

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS,
T-MOBILE USA, INC., T-MOBILE US, INC.,
AND AT&T MOBILITY, LLC,

Petitioners,

v.

ASPEN NETWORKS, INC.
Patent Owner.

U.S. Patent No. 8,009,554
Issue Date: August 30, 2011
Title: METHOD FOR MULTIPLE LINK QUALITY OF SERVICE FOR VOICE
AND VIDEO OVER INTERNET PROTOCOL

Inter Partes Review No.: IPR2025-00008

**DECLARATION OF DR. DANIEL VAN DER WEIDE IN SUPPORT OF
PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 8,009,554**

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Exhibit List

<i>Exhibit #</i>	<i>Description</i>
1001	U.S. Patent No. 8,009,554 (the “’554 Patent”)
1002	Select portions of prosecution history of the ’554 Patent (“’554 File History”)
1003	Declaration of Petitioners’ Expert, Dr. Daniel van der Weide (“VDW Declaration” or “VDW Decl.”)
1004	<i>Curriculum Vitae</i> of Daniel van der Weide, Ph.D.
1005	U.S. Pat. Pub. No. 2005/0286466 (“Tagg”)
1006	U.S. Pat. No. 8,467,377 (“Kottilingal”)
1007	Article, “Multilayer Mobility Management for All-IP Networks: Pure SIP vs. Hybrid SIP/Mobile IP” by Christos Politis, et al. (“Politis”)
1008	Article, “A Dynamic QoS Provisioning Model for Network Mobility,” by Rafidah Noor, et al. (“Noor”)
1009	Article, “Handover Management Architectures in Integrated WLAN/Cellular Networks,” by George Lampropoulos, et al. (“Lampropoulos”)
1010	Article, “DOHand: An ontology to support building services to exploit handover information in mobile heterogenous networks,” by Renata Maria Porto Vanni, et al., (“Vanni”)
1011	Article, “Seamless vertical handover of VoIP calls based on SIP Session Border Controllers,” by Stefano Salsano, et al. (“Salsano”)
1012	Article, “MSIP: A Protocol for Efficient Handoffs of Real-time Multimedia Sessions in Mobile Wireless Scenarios,” by Ranjeeth Kumar, et al. (“Kumar”)
1013	U.S. Pat. Pub. No. 2004/0076180 (“Satapati”)
1014	RFC2543 Session Initial Protocol
1015	Declaration of June Munford
1016	Complaint, <i>Aspen Networks, Inc. v. AT&T, Inc. et al.</i> , Case No. 2:23-cv-00476 (E.D. Tex.)
1017	Consolidated Order Lead Case 2:23-cv-00476 (E.D. Tex.)
1018	Docket Control Order, Case No. 2:23-cv-00476 (E.D. Tex.)

LISTING OF CHALLENGED CLAIMS

Reference	Claim Limitations
Claim 1	
1.0	A method of enhancing the reliability of a transmission from a source to a destination in a communications network using a network protocol that operates on top of the Internet Protocol (IP), the method comprising:
1.1	transmitting data between a source and destination over a first network path made up of one or more network links where at least one of the network links is to a local area network that is remote from the transmission source; and
1.2	switching the transmission from the first network path to one of a plurality of alternative network paths;
1.3.1	wherein said transmission is not disrupted as a result of said switch to the one of a plurality of alternative network paths,
1.3.2	said transmission contains audio or video data and,
1.3.3	at least one Network Address Translation (NAT) is performed on said transmission;
1.4	said transmission uses the Real Time Protocol (RTP);
1.5	said transmission uses the Session Initiation Protocol (SIP); and
1.6	the SIP signaling sequence of the transmission is maintained after said switching from the first network path to the one of a plurality of alternative network paths.
Claim 2	
2	The method of claim 1 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of a stream quality event.
Claim 3	
3	The method of claim 1 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of stream load balancing.
Claim 4	
4	The method of claim 1 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of an administrator move.

Claim 5	
5	The method of claim 1 wherein a SIP server associated with the one of a plurality alternative network paths may authenticate the transmission before it is switched.
Claim 6	
6	The method of claim 1 wherein the source device is a mobile device.
Claim 7	
7	The method of claim 6 wherein one or more of said plurality of alternative network paths become available to the mobile device during roaming.
Claim 8	
8	A communications network comprising:
8.1	a transmitting device;
8.2	a receiving device;
8.3	a first network device;
8.4	a second network device;
8.5	the transmitting device and receiving device operable to maintain a data transmission over a first network path that is made up of one or more network links where at least one of the network links is to a local area network is remote from the transmitting device;
8.6	wherein the first network device is operable to switch the transmission from the first network path to one of a plurality of alternative network paths without disrupting the transmission; the second network device is operable to perform a Network Address Translation (NAT) on said transmission;
8.7	said transmission contains audio or video content;
8.8	said transmission is made using the Real Time Protocol (RTP);
8.9	said transmission uses the Session Initiation Protocol (SIP); and
8.10	said transmission's SIP signaling sequence is maintained after said switching from the first network path to the one of a plurality of alternative network paths.
Claim 9	
9	The system of claim 8 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of a stream quality event.

Claim 10	
10	The system of claim 8 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of stream load balancing.
Claim 11	
11	The system of claim 8 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of an administrator move.
Claim 12	
12	The system of claim 8 wherein the SIP server associated with the one of a plurality alternative network paths may authenticate the transmission before it is switched.
Claim 13	
13	The system of claim 8 wherein the transmitting device is a mobile device.
Claim 14	
14	The system of claim 13 wherein one or more of said plurality of alternative network paths become available to the mobile device during roaming.
Claim 15	
15	A method of enhancing the reliability of a transmission from a source to a destination in a communications network using a network protocol that operates on top of the Internet Protocol (IP), the method comprising:
15.1	transmitting data between a source and destination over a first network path made up of one or more network links where at least one of the network links is to a local area network that is remote from the transmission source;
15.2	switching the transmission from the first network path to one of a plurality of alternative network paths;
15.3.1	wherein said transmission is not disrupted as a result of said switch to the one of a plurality of alternative network paths,
15.3.2	said transmission contains audio or video data, and
15.3.3	at least one Port Address Translation (PAT) is performed on said transmission;
15.4	said transmission contains audio or video content;

15.5	said transmission contains data used in the control of the audio or video transmission;
15.6	said transmission uses the Real Time Protocol (RTP);
15.7	said transmission further uses the Session Initiation Protocol (SIP); and
15.8	the SIP signaling sequence of the transmission is maintained after said switching from the first network path to the one of a plurality of alternative network paths.
Claim 16	
16	The method of claim 15 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of a stream quality event.
Claim 17	
17	The method of claim 15 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of stream load balancing.
Claim 18	
18	The method of claim 15 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of an administrator move.
Claim 19	
19	The method of claim 15 wherein a SIP server associated with the one of a plurality alternative network paths may authenticate the transmission before it is switched.
Claim 20	
20	The method of claim 15 wherein the source device is a mobile device.
Claim 21	
21	The method of claim 20 wherein one or more of said plurality of alternative network paths become available to the mobile device during roaming.
Claim 22	
22.0	A communications network comprising
22.1	a transmitting device;
22.2	a receiving device;
22.3	a first network device;
22.4	a second network device;

22.5	the transmitting device and receiving device operable to maintain a data transmission over a first network path that is made up of one or more network links where at least one of the network links is to a local area network is remote from the transmitting device;
22.6.1	wherein the first network device is operable to switch the transmission from the first network path to one of a plurality of alternative network paths without disrupting the transmission; and
22.6.2	said the second network device is operable to perform a Port Address Translation (PAT) on said transmission;
22.7	said transmission contains audio or video content
22.8	said transmission is made using the Real Time Protocol (RTP)
22.9	said transmission further uses the Session Initiation Protocol (SIP); and
22.10	said transmission's SIP signaling sequence is maintained after said switching from the first network path to the one of a plurality of alternative network paths.
Claim 23	
23	The system of claim 22 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of a stream quality event.
Claim 24	
24	The system of claim 22 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of stream load balancing.
Claim 25	
25	The system of claim 22 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of an administrator move.
Claim 26	
26	The system of claim 22 wherein a SIP server associated with the one of a plurality alternative network paths may authenticate the transmission before it is switched.
Claim 27	
27	The system of claim 22 wherein the transmitting device is a mobile device.

Claim 28	
28	The system of claim 27 wherein one or more of said plurality of alternative network paths become available to the mobile device during roaming.

I, Dr. Daniel van der Weide, declare as follows:

I. INTRODUCTION

1. I am over the age of eighteen (18) and otherwise competent to make this declaration.

2. I have been retained by Cellco Partnership d/b/a Verizon Wireless, T-Mobile USA, Inc., T-Mobile US, Inc., and AT&T Mobility, LLC, (collectively, “Petitioners”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office (“USPTO”). Although I am being compensated at a rate of \$850 per hour for the time I spend on this matter, no part of my compensation depends on the outcome of this proceeding, and I have no other interest in this proceeding. To the best of my knowledge, I have no financial interest.

3. This Petition for *inter partes* review involves U.S. Patent No. 8,009,554 (the “’554 patent”; EX-1001), entitled “METHOD FOR MULTIPLE LINK QUALITY OF SERVICE FOR VOICE AND VIDEO OVER INTERNET PROTOCOL” and lists Bill Chen, Sajit Bhaskaran and Robin Mavunkel as the inventors.

4. For the purposes of this *inter partes* review as discussed later, I have been instructed to assume that the effective filing date of the Claims of the ’554 Patent challenged by the Petitioners in this *inter partes* review is no earlier than

March 13, 2008, the filing date of U.S. Provisional Patent Application No. 61/036,377.

5. I understand that according to the USPTO records, the '554 Patent is currently assigned to Aspen Networks, Inc. ("Aspen" or "Patent Owner").

6. The '554 Patent is directed to systems and methods of non-disruptive VoIP network switches. I am familiar with the technology described in the '554 Patent as of the earliest possible priority date of March 13, 2008.

7. In preparing this Declaration, I have reviewed the '554 Patent (EX-1001), the file history of the '554 Patent (EX-1002), and each of the documents cited herein, and I have considered the documents in light of the general knowledge in the art as of March 13, 2008. In formulating my opinions, I have relied upon my experience in the relevant art. I have also considered the viewpoint of a person of ordinary skill in the art ("POSITA") in the relevant field, as of March 13, 2008, who I describe below (§IV.D). For convenience, the material I considered in arriving to my opinion are listed above.

8. The opinions and comments formulated during this assessment are based on observations and information available at the time of the investigation. The findings presented herein are made to a reasonable degree of scientific certainty. I have made every effort to accurately and completely investigate all areas of concern identified during our investigation.

9. I have been asked to provide my technical expertise, analysis, insights and opinions regarding the '554 Patent and relevant references that form the basis of the arguments set forth in the accompanying Petition for *inter partes* review of the '554 Patent. As described in detail below, I offer the following opinion in this Declaration:

- A POSITA would have found Claims 1-28 of the '554 Patent are unpatentable over (1) Tagg (EX-1005) and (2) the combination of Kottilingal (EX-1006) and Politis (EX-1007).

II. MY BACKGROUND AND QUALIFICATIONS

10. I am currently a Full Professor in the Department of Electrical and Computer Engineering at the University of Wisconsin-Madison. I teach several courses in my area of expertise, which includes high-frequency electrical measurement and communications systems and advanced high-frequency circuit design and measurement. Specifically, I perform research on digital radio and communications systems ranging from RFID tags to lightwave transceivers, with emphasis on wireless and microwave technology.

11. My academic credentials include a Bachelor of Science Degree in Electrical Engineering from the University of Iowa in 1987. I then received a Master of Science Degree and Ph.D. Electrical Engineering from Stanford University in 1990 and 1993, respectively.

12. I have worked for over 35 years in the field of Electrical Engineering. My first full-time employment was as an engineer with Motorola Inc. International Cellular Subscriber division. I conducted tests and research on radio receivers for cellular communications both at Motorola and subsequently using equipment donated by Motorola/Google, e.g., using communications systems analyzers. I have conducted similar tests on fiber-optic analogs, e.g., through founding Optametra and building polarization-diverse coherent receivers, which used Wiener filters to recover phase and polarization. I have used equipment to test transmission power control for cellular communications (both at Motorola and subsequently using equipment donated by Motorola/Google, e.g., using communications systems analyzers). In addition, I have tested performance of mobile devices in networks, such as drive tests.

13. In 2007, I co-founded Optametra, a company developing and selling hardware and software for analysis of coherent communications in long-haul single-mode optical fiber using many of the same techniques found in modern wireless communications, such as high-order modulation, equalization, carrier recovery, forward error correction, and multicarrier transmission. Optametra sold its systems worldwide to many major telecommunications vendors and carriers—competing directly and successfully with Agilent Technologies (the major telecom test and measurement vendor)—and was acquired by Tektronix in 2012.

14. As indicated in my curriculum vitae, I have founded several technology companies, including companies that offered products related to telecommunications, such as Optametra, mentioned above. I co-developed the technology, demonstrated and offered it for sale to telecommunications companies such as Corning, Lucent, and Adva, and received and filled purchase orders. From this experience, I have gained extensive knowledge regarding the operations of technology suppliers and the product development, demonstration, and purchase practices of large telecommunication companies. For example, I demonstrated our optical modulation analyzer technology to British Telecom and made measurements of their networks. This eventually resulted in an important sale to British government security organizations based on our representations of the features that were available for sale in our product.

15. I am a Fellow of the IEEE, the Institute of Electrical and Electronics Engineers that develops standards, publishes technical articles, and hosts international conferences on wireless telecommunications.

16. I am qualified by education and experience to testify as an expert in the field of telecommunications. My curriculum vitae, which includes a more detailed summary of my background and experience, is attached as EX-1004.

III. RELEVANT LEGAL STANDARDS

17. I am not a lawyer and do not provide any legal opinions in this Declaration. Although I am not a lawyer, I have been informed and understand that certain legal standards are to be applied by technical experts in forming opinions regarding the meaning and validity of patent claims. I have been asked to provide my opinions regarding whether the claims of the '554 Patent are anticipated or would have been obvious to a person having ordinary skill in the art at the time of the alleged invention, in light of the prior art.

18. I have been informed and understand that a patent claim is not patentable under 35 U.S.C. § 103 if differences between the patent claim and the prior art are such that the claimed subject matter as a whole would have been obvious at the time the claimed invention was made to a person having ordinary skill in the relevant art. Obviousness, as I have been informed and understand, is based on the scope and content of the prior art, the difference between the prior art and the claim, the level of ordinary skill in the art, and, to the extent that they exist, certain objective indicia of non-obviousness.

19. I understand that objective indicia can be important evidence regarding whether a patent is obvious or nonobvious, if it has an appropriate nexus to the claimed invention, i.e., is a result of the merits of a claimed invention (rather than the result of design needs or market-pressure advertising or similar activities). Such

indicia include: commercial success of products covered by the patent claims; a long-felt need for the invention; failed attempts by others to make the invention; copying the invention by others in the field; unexpected results achieved by the invention as compared to the closest prior art; praise of the invention by the infringer or others in the field; the taking of license under the patent by others; expressions of surprise by experts and those skilled in the art at the making of the invention; and the patentee proceeded contrary to the accepted wisdom of the prior art.

