¶0019, ¶¶0024, ¶¶0026-28, ¶¶0032-34; Ex-1003, ¶¶303-304.

The data-source device removing the network-edge devices from being associated with the multipath connection. The Sender removes disconnected mobile hosts from the multipath SHAKE connection. The Sender considers disconnection reports when selecting paths. Ex-1006, ¶¶0019, ¶¶0024. Removing a path from the multipath connection removes the corresponding host. Ex-1006, ¶¶0014-17, ¶¶0024, ¶¶0031-32, Figs. 1-3. Furthermore, Mineno suggests, and it was obvious, to remove disconnected hosts from the multipath connection because that host can no longer relay data to/from the outside network—that is the reason Mineno monitors for disconnections. Ex-1006, ¶¶0019. This avoids data loss. Ex-1003, ¶¶305-306.

TCP further teaches closing paths. Ex-1007, §3.5, 000011, 000027-28, 000055, 000009, 000043-45, 000066-67, Figs. 13-14; Ex-1003, ¶307.

The combination with RFC1990/1661 further teaches this. RFC1661 teaches endpoints receiving multipath information, such as the Link Termination packets, which are used to remove a link from a multilink bundle. Ex-1008, 000032, 000015, 000025-000026, 000029, 000039-40. RFC1661 teaches circumstances for removing a link, including “loss of carrier” or link failure, similar to Mineno. Ex-1008, 000012, 000015. Therefore, the combination of

Mineno and RFC1990/1661 teaches the Sender receiving multipath information in the form of termination packets about which mobile hosts are to be removed from the multipath connection, and the Sender removing those other mobile hosts.

Ex-1006, ¶¶0019, ¶¶0024; Ex-1008, 000025-000026, 000029, 000032, 000039-40.

A removed host is no longer associated with the connection and proceeds to a dead phase where data is no longer be assigned to that path. Ex-1008, 000015, 000012-13, 000022-23; Ex-1003, ¶¶308-310.

6. Claim 5

Grounds 2-3 teach claim 5. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶312-313.

At least one of the data-source device, the network-edge devices and the data-requesting device determining which of the network-edge devices are to be removed from the multipath connection. The Sender host receives information about which mobile hosts have lost their Internet connection and therefore should be removed from the multipath connection. *Supra* §VI.B.5. Therefore, Mineno teaches, or at least suggests, the data-source device determining which network-edge devices are to be removed. E.g., Ex-1006, ¶¶0019-24. Even if another mobile host or the destination made the determination, it still satisfies claim 5. Ex-1003, ¶¶313-314.

7. Claim 6

Grounds 2-3 teach claim 6. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶315-318.

The data-source device (Sender) is one of ... a server ... and a device capable of providing multipath services. The Sender is a device capable of providing multipath services, using multiple communication paths. *Supra* §§VI.B.2[1pre]-[1a], [1d]. Mineno teaches examples of the Sender as a fixed host Internet server. Ex-1006, ¶00015, ¶0017, ¶¶0031-32, ¶¶0038-42, Figs. 1-3; Ex-1003, ¶¶316-318.

8. Claim 7

[7pre] ...

[7pre] is identical to [1pre] and satisfied for the same reasons. *Supra* §VI.B.2[1pre]; Ex-1003, ¶¶319-320.

[7a] ...

Grounds 2-3 teach [7a]. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶321-330. The **data-source device**, **data-requesting device**, and **multipath connection** were explained above. *Supra* §VI.B.2.

Ground 2 teaches **the data-source device (Sender) receiving multipath connection requests from a plurality of data-requesting devices**. Mineno teaches the Sender as an Internet server. *Supra* §VI.B.2[1a]; Ex-1006, ¶0015,

¶¶0017, ¶¶0031-32, ¶¶0038-42, Figs. 1-3. Internet servers were well known, and they serviced requests from multiple clients simultaneously. Therefore, Mineno teaches the Sender receiving data requests from many client devices, either in the same or different clusters. *Id.* This is reflected and taught in TCP—the dominant transport protocol on the Internet—which teaches multiple simultaneous connections. Ex-1007, 000011, 000016, 000033. Therefore the combination teaches, or at least suggests, the Internet host receiving requests from a plurality of mobile hosts. Each request is a multipath connection request because it requests data to be transferred utilizing a multipath SHAKE connection over TCP. *Supra* §VI.B.2[1pre]-[1a]; Ex-1003, ¶¶323-326.