20. I have been informed whether there are any relevant differences between the prior art and the claimed invention is to be analyzed for the view of a person of ordinary skill in the relevant art at the time of the invention. As such, my opinions below as to a person of ordinary skill in the art areas of the time of the invention, even if not expressly stated as such; for example, even if stated in the present tense.

21. In analyzing the relevance of the difference between the claimed invention and the prior art, I have been informed that I must consider the impact, if any, of such differences on the obviousness or non-obviousness of the invention as a whole, not merely some portion of it. The person of ordinary skill faced with a problem is able to apply his or her experience and ability so solve the problem and also look to any available prior art to help solve the problem.

22. I have been informed that a precise teaching in the prior art direct to the subject matter of the claimed invention is not needed. I have been informed that one may consider the inferences and creative steps that a person of ordinary skill in the art would have employed in reviewing the prior art at the time of the invention. For example, if the claimed invention combined elements known in the prior art and the combination yielded results that were predictable to a person of ordinary skill in the art at the time of the invention, then this evidence would make it more likely that the claim was obvious. On the other hand, if the combination of known elements yielded unexpected or unpredictable results, or if the prior art teaches away from combining the known elements, then this evidence would make it more likely that the claim that successfully combined those elements was not obvious.

23. I have been informed and understand that there are recognized, exemplary, rationales for combining or modifying references to show obviousness of claimed subject matter. Some of the rationales include the following: combining prior art elements according to known methods to yield predictable results; simple substitution of one known element for another to yield predictable results; use of a known technique to improve a similar device (method or product) in the same way; applying a known technique to a known device (method or product) ready for improvement to yield predictable results; choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; know

work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; and some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art teaching to arrive at the claimed invention.

IV. BACKGROUND

A. The '554 Patent

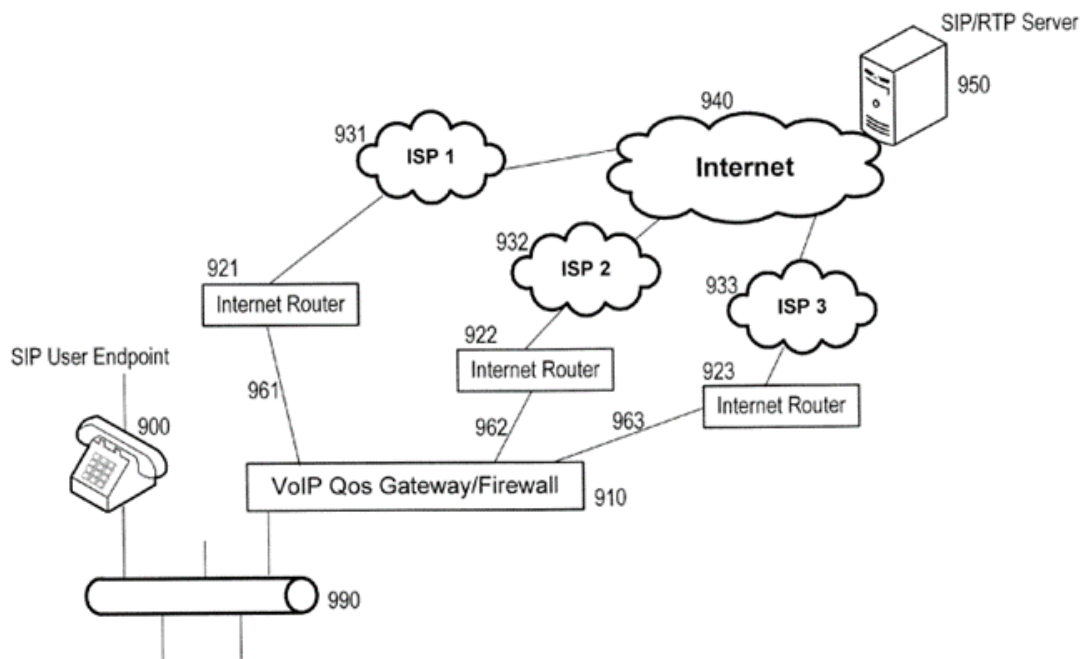
24. Claims 1-28 of the '554 Patent (the "Challenged Claims") are unpatentable as obvious over the prior art. The claims are directed to systems and methods of non-disruptive VoIP network switches, which was well known in the art before the filing of the '554 Patent.

25. The '554 Patent discloses a "method for achieving multiple link quality of service for video and voice calls over Internet links, or over IP links running in private networks." *EX-1001* 3:39-4:8.

26. Specifically, the '554 Patent describes that the invention allows for "voice and video calls can be moved at will from one path to another, as many times as required during a single conversation, without breaking the RTP voice or video payload stream." *EX-1001* 3:39-4:8.

27. FIG. 9 of the '554 Patent discloses a “multi-link QoS gateway 910” that has “3 logical network interfaces 961, 962 and 963” and “3 routers on the user local area network 990 [that] connect the user to the public Internet 940—these routers are 921, 922 and 923.” *EX-1001* 5:46-61. “Network interfaces 961, 962 and 963 correspond to globally routable public IP addresses belonging to the 3 access Internet Service Providers shown in FIG. 9 as 931, 932 and 933 respectively.” *EX-1001* 5:51-54.

Fig 9 A QoS Gateway Embodiment of Invention



EX-1001 Fig. 9.

28. Fig. 9 shows that “a SIP user endpoint 990 is shown communicating with a SIP/RTP server 950.” *EX-1001* 5:62-67. There are “3 alternate paths for quality of service in the non-mobile-domain are shown: Path 1: 900, 910, 961, 921,

931, 940, 950[;] Path 2: 900, 910, 962, 922, 932, 940, 950 [; and,] Path 3: 900, 910, 963, 923, 933, 940, 950” *EX-1001* 6:37-42.

29. Further in this embodiment (a non-mobile domain example), the QoS gateway can use various undisclosed algorithms “for detecting failures and degrades, as well as relative improvements in quality between links over time.” *EX-1001* 6:42-67. Also, the QoS gateway is “capable of deciding, while a SIP/RTP session is in progress, that a stream needs to be moved for load balancing reasons.” *EX-1001* 7:1-6.

30. In a different embodiment (a mobile domain example), “a cell phone with SIP/RTP over IP stack roams from one base station to another, where each base station also implies a different IP default router for the cell phone, as in FIG. 6.” *EX-1001* 4:12-15. In a mobile domain example, dropped calls are prevented during hand off in all IP type networks as long as “(a) the cell phone uses VoIP protocols SIP and RTP over IP, and (b) the cell phone always communicates with the same SIP server—that it originally registered with, for the entire duration of one call (630 in FIG. 6) as it moved from the first base station (605 in FIG. 6) to a second base station (606 in FIG. 6).” *EX-1001* 7:56-8:3.

31. Each of the embodiments disclosed above “can be implemented as either computer software or other digital logic (ASIC or FPGA).” *EX-1001* 3:45-47.

B. Claim Construction

32. I have been informed and understand that to properly evaluate the '554 Patent, the terms of the claims must first be interpreted.

33. I understand that Petitioners propose that each claim term in the Challenged Claims be given its plain and ordinary meaning in this proceeding, and that no specific construction of any claim term is required because the prior art relied on in this Petition meets each of the claim terms under any reasonable construction. The plain meaning is the ordinary and customary meaning to those skilled in the art.

C. Priority Date of the Challenged Claims

34. For this *inter partes* review, I have been instructed to assume that the effective filing date of each of the Challenged Claims is no earlier than the filing date of U.S. Provisional Patent Application No. 61/036,377. Solely for the purpose of this IPR, I have been instructed to assume the priority date is March 13, 2008.

D. Person of Ordinary Skill in the Art (POSITA)

35. I am familiar with the knowledge and capabilities of one of ordinary skill in the art. Unless otherwise stated, my testimony refers to the knowledge of one of ordinary skill in the art as of March 13, 2008, the earliest possible effective filing date of the '554 Patent.

36. I have been informed and understand that Person of Ordinary Skill in the Art ("POSITA") is a hypothetical person who is presumed to be aware of all

pertinent prior art, thinks along conventional wisdom in the art, and is a person of ordinary creativity.

37. With respect to the '554 Patent, a POSITA in the March 2008 would have been familiar with designing rules for implementing policies for service plans for use of an access network and provisioning those rules to network elements for policy enforcement, as demonstrated by the prior art references and description in the State of the Art below. A POSITA would have gained knowledge of these concepts through a mixture of training and work experience, such as by having a Bachelor's degree in electrical engineering or computer science and two years of experience; or by obtaining a Master's degree in electrical engineering or computer science, but having only one year of experience; or by having no formal education but experience in network service plan provisioning systems of at least four years.

38. A POSITA may work as part of a multi-disciplinary team and draw upon not only his or her own skills, but also take advantage of certain specialized skills of others on the team to solve a given problem.

V. STATE OF THE ART

39. The following section describes the state of the art for network service plan provision systems as of March 2008, the earliest effective filing date for claims of the '554 Patent. The prior art references, and the discussions of what was known to a POSITA, give an overview of the state of the art and additional motivation to

modify or combine the reference(s). Thus, I agree with Petitioners that these references should be considered by the Board.

1. Network Service Plan Provisioning Systems

40. Provisioning network service plans to account for dynamic Quality of Service (QoS) was well known to a POSITA prior to March 2008. Contrary to the assertions of the '554 patent specification related to the prior art, determining the “best” link at any given time to provide the link or path that provides the best quality for voice or video was well known in the prior art. *EX-1001* 2:11-17.

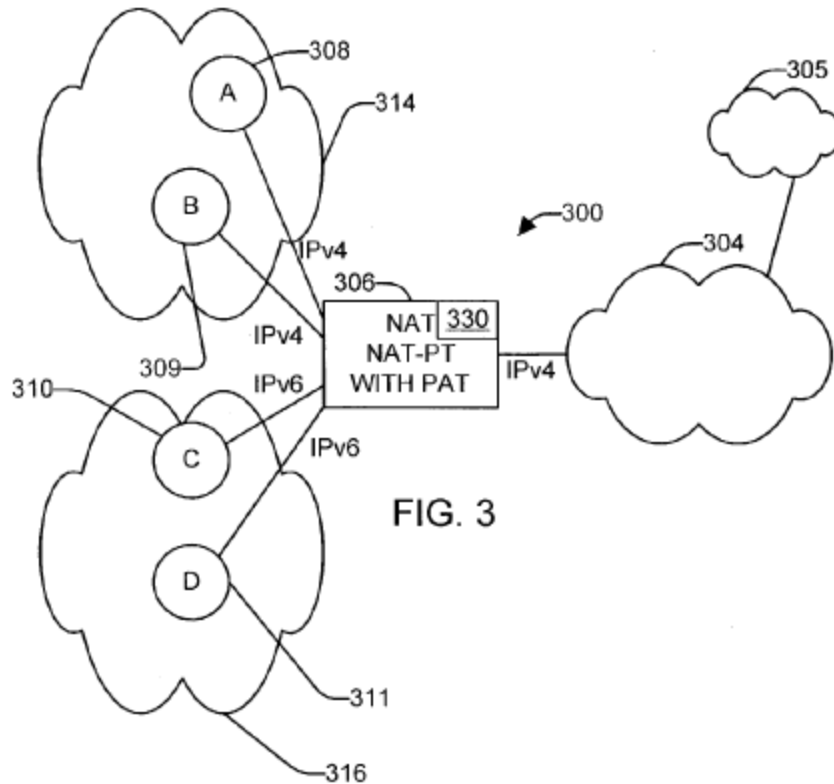
41. For example, Noor (EX-1008) teaches a “dynamic QoS provision model for network mobility.” EX-1008, p. 1. According to Noor, traffic patterns can be analyzed to provide dynamic QoS provisioning to maintain connectivity when a mobile unit changes its point of attachment. *EX-1008*, pp. 1, 4-6. In Noor, packets are prioritized and classified according to service subscriptions and traffic type, and QoS for mobile handovers are determined based on the QoS requirement, traffic volume, packet classification, and packet marking. *EX-1008*, pp. 1, 4-6.

42. Lampropoulos (EX-1009) further identifies solutions related to network service plan provisioning that address authentication, security, QoS support and mobility management. *EX-1009*, pp. 1-2. Lampropoulos describes mobility management systems related to handover management that provide seamless provisioning of multimedia applications across networks of different technologies,

e.g., 802.11-based WLAN networks and GPRS/UMTS cellular networks. *EX-1009*, p. 2.

43. Vanni (EX-1010) discloses solutions for provisioning network services for seamless handovers that considers policies on QoS, privacy, security, and pricing, across a variety of different wireless technologies. *EX-1010*, p. 1.

44. Finally, Satapati (EX-1013), addresses prior art IPv4 systems that “have more devices than available Internet IPv4 addresses allocated” and allows a network to multiplex a single IP address across, e.g., 65,536 devices, thereby allowing many more private network devices to connect to a public network. *EX-1013*, ¶¶ 0002-0004, 0019. Satapati expressly discloses using network address translation (NAT) and port address translation (PAT) 330 to connect a local network 314, 316 to the internet 304:



EX-1013, Fig. 3, ¶¶ 0026, 0032.

2. Seamless Handover of Multimedia Based Traffic

45. Solutions addressing the seamless handover of multimedia communications was well known in the prior art prior to the earliest priority date of the '554 patent.

46. Salsano (EX-1011) teaches that the proliferation of high data rate wireless networks enables the provisioning of real time multimedia services to mobile devices over IP. *EX-1011*, Abstract. Moreover, “the different nature of the adopted radio technologies (802.11/WiFi, Bluetooth, 2.5G/3G networks) has introduced the problems of supporting seamless communication across these

heterogeneous wireless accesses.” *EX-1011*, Abstract. Salsano proposes solutions to the Session Initiation Protocol (SIP) for mobility management that provides seamless voice services during handovers. *EX-1011*, Abstract. Moreover, Salsano describes seamless handovers using the SIP protocol and sequencing while addressing the need to support Network Address Translation (NAT) element traversal. *EX-1011*, pp. 1-3. Salsano specifically addresses the importance of maintaining SIP sequencing to increase handover performance. *EX-1011*, p. 5.

47. Kumar (EX-1012) also addresses deficiencies in Mobile IP and SIP to prevent real-time application delays and improved handoff latency for real-time (*i.e.*, multimedia) applications. *EX-1012*, p. 16. Consistent with the solution identified in the ’554 patent, Kumar discloses utilizing the SIP ReInvite messages with the same Call-ID to reduce latency during a handoff of a mobile node and maintain sequencing to prevent delays in communication. *EX-1012*, pp. 17-30.

VI. OVERVIEW

48. Below I explain how each limitation recited in the Challenged Claims is found in the prior art. The Challenge Claims are directed to a generic software or other digital logic used in the control and transmission of video or audio payloads over networks using the Internet Protocol.