The combination with RFC1990/1661 further teaches hosts (endpoints) sending multipath connection requests. RFC1990/1661 teach a negotiation process with an exchange of Configure packets. Ex-1008, 000008, 000013, 000024-25, 000028-31. Applied to Mineno, the combination teaches the mobile host sending configuration packets to the Internet server to request a SHAKE transfer and establish a multipath connection between them. *See id.*; Ex-1003, ¶327.

Each of the multipath connection requests involving a particular multipath connection to a data-requesting device. Each request is from a mobile host to the Internet server; SHAKE utilizes a particular multipath connection between for each Sender and Receiver host. Ex-1006, ¶0001, ¶¶0014-

17, ¶¶0024, ¶¶0026-28, ¶¶0033-34, Figs. 1-3 (annotated with example of Internet server X receiving requests, and using different multipath SHAKÉ connections, with mobile hosts A and B):

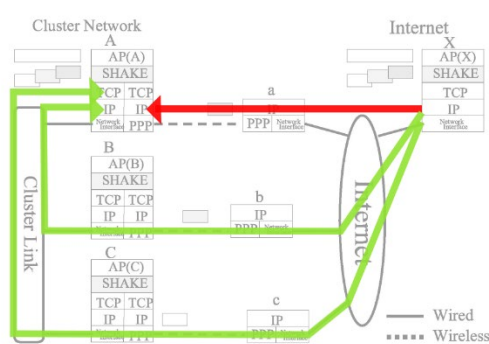


Figure 2: SHAKÉ Protocol Stack.
(Annotations/Emphasis Added)

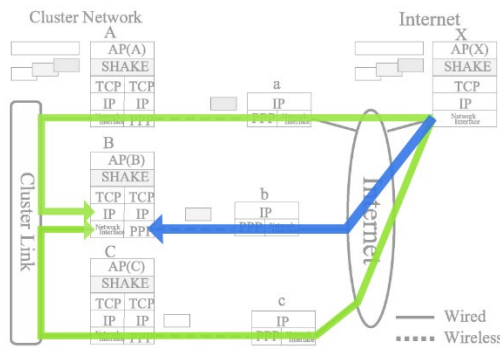


Figure 2: SHAKÉ Protocol Stack.
(Annotations/Emphasis Added)

Ex-1003, ¶328.

RFC1990/1661 further teaches a server using the EDO to distinguish between links to various endpoints, allowing a server to have several distinct multipath connections to several different endpoints. Ex-1009, 000019-23.

Therefore, the combination with Mineno teaches each of the multipath connection requests involving a particular multipath connection to a particular mobile host.

Ex-1003, ¶329.

[7b] ...

Grounds 2-3 teach [7b]. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶331-334. Connection ID and multipath connection requests were explained above. *Supra* §VI.B.3, §VI.B.8[7a].

The data-source device (Sender) associating a connection ID to each multipath connection request. The Sender associates a connection ID (e.g., link number) to each multipath connection request—each SHAKE connection has an associated link number used by hosts to direct packets to the requesting (destination) host. *Supra* §VI.B.3; Ex-1006, ¶¶0026-0028, ¶¶0033-35, Figs. 2-5. The Sender appends a SHAKE header with the link number and therefore associates a connection ID with each multipath connection request. *Id.*; *see also* Ex-1006, ¶0017, ¶0026, ¶35, Figs. 4-5; Ex-1003, ¶332.