VII. GROUNDS

A. Identification of Challenges

49. Based on my understanding of the law concerning obviousness above, Claims 1-28 of the '554 Patent are invalid as being obvious over (1) Tagg and (2) Kottilingal in view of Politis.

B. Ground 1: Tagg Alone Teaches Every Element of Claim 1-28.

1. Tagg

50. Tagg was filed as U.S. Patent Application No. 11/129,184 on May 12, 2005 and was published on December 29, 2005. *EX-1005*, Cover.

51. Tagg discloses “a system that provides VoIP over wireless LAN and WAN,” and is therefore directed toward the same field of endeavor as the '554 patent. *Compare EX-1005*, ¶¶ 0002, 0079, *with EX-1001*, 1:9-18.

52. Since Tagg seeks to switch between networks seamlessly to avoid call interruptions and voice quality degradation, it is also relevant to the problem faced by the '554 Patent inventors. *Compare EX-1005*, ¶¶ 0036-0037, 0068, 0343, *with EX-1001*, 2:5-24.

53. Tagg discloses a system where “one or more servers within the system provid[e] a range of telecommunications functions including call handling and termination.” *EX-1005*, ¶ 0324.

54. Users can place voice calls over networks using VoIP protocols to transport voice or data information over a network link. *EX-1005*, ¶¶ 0081, 0084-0085.

55. The “two main types of wireless network” are WWAN and WLAN—wide area and local area networks, respectively. *EX-1005*, ¶ 0034. Fig. 15 depicts mobile phone 1512 connecting to server 1500 (shaded purple) through wireless networks WLAN 1509 and WWAN 1519 (also shaded purple). *EX-1005*, ¶ 0324. These connections allow a user to transmit or move a call from mobile phone 1512 to another phone 1520 (both shaded green).

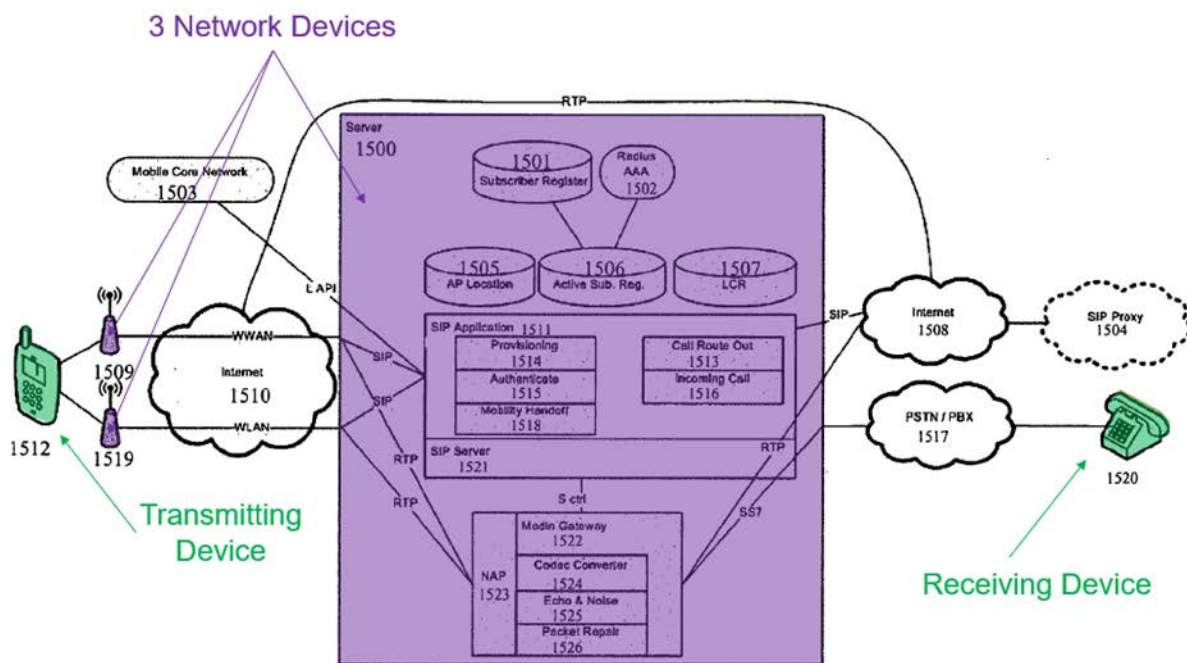


Figure 15

EX-1005, ¶ 0324, Fig. 15 (annotated).

56. Tagg implements a mobile phone voice-over IP (VoIP) protocol that achieves seamless and reliable handoffs between the networks. *EX-1005*, Title, Abstract, ¶¶ 0002, 0036-0037, 0095.

57. Tagg relies on protocols such as Session Initiation Protocol (SIP) and Real-time Transport Protocol (RTP) that are “optimized for wireless transport” and “are encoded at a high level within the protocol stack and transmitted down the protocol stack using IP within the phone.” *EX-1005*, ¶0100.

58. For example, the RTP protocol (shaded purple) is stacked upon the IP protocol (shaded red) as shown below:

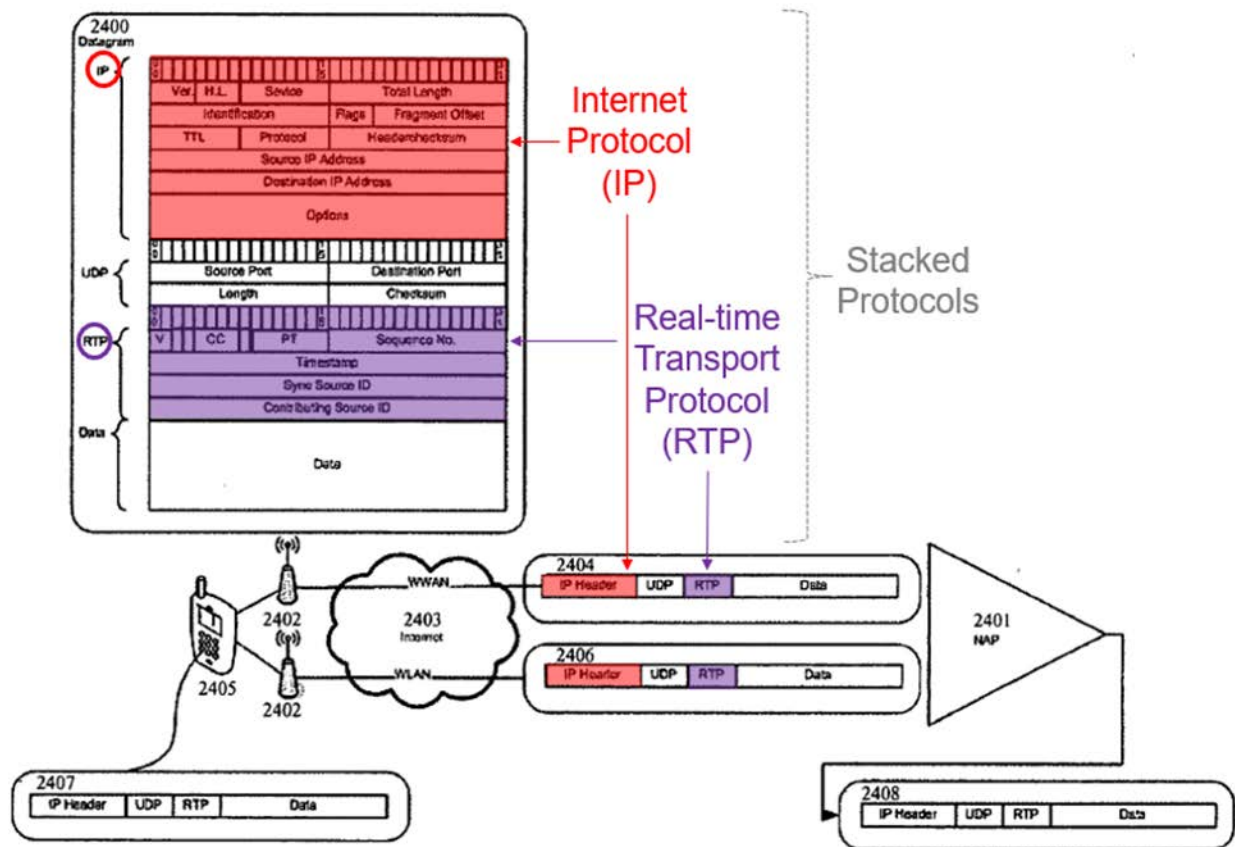


Figure 24

EX-1005, Fig. 24 (annotated).

59. The system executes seamless handoffs by copying a stream to both a WLAN and WWAN socket connection and switching packet transmission between WLAN (shaded yellow) and WWAN (shaded blue). EX-1005, ¶¶ 0288, 0290.

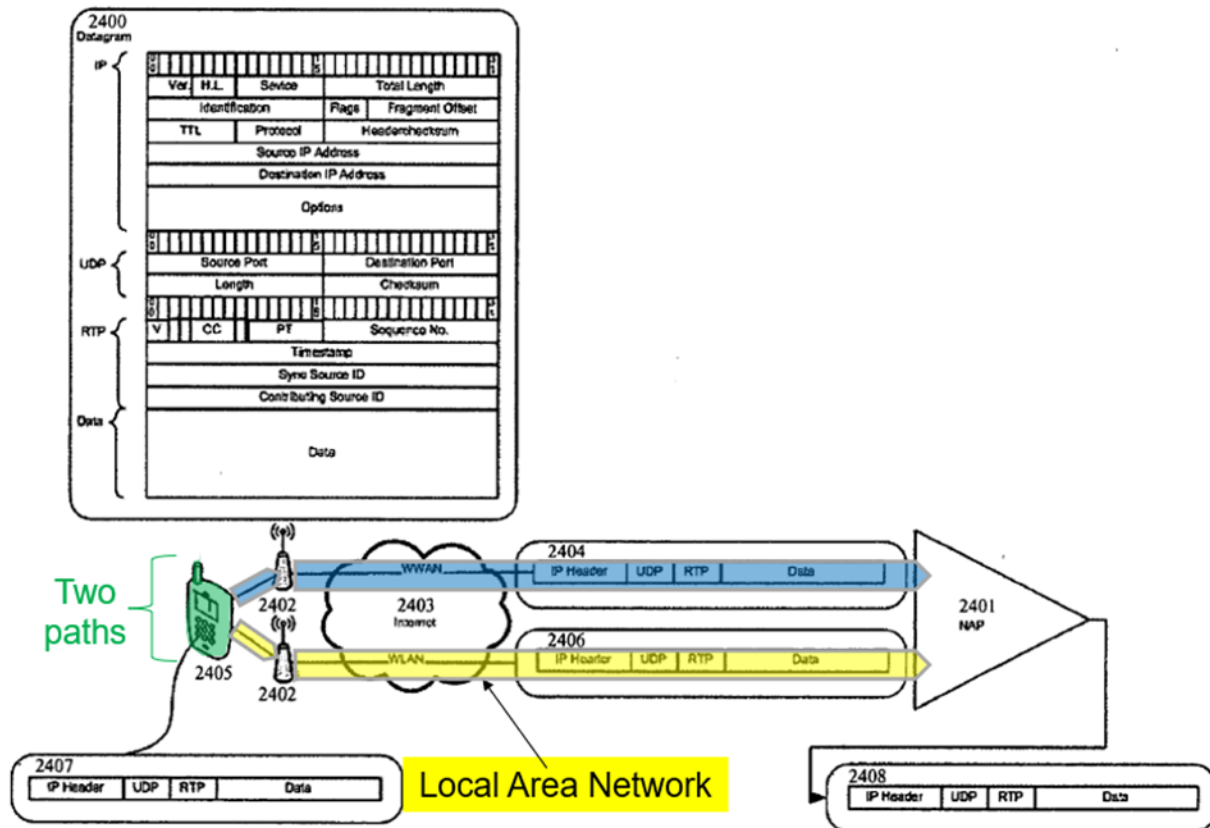


Figure 24

EX-1005, Fig. 24 (annotated) ¶¶ 0095, 0285.

60. Table 6 expressly discloses an embodiment (“Case 1”) of a handoff where a call is switched from WLAN to WWAN and another embodiment (“Case 6”) where the call is switched from WWAN to WLAN:

TABLE 6

<u>Handoff Cases</u>				
Case	Handoff from	Handoff to	Arrow	Typical use case
Case 1	Voice call on WLAN (IP Circuit)	Voice call on WWAN (IP Circuit)	1460	Walk away from Wi-Fi AP where 3G is available, picks up UMTS data connection.
Case 2	Voice call on WWAN-Audio Circuit	Voice call on WLAN (IP Circuit)	1459	Walk into Wi-Fi coverage area call is diverted to Wi-Fi and GSM call drops.
Case 3	Voice call on WLAN (IP Circuit)	Voice call on WWAN-Audio Circuit	1458	Walk away from Wi-Fi AP, (no 3G) reverts back to GSM call via conference feature.
Case 4	Voice call on WWAN-Audio Circuit	Voice call on WWAN (IP Circuit)	1454	Voice call on GSM switches to voice call on UMTS-VoIP
Case 5	Voice call on WWAN (IP Circuit)	Voice call on WWAN-Audio Circuit	1457	Voice call on UMTS-VoIP switches to voice call on GSM
Case 6	Voice call on WWAN (IP Circuit)	Voice call on WLAN (IP Circuit)	1464	WLAN becomes available again and call is switched back to use it.

EX-1005, Table 6 (annotated), ¶¶ 0285-0296.

61. Due to a “[m]ake-before-break” technique that sends a VoIP packet stream over the two network paths, “[t]here is no break in the call” and seamless handoff is achieved. *EX-1005*, ¶¶ 0280, 0285. Specifically, a duplicate audio path is created so that the calling handset may switch from one route to the other “when hand-off is looking likely.” *EX-1005*, ¶ 0296.

62. Indeed, switching a handset between WLAN and WWAN is “straightforward” and “units can flip back and forth freely between...cases [1 and 6]” which allows the “user [to] appear[] to the rest of the world as if they are not moving between networks.” *EX-1005*, ¶ 0320.

2. Detailed Application to Independent Claim 1

- a. Claim 1.0: “A method of enhancing the reliability of a transmission from a source to a destination in a communications network using a network protocol that operates on top of the Internet Protocol (IP), the method comprising:”**

63. To the extent the preamble is limiting, Tagg discloses or suggests this limitation. *EX-1005*.

64. Tagg discloses a “method and system for connecting to a network.” *EX-1005*, ¶ 0079. Tagg’s system and steps implement a packet-based, mobile phone voice-over IP (VoIP) protocol that achieves seamless handoffs between networks by sending packets via “differing routing paths providing for a high degree of redundancy and therefore reliability.” *EX-1005*, Title, Abstract, ¶¶ 0002, 0036-0037, 0095.

65. Tagg improves mobile VoIP applications that transmit and stream speech and data, such as music, video, pictures, and games. *EX-1005*, ¶¶ 0089-0092.