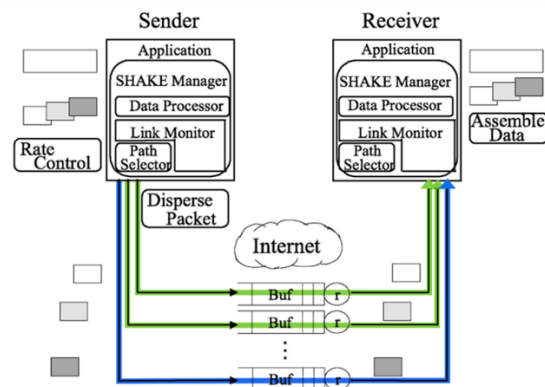
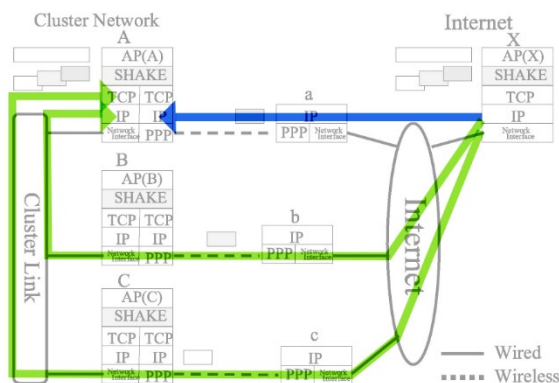
RFC1990/1661 teaches associating a class-address pair (from the EDO) as a unique identifier for each multilink bundle. Ex-1009, 000019-23; *supra* §VI.B.3. The combination with Mineno therefore teaches the Sender associating a connection ID to each multipath connection request, so that hosts can identify that particular multipath connection. Ex-1006, ¶¶0027-28; Ex-1003, ¶333.

[7c] ...

Grounds 2-3 teach [7c]. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶335-340. The first portion of [7c] tracks [1a], which Grounds 2-3 teach. *Supra* §VI.B.2[1a]; Ex-1003, ¶335.

Using the multipath information. The Sender receives the multipath information (*supra* §VI.B.2[1a]), and the whole purpose of receiving it is to use it. For example, the Sender appends a SHAKE header with multipath information,

including link number, to packets that it sends (Ex-1006, ¶¶0026, ¶¶0017, ¶¶0035, Fig. 4) and uses the multipath information to generate/update/use a path information table and to track changes and new hosts in the cluster. *Id.*, ¶¶0033-34. The multipath information includes a connection ID, which is used to route SHAKE packets. *Supra* §VI.B.8[7c]; Ex-1003, ¶¶336-337.



The particular multipath connection has a particular connection ID.

[7d] ...

Grounds 2-3 teach [7d]. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶341-346.

The data-source device (Sender) notifying each of the network-edge devices (other mobile host) that is participating in the particular multipath connection associated with the particular connection ID. Each multipath SHAKE connection has a particular connection ID. *Supra* §VI.B.8[7a]-[7b], §VI.B.3. The Sender (e.g., Internet server X) sends packets to other mobile hosts in a SHAKE connection. *Supra* §VI.B.2[1a]. Before the Sender transmits data using SHAKE, it notifies each of the other mobile hosts that is participating in the particular multipath connection, e.g., when a TCP connection is established between them. The Sender uses TCP connections to send packets to the Receiver and other mobile hosts; therefore, the Sender forms TCP connections with each. Ex-1006, ¶¶0017, ¶¶0024, ¶¶0026-28 Figs. 2-3; Ex-1003, ¶¶340-343.

When the server establishes a TCP connection with a mobile host, it notifies the mobile hosts during the “three-way” handshake that establishes the TCP connection, e.g., by sending a “SYN” segment to initiate a TCP connection. Ex-1007, 000018, 000027-29, 000033, 000036-38, Figs. 7-8. Since the Sender decides which paths to use, the Sender notifies the other mobile hosts in the multipath connection by initiating TCP connections. Ex-1006, ¶¶0013-17, ¶¶0024-

28, ¶¶0033-36. This would have at least been suggested and obvious as one of a finite number of possibilities. Moreover, even if the other mobile hosts initiated the TCP connection, the Sending host would still notify the mobile hosts during the three-way handshake, e.g., by sending “SYN-ACK” to each of the other mobile hosts participating in the multipath connection. Ex-1007, 000036-38; Ex-1003, ¶¶344-345.

[7e] ...

Grounds 2-3 teach [7e]. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶347-351.

The data-source device (Sender) sending data associated with the particular connection ID to the network-edge devices (other mobile hosts) participating in the particular multipath connection. Mineno teaches the Sender sending data for a particular multipath SHAKE connection to the other mobile hosts participating in the connection. *Supra* §VI.B.2[1a], [1d].

Ground 2 teaches the Link Number as the connection ID. *Supra* §VI.B.3. Data sent over the particular multipath connection is associated with the Link Number because the Sender adds a SHAKE header to each packet with the Link Number. Ex-1006, ¶0017, ¶¶0026-28, ¶¶0033-35, Fig. 4. Ground 3 teaches using an ID, such as a class-address pair such as IP address. *Supra* §VI.B.3. Data packets sent over a multipath SHAKE connection would be associated with the IP

addresses of the Sender and Receiver because SHAKE runs on top of IP. *E.g.*, Ex-1006, Fig. 2. For both grounds, data sent over a multipath SHAKE connection is associated with that connection and the particular ID for that connection. Ex-1003, ¶¶347-350.

The particular multipath connection associated with a particular connection ID. *Supra* §VI.B.8[7a]-[7b]; Ex-1003, ¶347.

9. Claim 8

Claim 8 includes language from [1d]. Grounds 2 or 3 teach the shared language (*supra* §VI.B.2[1d]) and the different language: the data-source device sending different groups of data packets to different network-edge devices that are participating in the **particular multipath connection associated with the particular connection ID**. The Sender sends different groups of data packets to different mobile hosts that are participating in the particular multipath connection to the destination/Receiver. *Supra* §VI.B.2[1d], §VI.B.8[7e]. Each multipath SHAKE connection has a particular connection ID. *Supra* §VI.B.8[7a]-[7b], §VI.B.3; Ex-1003, ¶¶352-353.

10. Claim 9

Claim 9 is nearly identical to claim 4. Grounds 2-3 teach the shared language, explained above. *Supra* §VI.B.5. *Supra* §VI.A.1 (explaining MTC); Ex-1003, ¶¶354-357.

The data-source device (Sender) receives **identification of the network-edge devices** (disconnected mobile hosts) to be removed from the **particular** multipath connection. The Sender receives multipath information that identifies which mobile hosts have been disconnected and are to be removed from the particular multipath connection between Sender and Receiver. *Supra* §VI.B.5. The Sender then removes the **identified** mobile hosts from the **particular** multipath connection between the Sender and Receiver. *Id.*

11. Claim 10

Grounds 2-3 teach claim 10. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶358-360.

The data-source device (Sender) notifying the data-requesting device (Receiver/destination) when all data has been sent over the particular [multipath] connection. *Supra* §V.D (construction). Mineno uses TCP to send data from Sender to Receiver host. Ex-1006, ¶0017. TCP teaches the sender sending a control bit “FIN”, which notifies the receiver that all data has been sent and there is “[n]o more data from Sender” (Ex-1007, 000021-22, Figure 3, 000028-32), and a “CLOSE” operation, “meaning ‘I have no more data to send.’” Ex-1007, 000043; *see also id.*, 000044-45, 000018, 000085. Therefore, in the combination with Mineno, when the Sender closes its TCP connection, the Sender notifies the Receiver that “I have no more data to send” and there is “[n]o more

data from Sender”, meaning all data has been sent by the Sender over the multipath connection. *See* Ex-1007, 000021-22, 000043; Ex-1003, ¶¶358-359.

12. Claim 11

Grounds 2-3 teach claim 11 for the same reasons explained for claim 6. *Supra* §VI.B.7; Ex-1003, ¶361.

13. Claim 12

Grounds 2-3 teach claim 12 for the same reasons explained for claim 2. *Supra* §VI.B.3; Ex-1003, ¶362.

14. Claim 21

[21pre] A method for creating and using a multipath connection, comprising the steps of:

Grounds 2-3 teach [21pre]. The method was explained for claim 1 (*Supra* §VI.B.2[1pre]) and further comprises the below steps (*infra* §§VI.B.14[21a]-[21d]).

Creating a multipath connection was explained above, e.g., as part of the process for establishing a multipath connection. *Supra* §VI.B.2[1pre]-[1a].

Grounds 2-3 teach **using a multipath connection** to send data from Sender to Receiver via SHAKE. *Supra* §§VI.B.2[1pre]-[1a], [1d]; Ex-1003, ¶¶363-366.

[21a] ...

Grounds 2-3 teach [21a]. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶367-374.