66. Tagg’s protocols include Session Initiation Protocol (SIP) and Real-time Transport Protocol (RTP) that are “optimized for wireless transport” and “are encoded at a high level within the protocol stack and transmitted down the protocol stack using IP within the phone.” *EX-1005*, ¶ 0100.

67. The protocols are stacked upon the IP protocols as shown below:

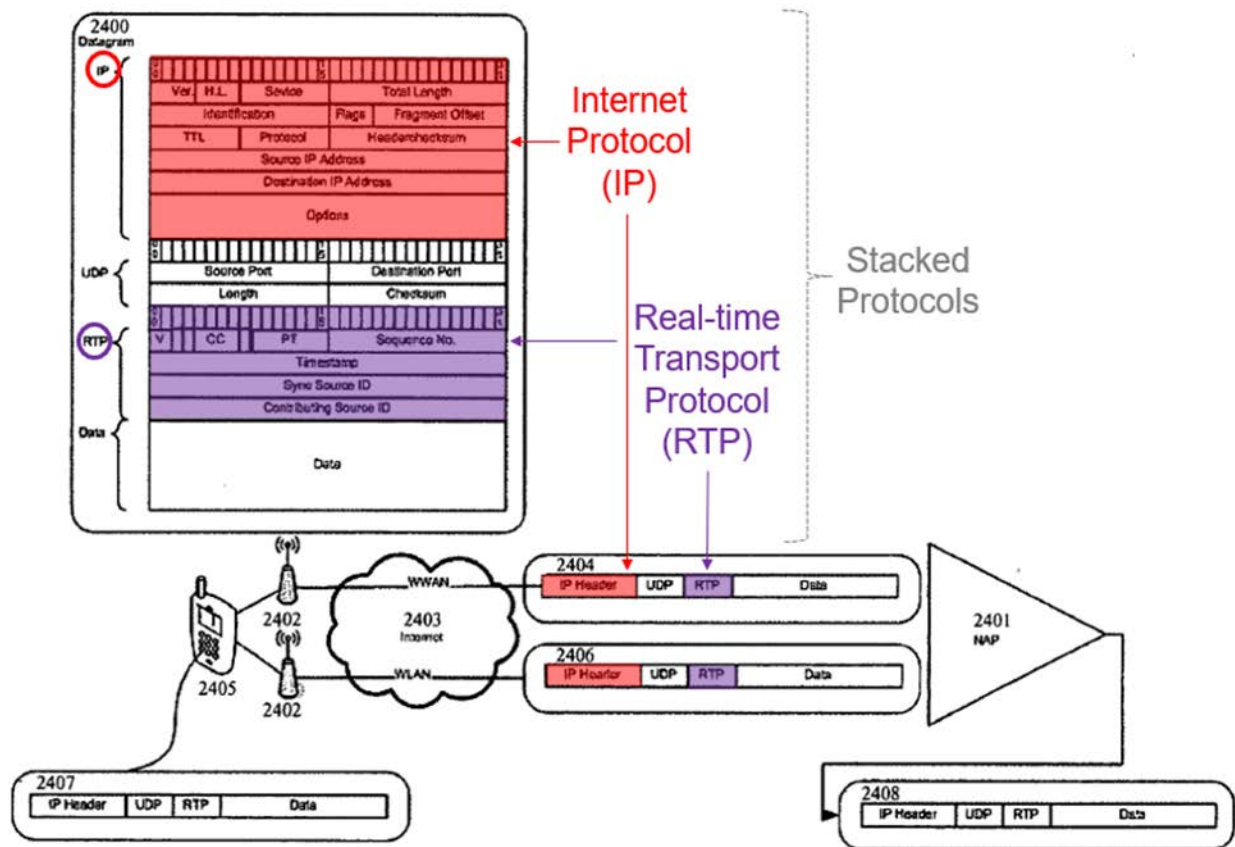


Figure 24

EX-1005, Fig. 24 (annotated), ¶ 0161 (“FIG. 24 illustrates the Network Address Processing required to process IP v4 RTP datagrams for the mobile roaming, handoff and handover in accordance with one embodiment of the invention”).

68. This IP architecture stacks protocols in a way that advantageously allows “handoff...without interfacing with the low level stack components of a phone.” EX-1005, ¶ 0100.

69. Accordingly, Tagg discloses or suggests a method of using a stacked IP architecture that routes packets among multiple paths during handoffs to increase

system reliability (“[a] method of enhancing the reliability of a transmission from a source to a destination in a communications network using a network protocol that operates on top of the Internet Protocol (IP)”).

b. Claim 1.1: “transmitting data between a source and destination over a first network path made up of one or more network links where at least one of the network links is to a local area network that is remote from the transmission source; and”

70. Tagg discloses or suggests 1.1.

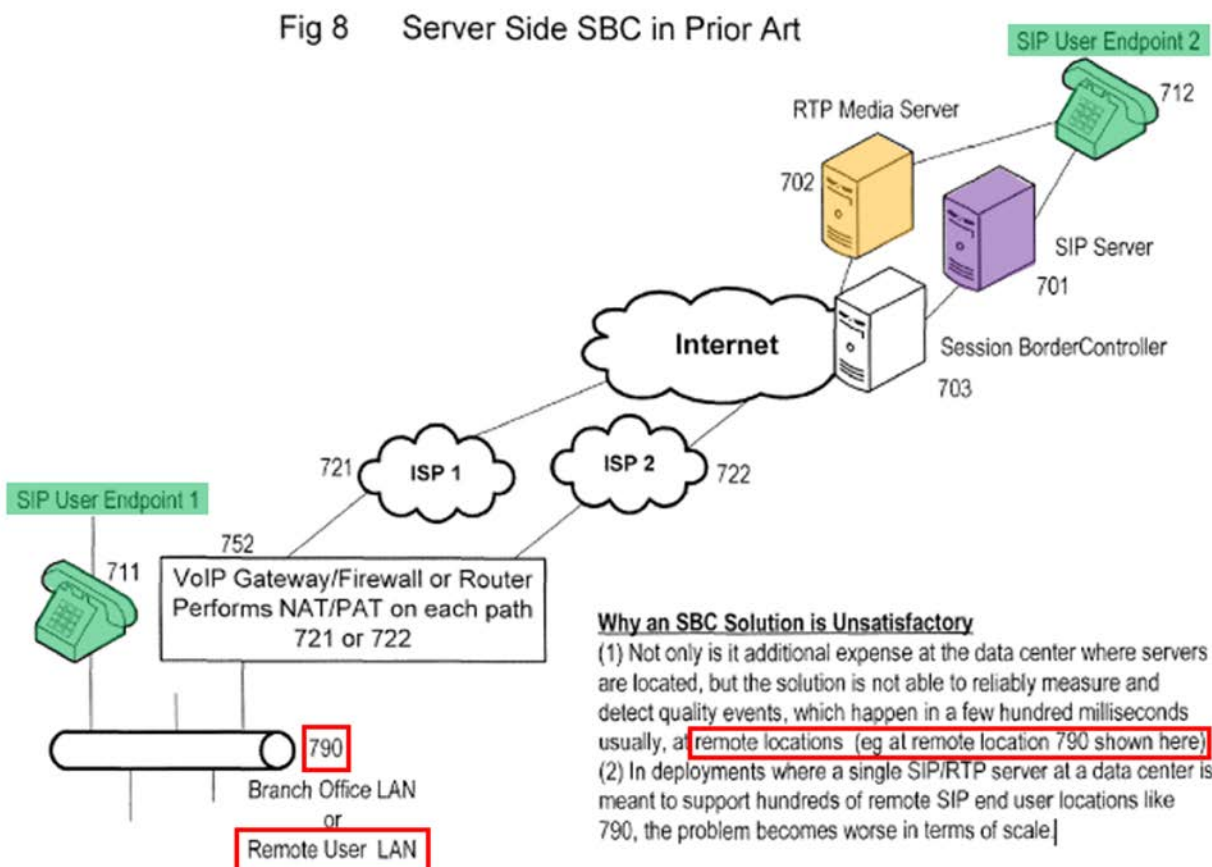
71. As discussed in 1.0 above, Tagg discloses an IP architecture suitable for mobile roaming handoffs. *EX-1005*, ¶ 0100, Fig. 24; *see also* 1.0, above.

72. Users of Tagg’s system place voice calls over networks using VoIP protocols to transport voice or data information over a network link. *EX-1005*, ¶¶ 0081, 0084-0085.

73. The “two main types of wireless network” are WWAN and WLAN—wide area and local area networks, respectively. *EX-1005*, ¶ 0034. Tagg’s mobile handoffs require network address processing and SIP or RTP packet routing. *EX-1005*, ¶¶ 0100, 0402. Each RTP packet “contains source and destination information for both IP address and port-together known as a socket,” which the “phone sends...to one or more sockets during handoff” as the packets “travel over WWAN...or WLAN...infrastructure.” *EX-1005*, ¶ 0402.

74. A POSITA would have recognized that Tagg's disclosure in this regard is like the '554 Patent's disclosure.

75. The '554 Patent discloses a remote network in the context of prior art as a "remote user LAN" exemplified by "remote location 790" at Endpoint 1 (below):



EX-1001, Fig. 8 (annotated), 3:5-20.

76. A POSITA would have recognized Tagg likewise teaches a remote location as, e.g., a roaming mobile phone subscriber at an endpoint (below):

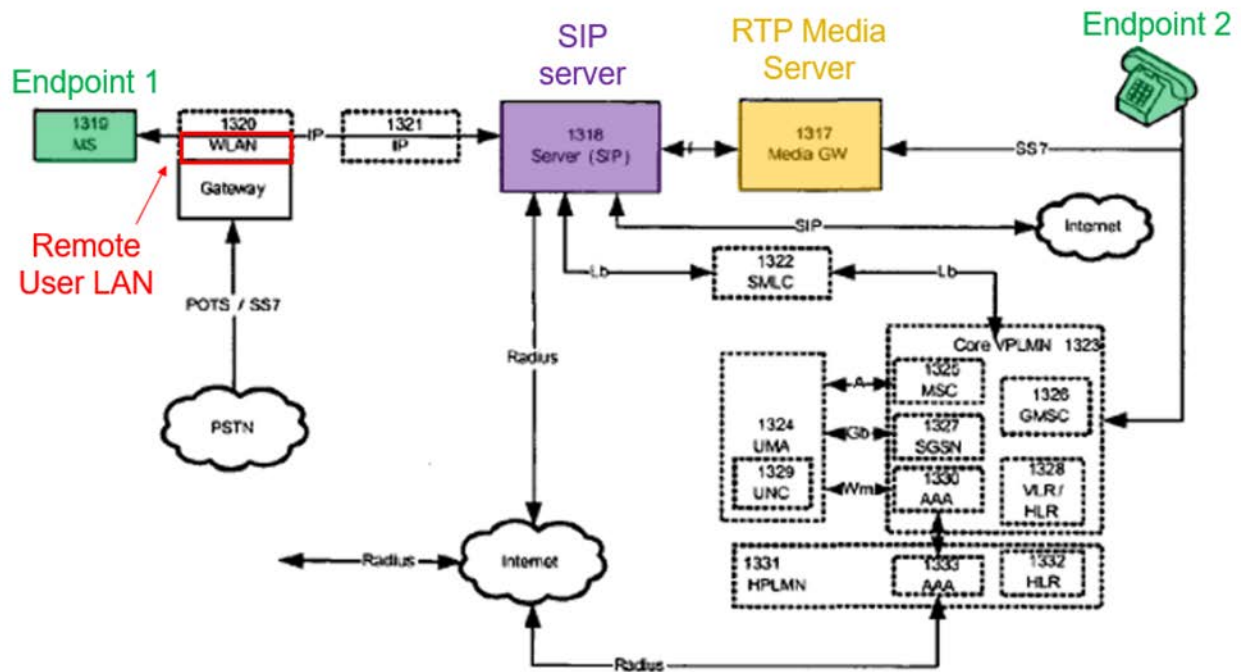


Figure 13b (proposed invention).

EX-1005, Fig. 13b (annotated), ¶¶ 0270, 0274-0275.

77. Tagg’s system executes seamless handoffs by copying an IP stream to both a WLAN and WWAN socket connection and switching packet transmission from the WLAN to the WWAN. EX-1005, ¶¶ 0288, 0290.

78. Tagg’s “different routing paths” include the following:

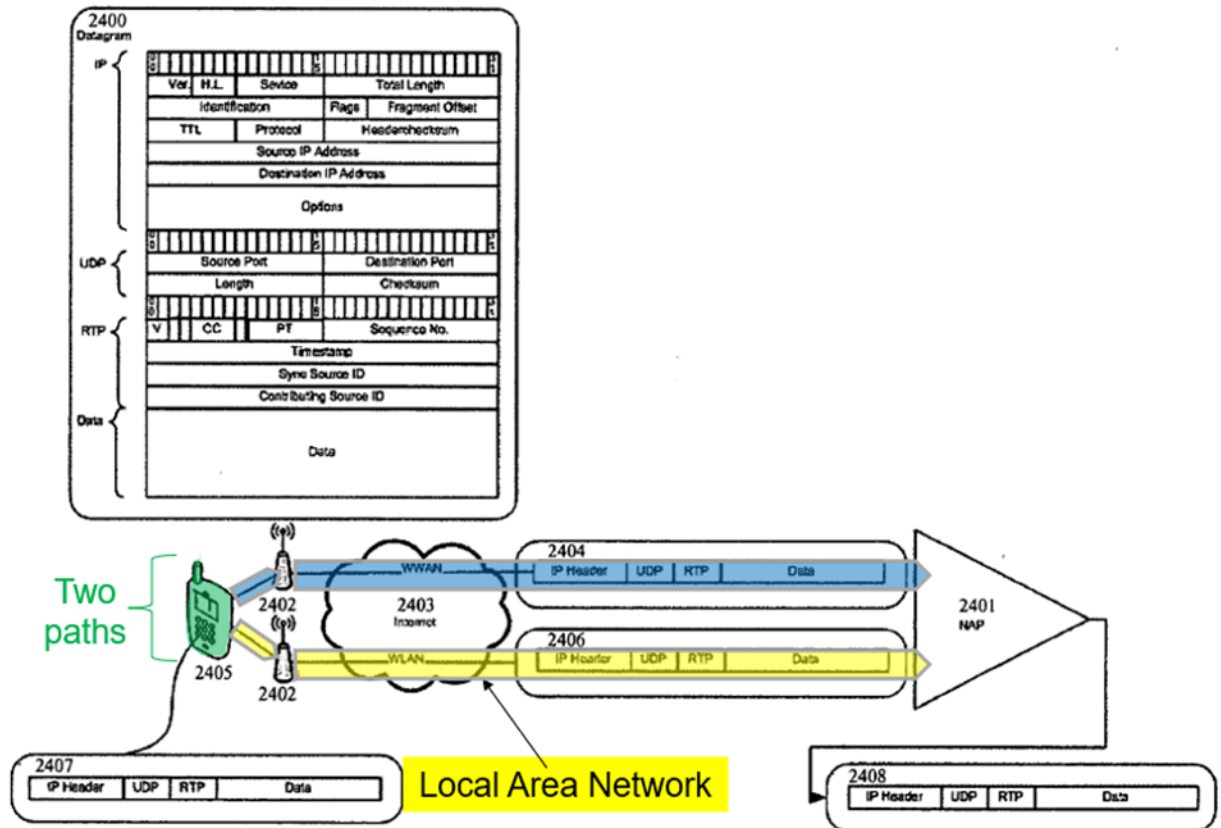


Figure 24

EX-1005, Fig. 24 (annotated) ¶¶ 0095, 0285.