A data-requesting device (a destination/receiver host) sending first multipath control information to or through a first network-edge device (one of the other mobile hosts), the first multipath control information indicates that the first network-edge device will join the multipath connection. Grounds 2-3 teach a plurality of network-edge devices, each being capable of joining a multipath connection with a data-requesting device; any one satisfies the “first” network-edge device. *Supra* §VI.B.2[1a]; Ex-1003, ¶368.

Mineno teaches a destination/Receiver host sending multipath control information to or through the other mobile hosts, e.g., a “control packet” that is used “to form a cluster” and “make a link table”, which in turn is used to route packets through the multiple paths of a SHAKE connection. *Supra* §VI.B.2[1pre]-[1a]; Ex-1006, ¶¶0017-18, ¶¶0026-28. Information from control packets, stored in the SHAKE management module, is responsible for “controlling the other modules, forming the cluster, ensuring communication paths” Ex-1006, ¶0027-36, ¶¶0017-18, Fig. 3. Control packets therefore include multipath control information regarding link numbers and paths for a multipath SHAKE connection. *Id.* When sent, this information indicates to other mobile hosts that they will join the multipath connection, e.g., when a new mobile host joins the cluster to initiate a multipath SHAKE transfer from an Internet host, the new host sends control

information to the other mobile hosts indicating that they will join the multipath connection. Ex-1006, ¶¶0017-18, ¶¶0026-36; Ex-1003, ¶¶369-370.

Furthermore, since mobile hosts use TCP to send SHAKE packets to each other, Mineno teaches the Receiver establishing TCP connections with other mobile hosts to initiate a multipath SHAKE connection. Ex-1006, ¶0017, Figs. 2-3. TCP teaches a three-way handshake where the Receiver sends SYN or SYN-ACK (Ex-1007, 000018, 000032-33, 000090, 000021-22, 000013, Figs. 3, 6-8); either is multipath control information because Mineno uses it to establish the TCP communication paths in a multipath SHAKE connection. Ex-1006, ¶0017, Fig. 2. When a destination/Receiver sends this to another mobile host, it indicates that the other mobile host will join the multipath connection because it creates a TCP connection for SHAKE to use. *Id.*; Ex-1003, ¶372.

Additionally, RFC1990/1661 teaches a unique ID for distinguishing links in one bundle from others; the combination of Mineno and RFC1990/1661 therefore teaches a destination/receiver mobile host providing a connection ID to other mobile hosts to indicate they will join the multipath SHAKE connection and to facilitate the connection. *Supra* §VI.B.3; Ex-1003, ¶371.

The data-requesting device being connected over a first connection to the first network-edge device (other mobile hosts). Each of the other mobile hosts is connected to the destination/Receiver host over a different connection; the

connection for the first network-edge device is a first connection. *Supra* §§VI.B.2[1a], [1c]; Ex-1003, ¶373.

[21b] ...

Grounds 2-3 teach limitation [21b]. *Supra* §VI.B.1 (explaining MTC); Ex-1003, ¶¶375-378.

The first portion of [21b] is identical to [21a] but recites “second” instead of “first.” Any one of the other mobile hosts and corresponding connection is the “first” device/connection; any other device and corresponding connection satisfies the “second.” for reasons explained previously. *Supra* §VI.B.14[21a], §§VI.B.2[1a]-[1c]; Ex-1003, ¶376.

The data-requesting device capable of receiving different data over the first connection and the second connection at the same time. Different groups of data packets are sent to the different mobile hosts, which correspond to the different connection paths in the multipath SHAKE connection. *Supra* §§VI.B.2[1c]-[1d]. Mineno teaches data being sent in parallel over paths that each traverses a separate Internet connection; the destination/Receiver is therefore capable of receiving different data over the first/second connections at the same time. Ex-1006, ¶¶0001-4, ¶¶0012-16, ¶¶0026-28, ¶¶0037-47, Figs. 1-3; Ex-1003, ¶377.

[21c] ...

Grounds 2-3 teach limitation [21c]. Mineno teaches, e.g., in Fig. 2, **after the first network-edge device** (one of the other mobile hosts) **joins the multipath connection, the data-requesting device** (a destination host) **receiving first data over the first connection from the first network-edge device**. Different groups of data packets are sent to the different mobile hosts—including the recited first network-edge device—over the multipath SHAKE connection. *Supra* §§VI.B.2[1c]-[1d], §§VI.B.14[21a]-[21b]. Therefore, Mineno teaches after the first network-edge device joins the multipath connection, the destination/Receiver receives data over the first connection, from the first network-edge device, which is the recited first data. Ex-1006, ¶¶0014-16, ¶0024, ¶¶0026-28, ¶¶0033-35, Figs. 2-3 (A as destination host; B as first network-edge device):

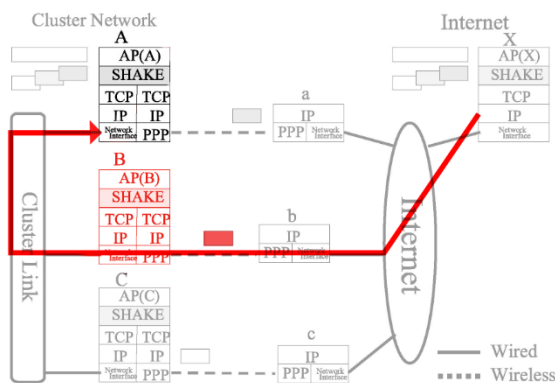


Figure 2: SHAKE Protocol Stack.
(Annotations/Emphasis Added)

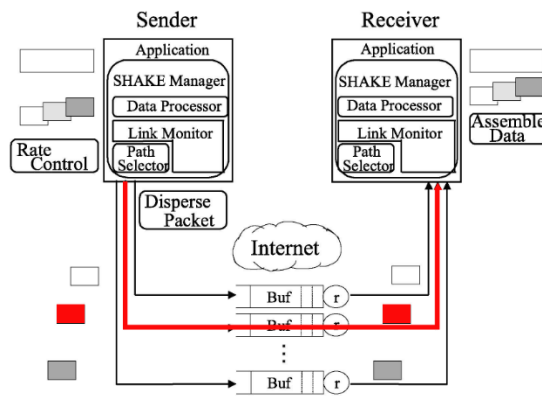


Figure 3: Illustration of SHAKE Modules.
(Emphasis Added)

Ex-1003, ¶¶379-380.

[21d] ...

[21d] tracks the language of [21c] but replaces “first” network-edge device/connection with “second.” Grounds 2-3 teach a *plurality* of network-edge devices, each being connected to the data-requesting device over a different connection path. *Supra* §§VI.B.14[21a]-[21b], §§VI.B.2[1a]-[1c]. Different groups of data packets are sent to the different mobile hosts—including the recited second network-edge device—over the multipath SHAKE connection. *Supra* §§VI.B.2[1c]-[1d], §§VI.B.14[21a]-[21b]. Therefore, the analysis from [21c] also applies to the “second” network-edge device/connection because Mineno’s teachings apply to both. *Supra* §VI.B.14[21c]. The data sent over the second connection is the recited second data, which is different from the first. *Supra* §VI.B.2[1d]; Ex-1003, ¶¶382-383:

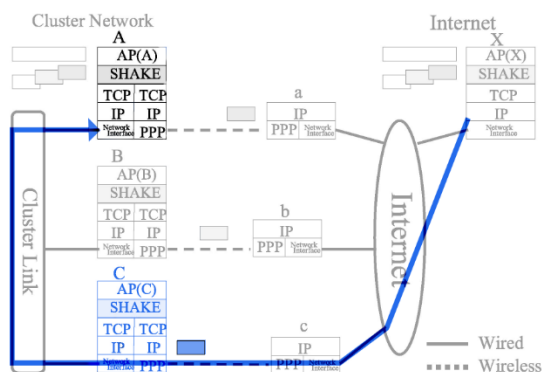


Figure 2: SHAKE Protocol Stack.
(Annotations/Emphasis Added)

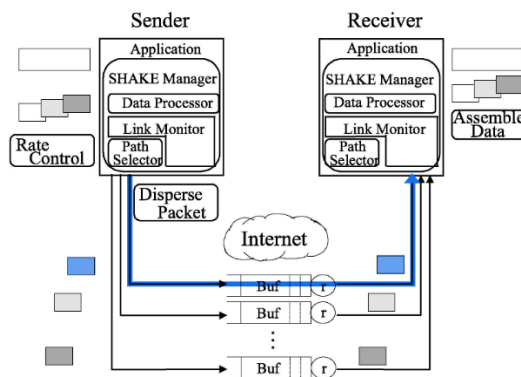


Figure 3: Illustration of SHAKE Modules.
(Emphasis Added)

15. Claim 22

[22] The method as in claim 21, wherein the first network-edge device is connected to a network, and wherein the second network-edge device is connected to the network or a different network.