79. Tagg’s Table 6 expressly discloses an embodiment (“Case 1”) of a handoff where a mobile user switches from WLAN to WWAN, below:

TABLE 6				
Handoff Cases				
Case	Handoff from	Handoff to	Arrow	Typical use case
Case 1	Voice call on WLAN (IP Circuit)	Voice call on WWAN (IP Circuit)	1460	Walk away from Wi-Fi AP where 3G is available, picks up UMTS data connection.

EX-1005, ¶¶ 0285 - 0296. The flow in Figure 12 further explains this process:

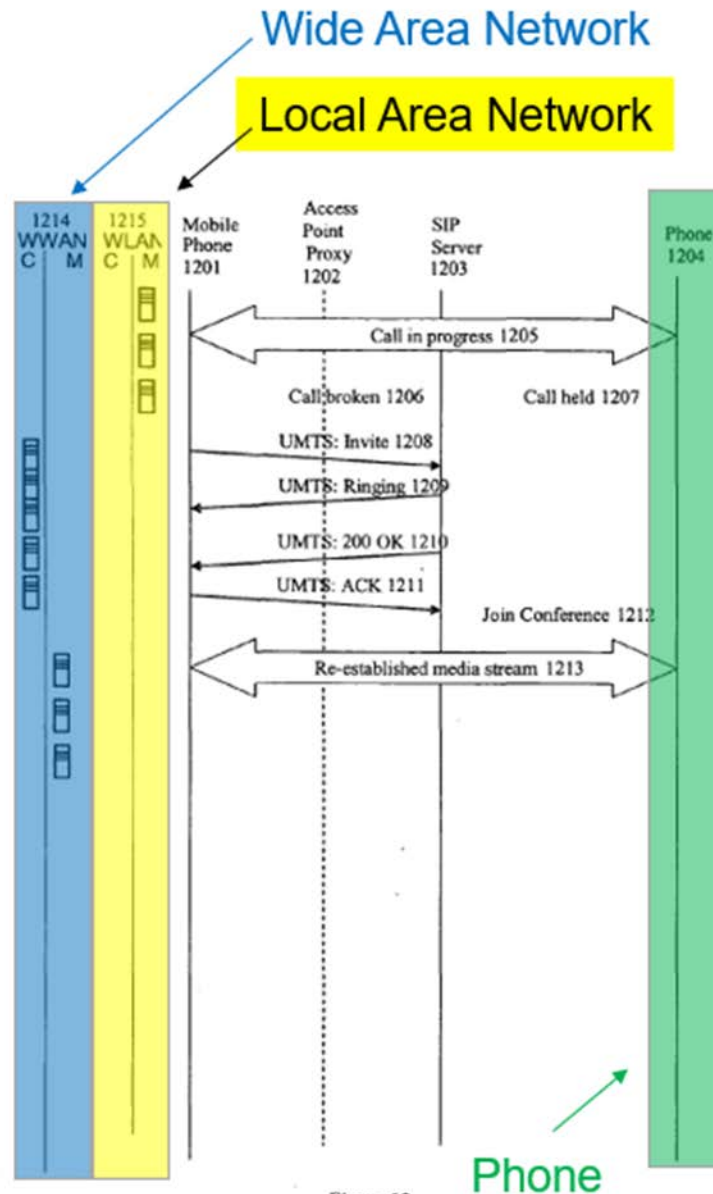


Figure 12

EX-1005, Fig. 12, ¶ 0292 (“Fig. 12 is a call flow diagram showing one embodiment for handing off a call that was initiated as a WLAN call and will be switched to a WWAN-audio protocol call”).

80. Thus, Tagg discloses or suggests voice over internet calls placed between two phones over a local WLAN network path and separate WWAN network

path (“transmitting data between a source and destination over a first network path made up of one or more network links where at least one of the network links is to a local area network that is remote from the transmission source”).

c. Claim 1.2: “switching the transmission from the first network path to one of a plurality of alternative¹ network paths;”

81. Tagg discloses or suggests 1.2.

82. Tagg’s system hands off calls between WWAN and WLAN networks.

EX-1005, ¶ 0277.

83. In the same embodiment as described in 1.1 above (“Case 1”), the handoff occurs using “seamless handoff...achieved by...rapidly switching the IP stream from the WLAN socket to the WWAN socket connection.” *EX-1005*, ¶ 0290;

¹ Petitioners treat “alternative” as including “alternative network paths of the same network type as the first network path.” *See, e.g., EX-1001*, 5:39-6:67; Fig. 9; 7:56-8-3. Tagg discloses multiple manners of switching, including switching between network paths where the network paths are of a different type (e.g., WWAN to WLAN) and where the network paths are of the same type (e.g., WLAN to WLAN). *See, e.g., EX-1005*, ¶¶ 0037, 0285, 0321. For the purposes of the below discussion, Petitioners note that Tagg discloses handoffs and handovers follow the same mechanisms. *See, e.g., EX-1005*, ¶ 0402; Fig. 24.

see also limitation 1.1. This occurs when a user on a WLAN call moves out of local network range to transmit packets on WWAN. *EX-1005*, ¶ 0288.

84. Tagg’s system also creates a duplicate audio path via another IP route “when hand-off is looking likely, then...switches over to the new audio-path and disconnects the old one.” *EX-1005*, ¶ 0296.

85. Similarly, the inverse is true in another embodiment— “Case 6” of Table 6, below:

TABLE 6				
<u>Handoff Cases</u>				
Case	Handoff from	Handoff to	Arrow	Typical use case
Case 6	Voice call on WWAN (IP Circuit)	Voice call on WLAN (IP Circuit)	1464	WLAN becomes available again and call is switched back to use it.

EX-1005, ¶ 0285 (excerpted and combined).

86. Tagg notes that switching a handset between WLAN-P and WWAN-IP is “straightforward” and “units can flip back and forth freely between...cases [1 and 6]” because “authentication remains valid and the call path in the higher level stack needs no change,” and further because the server processing element ensures the “user appears to the rest of the world as if they are not moving between networks.” *EX-1005*, ¶ 0320.

87. Therefore, Tagg discloses or suggests switching a VoIP call between WLAN and WWAN networks (“switching the transmission from the first network path to one of a plurality of alternative network paths”).

d. Claim 1.3.1: “wherein said transmission is not disrupted as a result of said switch to the one of a plurality of alternative network paths,”

88. Tagg discloses or suggests 1.3.1.

89. As discussed in 1.2 above, Tagg routes packets along local and wide area networks (WLAN and WWAN). *EX-1005*, ¶0277; *see also* limitation 1.2.

90. Tagg’s system switches VoIP packet routing—i.e., voice over internet calls—using seamless handoff. *EX-1005*, ¶¶ 0277-0281.

91. In seamless handoff, “[t]here is no break in the call[.]” *EX-1005*, ¶ 0280. Tagg’s system avoids call breaks using a “[m]ake-before-break” technique that sends a VoIP packet stream over two paths during the handoff. *EX-1005*, ¶ 0285.

92. Specifically, Tagg “cop[ies] the IP stream to two sockets and once end-to-end connectivity is proven[,] stop[s] the stream to the stream to the WLAN socket[.]” *EX-1005*, ¶ 0290. A duplicate audio path is thus created to and from a proxy via another IP route so that the calling handset may switch from one route to the other “when hand-off is looking likely” without reestablishing, e.g., a conference call because the proxy uses the same IP address as the client and therefore appears to be the same for a server’s processing. *EX-1005*, ¶ 0296.

93. Thus, Tagg discloses or suggests a seamless handoff using a make-before-break technique (“wherein said transmission is not disrupted as a result of said switch to the one of a plurality of alternative network paths”).

e. Claim 1.3.2: “said transmission contains audio or video data and,”

94. Tagg discloses or suggests 1.3.2.

95. As discussed in 1.0 above, Tagg’s system provides a “complete telephony solution that allows a person to use one phone handset for all...telecommunications needs” in “home, office, and mobile environments” by converting speech and data (including music, video, pictures, and games) into packets for VoIP protocol transmission—i.e., streaming—over a plurality of routing paths in a network. *EX-1005*, ¶¶ 0089-0095; *see also* limitation 1.0.

96. Accordingly, Tagg discloses streaming packets of media and sound data (“said transmission contains audio or video data and transmission contains audio or video data”).

f. Claim 1.3.3: “at least one Network Address Translation (NAT) is performed on said transmission;”

97. Tagg discloses or suggests 1.3.3.

98. Tagg’s system requires network address translation in multiple instances. Within a home or office local network, Tagg’s system includes wall

outlet-powered SIP and VoIP compatible repeaters that translate between both Wi-Fi and Bluetooth protocols (below):

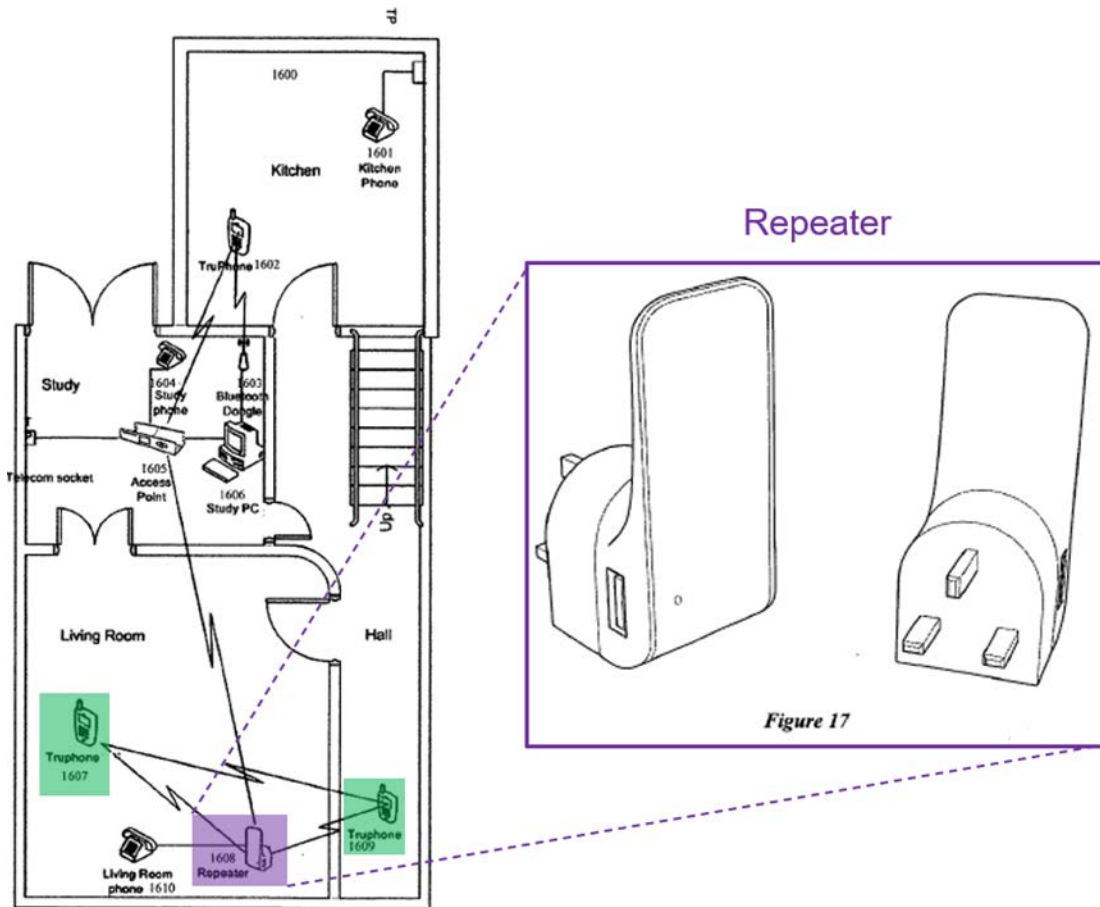


Figure 16

Repeater

Figure 17

EX-1005, Figs. 16-17 (combined and annotated), ¶ 0104.

99. The alternating current-powered repeaters use Network Address Translation (NAT) to keep incoming channels and unblocked ports open to communication with a server. *EX-1005*, ¶ 0108.

100. The repeaters help users navigate “tough conditions” including phone power constraints and link obstacles by creating an increasing number of diversity

back channels using multiple protocols to provide home-powered “range and capacity improvement.” *EX-1005*, ¶¶ 0104-0105.

101. Because Tagg’s outgoing call packets are structured as RTP or SIP datagrams, they require Network Address Processing (“NAP”) to route them between a source phone and destination phone, each identified by respective IP addresses and ports (collectively, a “socket”) during mobile handoff (below):

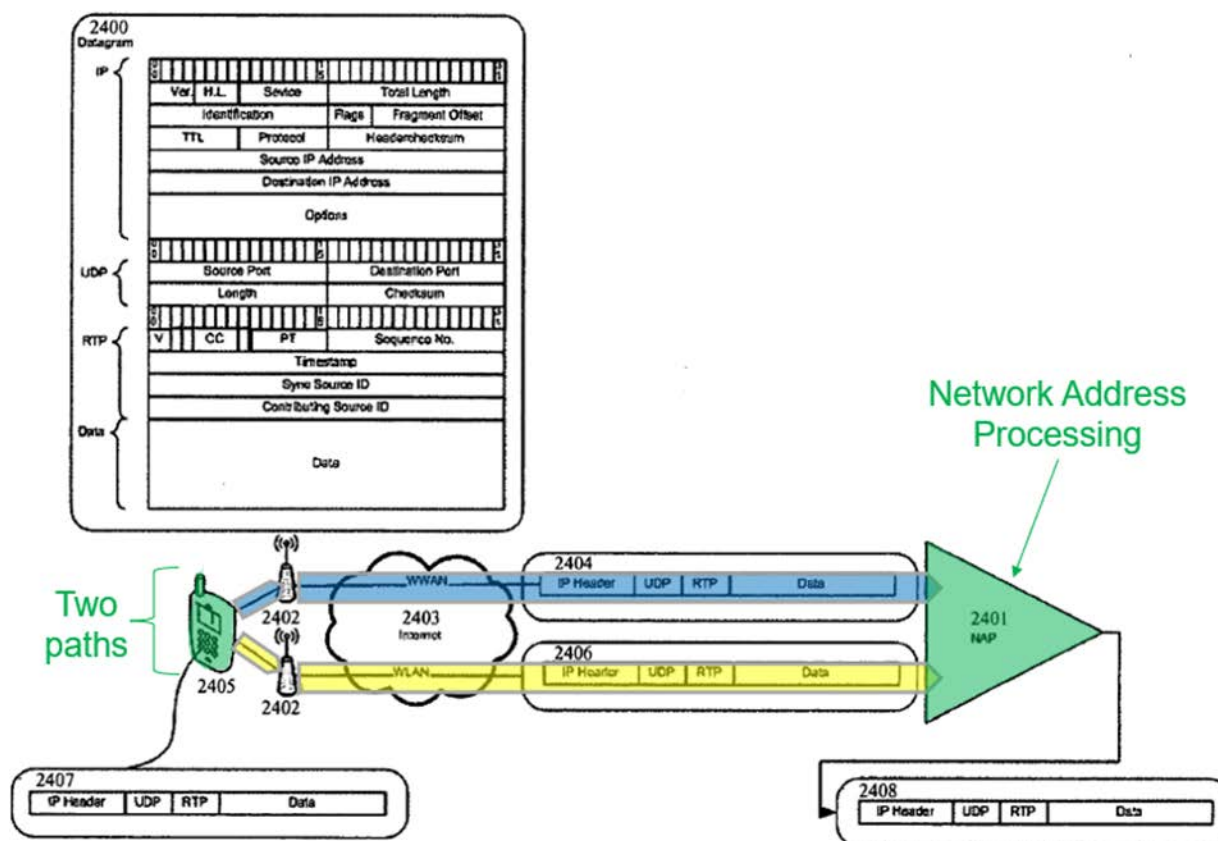


Figure 24

EX-1005, Fig. 24 (annotated), ¶ 0402.