Mineno teaches each of the network-edge devices (other mobile hosts) being connected to one or more networks (*supra* §VI.B.2[1c]) and each mobile host is connected to a network different from the other mobile hosts. In Figs. 1-2, each mobile host has its own connection to a different network (e.g., “b” and “c”), with separate connections to the Internet. Ex-1006, Figs. 1-2:

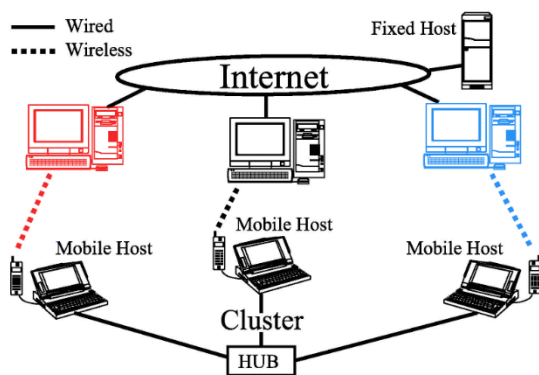


Figure 1: An Example of the System.
(Emphasis Added)

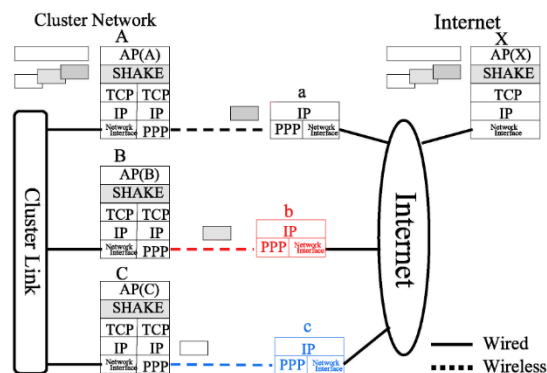


Figure 2: SHAKE Protocol Stack.
(Emphasis Added)

Ex-1003, ¶¶385-386.

VII. MANDATORY NOTICES AND FEES

Real Parties In Interest: The real parties-in-interest here are Oracle Corporation and Oracle America, Inc. No other parties directed, controlled, or funded this Inter Partes Review proceeding (IPR).

Related Matters: *Competitive Access Systems, Inc. v. Oracle Corporation and Oracle America, Inc.*, 1:23-cv-00286 (W.D. Tex.).

Lead and Backup Counsel: Pursuant to 37 C.F.R. §42.8(b)(3) and 42.10(a), Petitioner designates Harper Batts (Reg. No. 56,160) as lead counsel and Chris Ponder (Reg. No. 77,167) and Jeffrey Liang (Reg. No. 69,043) as back-up counsel, each of Sheppard, Mullin, Richter & Hampton LLP.

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Petitioner's counsel may also be served by mail or hand delivery at Sheppard, Mullin, Richter & Hampton LLP, 1540 El Camino Real Suite 120, Menlo Park, CA 94025. Petitioner's counsel may be reached by telephone at (650) 815-2673 and by facsimile at (650) 815-4668.

Fees: The Office is authorized to charge fees for this Petition to Deposit Account 50-4561, Ref. 0VDP-363019.

Respectfully submitted,

SHEPPARD, MULLIN,
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/Harper Batts/

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CLAIM APPENDIX

[1pre]. A method for establishing and sending data during a multipath connection comprising:

[1a] a data-Source device receiving multipath information about each of a plurality of network-edge devices that is capable of joining a multipath connection with a data-requesting device,

[1b] each of the network-edge devices being connected to one or more networks,

[1c] and each of the network-edge devices being connected to the data-requesting device over a different connection: and

[1d] the data-source device performing at least one of the (i) sending different groups of data packets to different network-edge devices that are participating in the multipath connection, more of the network-edge devices that are participating in the multipath connection, and (iii) sending combinations of different streams and different groups of data packets to one or more of the network-edge devices that are participating in the multipath connection.