102. In practice, calling phone 2405 is known by two IP addresses transmitting packets over two different paths during handover, which the Network

Address Processor resolves (e.g., de-duplication or duplicate removal until one stream is disconnected) for either SIP- or RTP-structured packet routing. *EX-1005*, ¶¶ 0288, 0296, 0343 (“the packets must be de-duplicated in conjunction with the NAP function”).

103. The NAP element and its function are executed in a media gateway that further repairs packets and uses “network address translation to ‘fix-up’ the addresses of all incoming packets so that they appear not to change IP addresses as the user moves between different networks” (below):

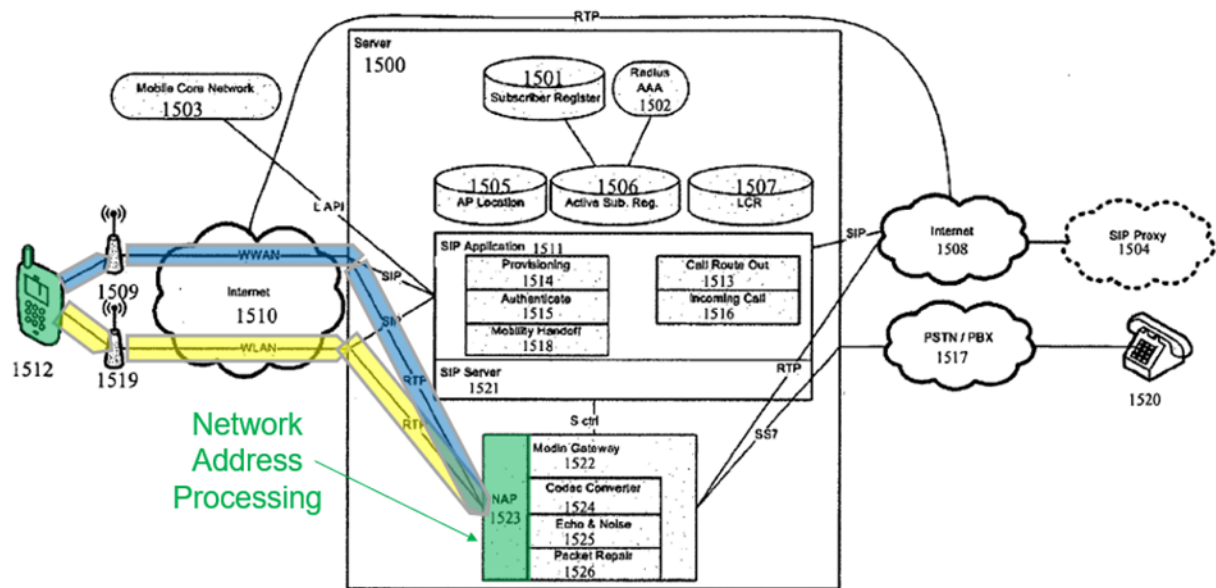


Figure 15

EX-1005, Fig. 15 (annotated), ¶ 0340.

108. Tagg's system places calls between endpoints using SIP negotiation (green) and RTP (de)packetization (purple) procedures implemented in either an access point (AP) or mobile handset:

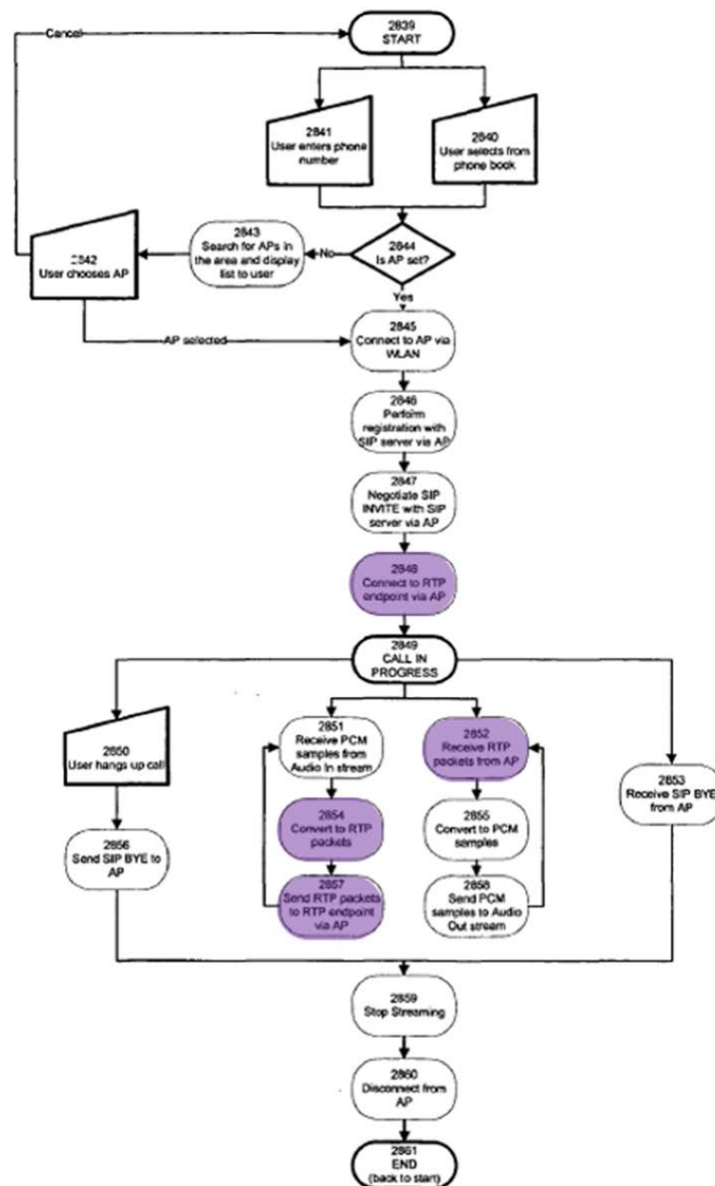


Figure 28c

EX-1005, Fig. 28c (annotated), ¶¶ 0413-0416, *see also* Figs. 28a-b, d.

109. Specifically, Tagg's handset initiates a SIP connection that transmits RTP encoded audio streams to an AP over WWAN or WLAN networks as VoIP packets for transmission to an AP. *EX-1005*, ¶¶ 0247, 0402.

110. Accordingly, Tagg discloses or at least suggests transmitting RTP encoded audio streams over networks ("said transmission uses the Real Time Protocol (RTP)").

h. Claim 1.5: "said transmission uses the Session Initiation Protocol (SIP); and"

111. Tagg discloses or suggests 1.5.

112. As discussed in 1.4, Tagg discloses that "[t]he protocols used in the invention can be Session Initiation Protocol (SIP) and Real-time Transport Protocol (RTP) optimized for wireless transport." *EX-1005*, ¶ 0100; *see also* limitation 1.4.

113. Tagg's system uses SIP transmissions (red) when placing calls between two endpoints (below):

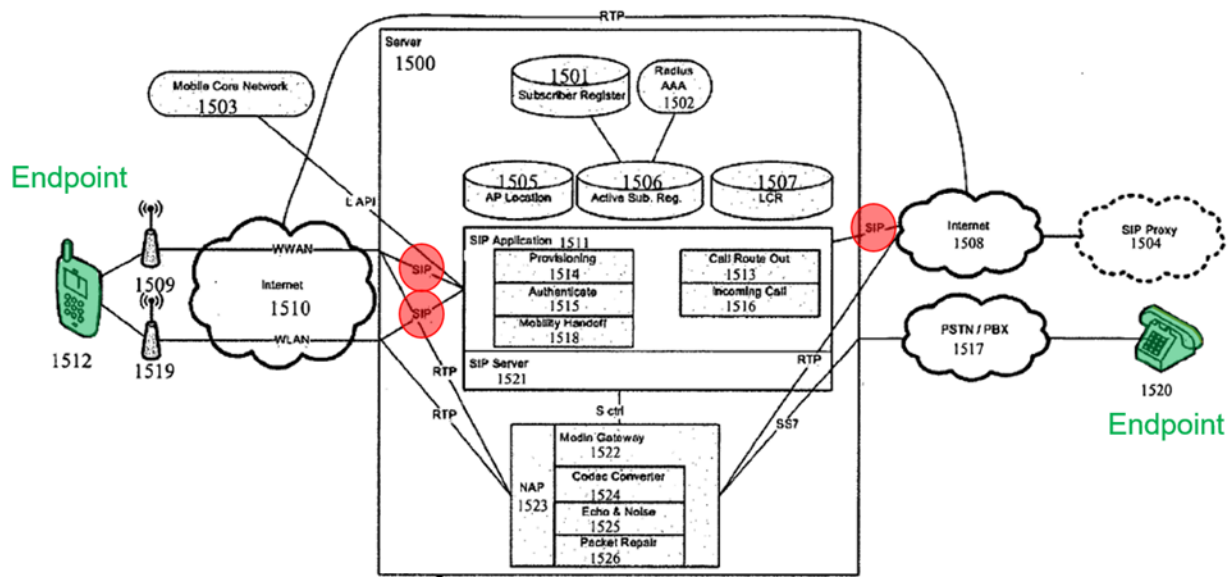


Figure 15

EX-1005, Fig. 15 (annotated), ¶ 0154.

114. Tagg's system places calls between endpoints using SIP negotiation (green) procedures implemented in either an access point (AP) or mobile handset:

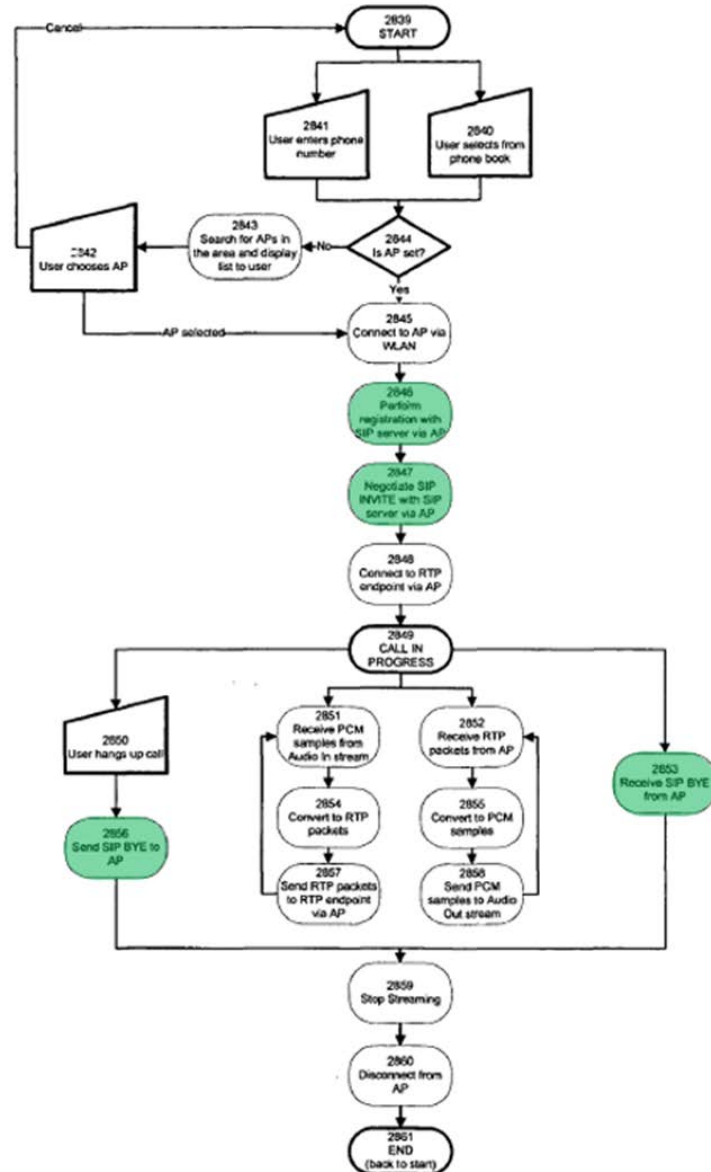


Figure 28c

EX-1005, Fig. 28c (annotated), ¶¶ 0413-0416, *see also* Figs. 28a-b, d.

115. Tagg's handset initiates a SIP connection that transmits RTP encoded audio streams to an AP over WWAN or WLAN networks as VoIP packets for transmission to an AP. EX-1005, ¶¶ 0247, 0402.

116. Accordingly, Tagg discloses or suggests SIP wireless transmissions (“said transmission uses the Session Initiation Protocol (SIP)”).

i. Claim 1.6: “the SIP signaling sequence of the transmission is maintained after said switching from the first network path to the one of a plurality of alternative network paths.”

117. Tagg discloses or suggests 1.6.

118. The ’554 Patent discloses that a SIP signaling sequence number must be maintained between a SIP device and server unless information is re-transmitted. *EX-1001* 5:12-14, 5: 25-30 (Table disclosing “SIP signaling”).

119. Tagg discloses placing a call to a SIP proxy or server over WWAN or WLAN by a handset that may further include a “SIP stack...for signaling.” *EX-1001* ¶¶ 0246-0247, 0324. When a call is made at a mobile handset, an AP converts the phone number into a SIP INVITE command to negotiate with the SIP server or SIP proxy “to get an endpoint....for sending and receiving VoIP RTP packets.” *EX-1001* ¶ 0414, 0416.

120. Once Tagg’s system identifies an RTP endpoint, “a connection is established...and the call can proceed” until either a caller hangs up or a SIP BYE command is issued. *EX-1005*, ¶ 0414.

121. As seen in the call handling diagram below, the same SIP signaling sequence is preserved to and through a SIP server or SIP proxy regardless of its switching from a WWAN to WLAN network or vice versa:

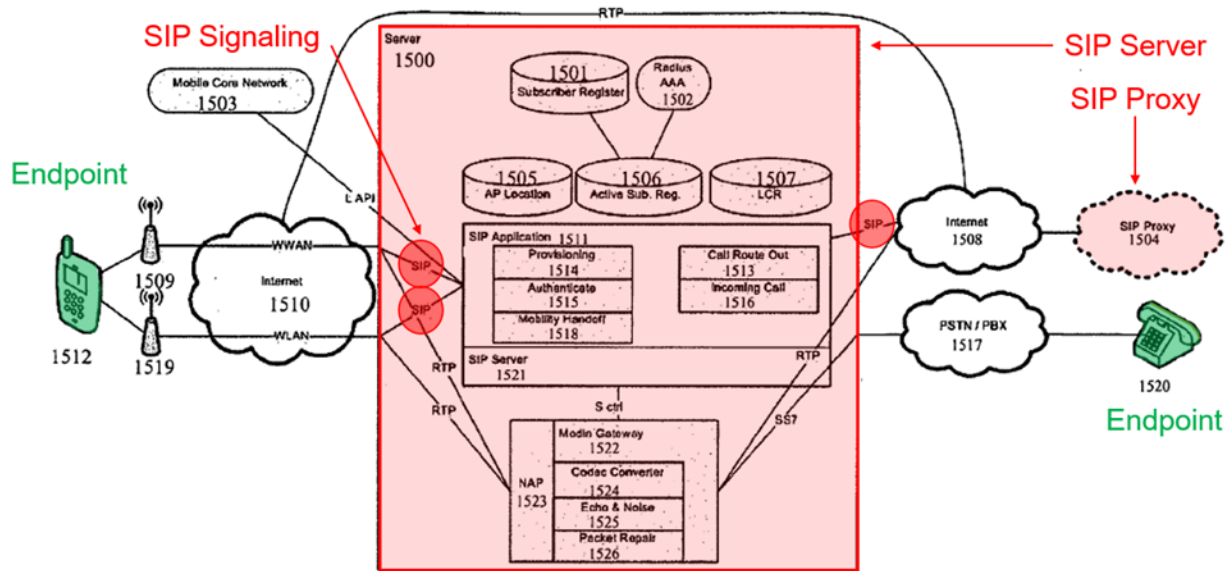


Figure 15

EX-1005, Fig. 15 (annotated), ¶ 0154.

122. Indeed, “[b]oth WWAN and WLAN connections may be made simultaneously providing multiple IP connectivity paths to the same point.” EX-1005, ¶ 0246.

123. A POSITA would have understood that Tagg’s SIP protocol uniformity in directionality teaches that a “SIP signaling sequence...is maintained” regardless of switching between the WWAN and WLAN networks because this allows the user to “appear[] to the rest of the world as if they are not moving between networks” even when “flip[ping] back and forth freely” between WWAN and WLAN networks (Tagg’s cases 1 and 6). EX-1005, Fig. 15, ¶¶ 0247, 0320.

124. Accordingly, Tagg discloses or suggests maintaining a uniform SIP signaling sequence while placing calls over WLAN and WWAN networks

regardless the direction of switching (“the SIP signaling sequence of the transmission is maintained after said switching from the first network path to the one of a plurality of alternative network paths.”).

3. Detailed Application to Independent Claim 15

125. Tagg discloses or suggests method claim 15 for substantially the same reasons as method claim 1 because, other than limitation 15.3.3 and 15.5, the claims are substantively identical as shown in the table below:

Method Claim 15	
Limitation	Substantially Similar Limitation(s)
15.0	1.0
15.1	1.1
15.2	1.2
15.3.1	1.3.1
15.3.2	1.3.2
15.3.3	-
15.4	1.3.2
15.5	-
15.6	1.4
15.7	1.5
15.8	1.6

a. Claim 15.3.3: “at least one Port Address Translation (PAT) is performed on said transmission;”

126. Tagg discloses or suggests 15.3.3.

127. As described above, Tagg’s system transmits IP v4 RTP packets using Network Address Processing. *EX-1005*, ¶ 0402; *see also* limitation 1.3.3.

128. Tagg’s RTP packets “each contains source and destination information **for both IP address and port- together known as a socket.**” *EX-1005*, ¶ 0402.

129. When RTP packets are transmitted seamless, they “may arrive from two different sockets.” *EX-1005*, ¶ 0402. This means the RTP packets “may not have the same...port.” *EX-1005*, ¶ [0288].

130. Tagg’s system accounts for this; the packets are “processe[d] and de-duplicated into one stream prior to traveling on.” *EX-1005*, ¶ 0402. Specifically, “the phones[’]s IP address may remain the same via both paths even though the paths differ and **ports may be used to distinguish the two streams.**” *EX-1005*, ¶ 0288.

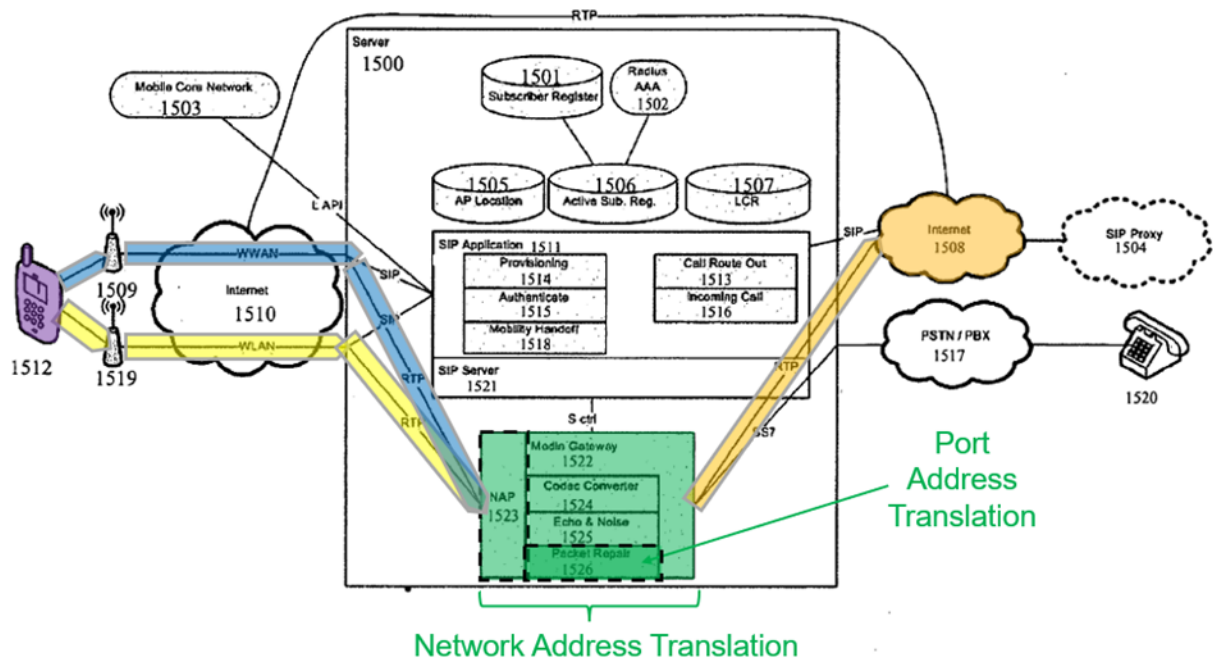
131. Tagg dedicates a “packet repair module” to the task of “duplicate packet removal” that therefore “deduplicate[s packets] in conjunction with the NAP function” even when “duplicate packets may not have the same....port.” *EX-1005*, ¶ 0343.

132. A POSITA would have understood the process of de-duplicating packets by port addresses refers to Port Address Translation (PAT) because the *port* address must be determined (translated) when an *IP* address of two packets is otherwise the same, else two copies of the same packet would persist and would create unnecessary traffic to the Internet when one packet must be removed to create a single stream of packets for connecting securely and efficiently to the Internet. *EX-1005*, ¶ 0343.

133. A POSITA would have also recognized Tagg discloses IP address and port address processing as a well-known architecture and technique commonly

employed in prior art IPv4 systems that “have more devices than available Internet IPv4 addresses allocated” because including port addresses allows the system to multiplex a single IP address across, e.g., 65,536 devices, thereby allowing many more private network devices to connect to a public network. *See EX-1013 ¶¶ 0002-0004, 0019.*

134. Furthermore, a POSITA would have found Tagg’s system connects a device (purple) to the internet (orange) over one of two network paths (blue, yellow) using both NAT and PAT (green) just like the prior art:



EX-1005, Fig. 15 (annotated). This is shown in EX-1013:

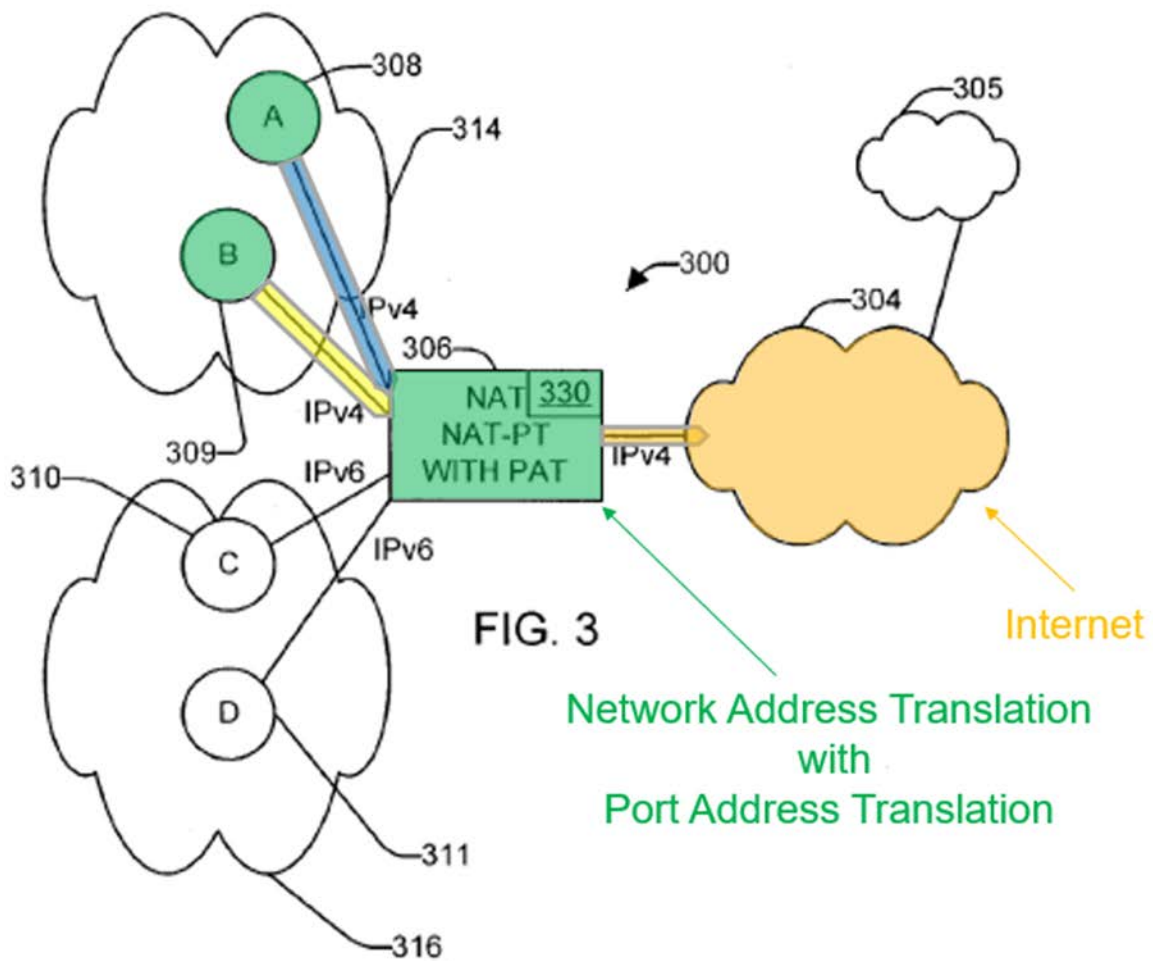


FIG. 3

EX-1013, Fig. 3 (annotated).

135. Thus, a POSITA would have further recognized Tagg's network address translation includes port address translation because Tagg uses the same NAT-with-PAT structure as that known in the prior art to achieve the same result in the same way: improved private network connection to the public internet. EX-1013, Fig. 3, ¶¶ 0002-0004, 0019.

136. Accordingly, Tagg discloses or suggests transmitting and processing RTP packets bearing port address information (“Port Address Translation”) while connecting user devices to the Internet (“performed on said transmission”).

b. Claim 15.5: “said transmission contains data used in the control of the audio or video transmission;”

137. Tagg discloses or suggests 15.5.

138. The ’554 Patent discloses a “SIP Control Flow and RTP Stream” pictorial and tabular format, both of which disclose moving RTP streams through a series of SIP INVITEs managed by a SIP server. *EX-1001*, Fig. 4, 4:37-5:36.

139. Likewise, Tagg discloses connecting a handset to an access point by converting a calling phone number into a SIP INVITE command and “negotiat[ing] with the SIP server to get an endpoint...for sending and receiving VoIP RTP packets” to facilitate an “exchange of audio/RTP data” until a call-ending SIP BYE command is received. *EX-1005*, Fig. 28b, ¶ 0414.

140. Accordingly, Tagg discloses or suggests SIP server commands for controlling RTP packet flow (“said transmission contains data used in the control of the audio...transmission”).

4. Detailed Application of Independent Claims 8, 22

141. Tagg discloses or suggests system claims 8 and 22 with components executing steps that are substantially identical, other than 8.1-8.4 and 22.1-22.4

which are further discussed below, to the method steps recited in claims 1 and 15, as shown in the tables below:

System Claim 8	
Limitation	Substantially Similar Limitation(s)
8.0	1.0
8.1	-
8.2	-
8.3	-
8.4	-
8.5	1.1
8.6.1	1.3.1
8.6.2	1.3.3
8.7	1.3.2
8.8	1.4
8.9	1.5
8.10	1.6

System Claim 22	
Limitation	Substantially Similar Limitation(s)
22.0	15.0
22.1	-
22.2	-
22.3	-
22.4	-
22.5	15.1
22.6.1	15.3.1
22.6.2	15.3.3
22.7	15.3.2
22.8	15.4
22.9	15.5
22.10	15.6

c. Claim limitations 8.1-8.4/22.1-22.4: “a transmitting device”; “a receiving device”; “a first network device”; and “a second network device.”

142. Tagg discloses or suggests claim limitations 8.1-8.4 and 22.1-22.4.

143. Tagg discloses a handset phone, i.e., mobile phone 1512 (“transmitting device”). *EX-1005*, Fig. 15 (green), ¶¶ 0324, 0326.