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

3. The method of claim 1, further comprising:

the data-Source device receiving second multipath information about a second network-edge device that is capable of joining the multipath connection; and the data-source device joining the second network-edge device to the multipath connection.

4. The method of claim 1, further comprising:

the data-source device receiving multipath information about which network-edge devices are to be removed from the multipath connection; and the data-source device removing the network-edge devices from being associated with the multipath connection.

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

6. The method of claim 1, wherein the data-source device is one of a multipath link aggregator, a network relay, a multi path link server, a server, a network Switch, a network router and a device capable of providing multipath services.

[7pre]. A method for establishing and sending data during a multipath connection, comprising:

[7a] the data-source device receiving multipath connection requests from a plurality of data-requesting devices, each of the multipath connection requests involving a particular multipath connection to a data-requesting device;

[7b] the data-Source device associating a connection ID to each multipath connection request;

[7c] the data-source device using multipath information about each of a plurality of network-edge devices that is capable of joining in a particular multipath connection to a particular data-requesting device, the particular multi-path connection having a particular connection ID;

[7d] the data-Source device notifying each of the network-edge devices that is participating in the particular multipath connection associated with the particular connection ID; and

[7e] the data-source device sending data associated with the particular connection ID to the network-edge devices participating in the particular multipath connection associated with the particular connection ID.

8. The method of claim 7, further comprising: the data-source device sending different groups of data packets to different network-edge devices that are participating in the particular multipath connection associated with the particular connection ID.

9. The method of claim 7, further comprising:

the data-source device receiving identification of the network-edge devices to be removed from the particular multipath connection; and

the data-source device removing the identified network-edge devices from the particular multipath connection.

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

11. The method of claim 7, wherein the data-source device is one of a multipath link aggregator, a network relay, a multipath link server, a server, a network switch, a network router and a device capable of providing multipath services.

12. The method of claim 7, wherein the connection ID is generated by one of the data-source device, one of the plurality of network-edges, the data-requesting device, and a network device.

[21pre]. A method for creating and using a multipath connection, comprising the steps of:

[21a] a data-requesting device sending first multipath control information to or through a first network-edge device, the first multipath control information

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

[21b] the data-requesting device sending a second multipath control information to or through a second network-edge device, the second multipath control information indicates that the second network-edge device will join the multipath connection, the data-requesting device being connected over a second connection to the second network-edge device, the data-requesting device capable of receiving different data over the first connection and the second connection at the same time; and

[21c] after the first network-edge device joins the multipath connection, the data-requesting device receiving first data over the first connection from the first network-edge device; and

[21d] after the second network-edge device joins the multipath connection, receiving second data at the data-requesting device over the second path from the second network-edge device.

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

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on May 8, 2023, true and correct copies of the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 9,350,649 and Exhibits 1001-1027 were served in entirety on the Patent Owner at the following addresses of record as listed on PAIR, via Priority Mail Express®:

The Law Office Of Clay McGurk
PO Box 1488
Orange, CA 92856

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The undersigned certifies that true and correct copies of the Petition for *Inter Partes* Review of U.S. Patent No. 9,350,649 and Exhibits 1001-1027 were also sent via electronic mail to the attorneys of record for Plaintiff in the concurrent litigation matter(s):

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**CERTIFICATE OF COMPLIANCE WITH
TYPE-VOLUME LIMITATION, TYPEFACE REQUIREMENTS,
AND TYPE STYLE REQUIREMENTS**

1. This Petition complies with the type-volume limitation of 14,000 words, comprising 13,826 words, as counted using the Microsoft Word software that was used to prepare this paper, excluding the parts exempted by 37 C.F.R. § 42.24(a).

2. This Petition complies with the general format requirements of 37 C.F.R. § 42.6(a) and has been prepared using Microsoft® Word in 14-point Times New Roman.

Respectfully submitted,

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