144. Tagg’s phone connects to wireless WLAN (1509) and WWAN (1512) radio resources connections that further connect to a server (1521) (“a first...[and] second network device”). *EX-1005*, Fig. 15 (orange), ¶¶ 0324-0327. These connections allow a user to connect to another endpoint phone (1520) (“receiving

device”). *EX-1005*, Fig. 15 (green), ¶ 0414 (describing an RTP endpoint and hangup commands).

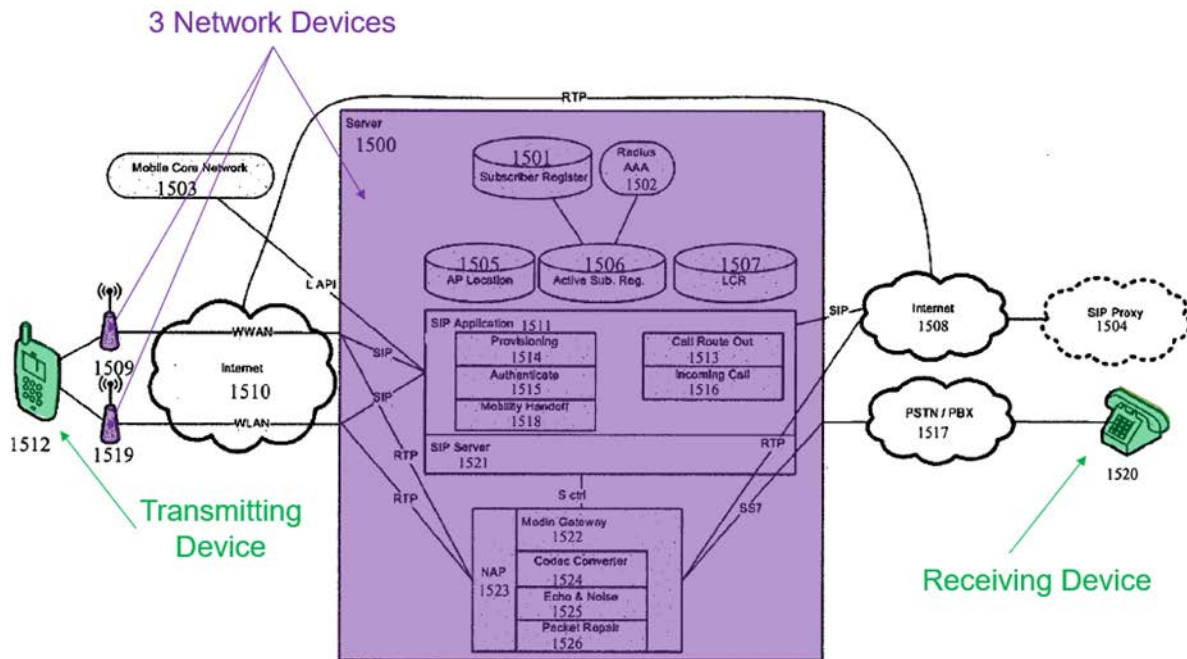


Figure 15

EX-1005, Fig. 15 (annotated).

145. Accordingly, Tagg discloses or suggests two phones (“transmitting device,” “receiving device”) wirelessly connected via a plurality of network devices including a server as well as WLAN and WWAN radio resources (“first” and “second network device”).

5. Detailed Application of Claims 2, 9, 16, 23

- a. **Claim 2:** “The method of claim 1 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of a stream quality event.”

- b. Claim 9: “The system of claim 8 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of a stream quality event.”**
- c. Claim 16: “The method of claim 15 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of a stream quality event.”**
- d. Claim 23: “The system of claim 22 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of a stream quality event.”**

146. Tagg discloses or suggests independent claims 1, 8, 15, 22.

147. Additionally, Tagg discloses or suggests claims 2, 9, 16, and 23’s additional limitations.

148. As described above, a seamless handoff uses a make-before-break technique to rapidly switch an IP stream from WLAN to WWAN. *EX-1005*, ¶ 0290; *see limitation 1.3.1*.

149. Tagg’s handoffs occur when any of a “Receive Signal Strength Indication (RSSI), Bit Error Rate (BER) or Network Location Services (NLS)” metric detects an “edge of range.” *EX-1005*, ¶ 0289.

150. A POSITA would have recognized each of Tagg’s metrics monitor for a “stream quality event” to determine whether to switch to an alternative network because low enough signal strength, high enough bit error rate, or out-of-range location may each, independently or together, “lose the call.” *EX-1001* 2:17-24.

151. More specifically, the '554 Patent discloses “packet loss, jitter, packet re-sequencing, packet duplicate creation, MOS scores, etc.” as the earmark metrics of degraded quality of service over a given packet route. *EX-1001* 2:17-20.

152. POSITAs would have recognized that Tagg expressly mitigates those same metrics during handoff using a Packet Repair module. *Tagg*, [0343] (describing how the Packet Repair module “provides for jitter buffering, duplicate packet removal, missing packet request or masking, and packet re-ordering”). Therefore, a POSITA would have understood that Tagg’s system switches networks as the result of a stream quality event because it is specifically tuned to repair the same list of quality of service events and switch networks to avoid losing the call.

6. Detailed Application of Claims 3, 10, 17, 24

- a. Claim 3: “The method of claim 1 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of stream load balancing.”**
- b. Claim 10: “The system of claim 8 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of stream load balancing.”**
- c. Claim 17: “The method of claim 15 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of stream load balancing.”**
- d. Claim 24: “The system of claim 22 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of stream load balancing.”**

153. Tagg discloses or suggests independent claims 1, 8, 15, 22.

154. Additionally, Tagg discloses or suggests claims 3, 10, 17, and 24's additional limitations.

155. Tagg discloses "balancing the transmit and receive link budget" in the system for co-existing WiFi and Bluetooth WLAN systems. *EX-1005*, ¶¶ 0109-0112.

156. Specifically, the system "attempts to look for the shortest signal path" between two handsets, which may mean routing a call only through a LAN and not to the public internet (PSTN).

157. A POSITA would have understood that Tagg's switching between WiFi and Bluetooth LAN networks to achieve the shortest, most efficient transmission path teaches stream load balancing because most often WiFi and Bluetooth coexist, and therefore a need exists to ensure they can "be used in a seamless fashion without causing interference with each other." *EX-1005*, ¶ 0110.

158. By doing so, a POSITA would have understood that the network would benefit from using a plurality of low-cost devices relying upon the same signaling protocol and system architecture, allowing for optimization of the WiFi and Bluetooth roles. *EX-1005*, ¶¶ 0116-0118 (describing the benefits of using either

Bluetooth or WiFi as the “backbone” and the other as the “local link” to “maximize range and throughput”).

7. Detailed Application of Claims 4, 11, 18, 25

- a. Claim 4: “The method of claim 1 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of an administrator move.”**
- b. Claim 11: “The system of claim 8 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of an administrator move.”**
- c. Claim 18: “The method of claim 15 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of an administrator move.”**
- d. Claim 25: “The system of claim 22 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of an administrator move.”**

159. Tagg discloses or suggests independent claims 1, 8, 15, 22.

160. Additionally, Tagg discloses or suggests claims 4, 11, 18, and 25’s additional limitations.

161. Besides seamless handoff, Tagg also teaches the option for non-seamless handoff, “[w]here [a] user has to make a decision and take action—such as to walk back into WLAN coverage.” *EX-1005*, ¶¶ 0282-0283.

162. Tagg’s non-seamless handoff implements a “[b]reak-before-make” technique that notifies a user by some form of audio/visual indication that a WLAN

connection is degrading, and “giving [users] the option to either move back into coverage, accept the handoff, or terminate the call.” *EX-1005*, ¶0291.

163. A POSITA would have recognized that by giving users these options, an administrator determines the options.

164. Specifically, one option is a handoff—the opportunity to switch from one network to another—that occurs when “costs associated with the new mobile data link may be higher,” which a POSITA would have recognized only an administrator setting those rates would know. *EX-1005*, ¶ 0292.

165. A POSITA would have also recognized allowing subscribers to select (or avoid) higher costs therefore improves a subscribing user’s experience by notifying the user before charging significantly more money to have the same call a user could maintain by simply stepping back into an internet café. *EX-1005*, ¶ 0292.

8. Detailed Application of Claims 5, 12, 19, 26

- a. Claim 5: “The method of claim 1 wherein a SIP server associated with the one of a plurality alternative network paths may authenticate the transmission before it is switched.”**
- b. Claim 12: “The system of claim 8 wherein the SIP server associated with the one of a plurality alternative network paths may authenticate the transmission before it is switched.”**
- c. Claim 19: “The method of claim 15 wherein a SIP server associated with the one of a plurality alternative network paths may authenticate the transmission before it is switched.”**

d. Claim 26: “The system of claim 22 wherein a SIP server associated with the one of a plurality alternative network paths may authenticate the transmission before it is switched.”

166. Tagg discloses or suggests independent claims 1, 8, 15, 22.

167. Additionally, Tagg discloses or suggests claims 5, 12, 19, and 26’s additional limitations.

168. For the several handoff cases Tagg discloses, at least one models the situation when a user makes a call over a local network (WLAN-IP) and moves out of range, requiring the mobile phone to switch to a wide area network (WWAN-IP). *EX-1005*, ¶ 0320.

169. When this happens, the handoff is a “straightforward switch” because “authentication remains valid”; authentication happened before the switch and need not change with respect to the switch; therefore, the call is authenticated before it is switched. *EX-1005*, ¶ 0320.

170. Tagg further discloses that authentication precedes switching networks in the “handoff states” tabulated below:

TABLE 9

State Table	
	Phone off
	Phone on
	Discovered WWAN
Authentication	Authenticated to WWAN
	Connected WWAN-Audio
	Connected WWAN-DATA
	Discovering WLAN
	Connected to WLAN
	Authenticated WLAN-IP
	Authenticated WLAN-VoIP
	In call incoming WWAN-Audio
	In call incoming WWAN-VoIP
	In call incoming WLAN-VoIP
	In call outgoing WWAN-Audio
	In call outgoing WWAN-VoIP
	In call outgoing WLAN-VoIP
Precedes Handoff	Handing off
	Handing over

EX-1005, ¶ 0355 (disclosing Table 9).

171. Further, Tagg's system expressly uses a SIP server executing a SIP application with authentication logic to authenticate VoIP calls placed by a mobile device moving between access points:

9. Detailed Application of Claims 6, 13, 20, 27

- a. Claim 6: “The method of claim 1 wherein the source device is a mobile device.”**
- b. Claim 13: “The system of claim 8 wherein the transmitting device is a mobile device.”**
- c. Claim 20: “The method of claim 15 wherein the source device is a mobile device.”**
- d. Claim 27: “The system of claim 22 wherein the transmitting device is a mobile device.”**

172. Tagg discloses or suggests independent claims 1, 8, 15, 22.

173. Additionally, Tagg discloses or suggests claims 6, 13, 20, and 27’s additional limitations.

174. Tagg discloses a multi-server for providing telecommunication call handling and termination in which “[a] call originates on...mobile phone 1512 and connects to the server 1500 via wireless connections WLAN 1509 and WWAN 1519” (below):

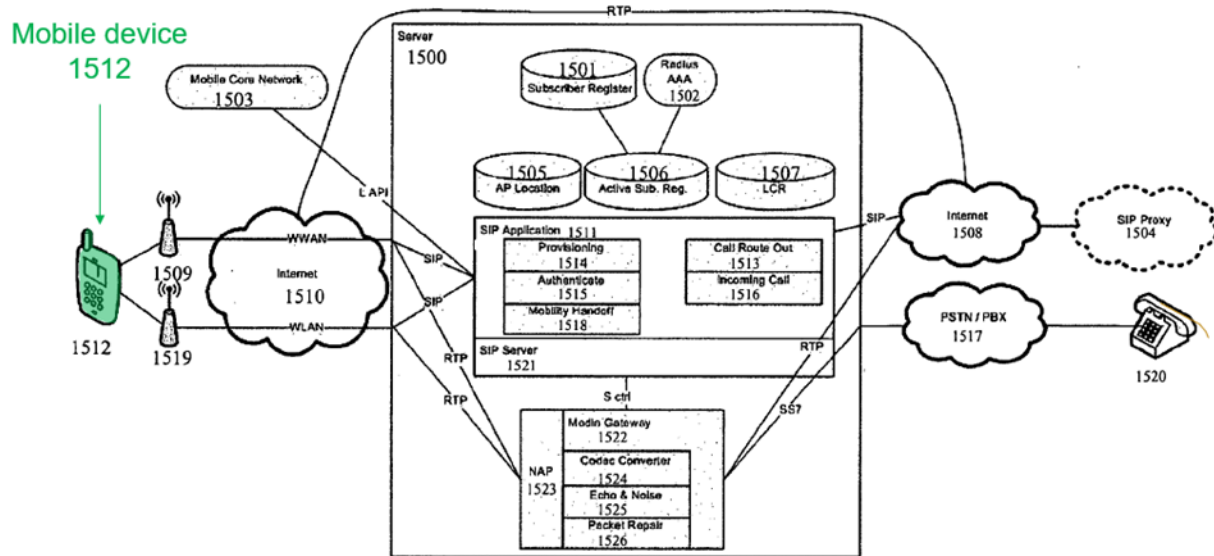


Figure 15

EX-1005, Fig. 15 (annotated), ¶ 0324.

175. Calls placed by mobile devices (“source/transmitting devices”) are subject to handoffs. EX-1005, ¶ 0287 (disclosing Case 1, or the handoff from a mobile device-initiated VoIP call on WLAN to WWAN).

10. Detailed Application of Claims 7, 14, 21, 28

- a. Claim 7: “The method of claim 6 wherein one or more of said plurality of alternative network paths become available to the mobile device during roaming.”
- b. Claim 14: “The system of claim 13 wherein one or more of said plurality of alternative network paths become available to the mobile device during roaming.”
- c. Claim 21: “The method of claim 20 wherein one or more of said plurality of alternative network paths become available to the mobile device during roaming.”

d. Claim 28: “The system of claim 27 wherein one or more of said plurality of alternative network paths become available to the mobile device during roaming.”

176. Tagg discloses or suggests independent claims 6, 13, 20, and 27.

177. Additionally, Tagg discloses or suggests claims 7, 14, 21, and 28’s additional limitations.

178. Tagg’s mobile device “initiates a search for WLAN resources...and locates them” while roaming. *EX-1005*, ¶¶ 0325-0326.

179. The SIP server manages mobile roaming for a handset—i.e., mobile phone—using at least Network Address Processing of IP v4 RTP packets over multiple networks as discussed above. *EX-1005*, ¶¶ 0274, 0402; *see also* claim 1.

180. Further, Tagg’s six “handoff/handover cases apply in a broadly similar manner to the situation where a persona has traveled internationally,” i.e., “[i]nternational [r]oaming.” *EX-1005*, ¶¶ 0349-0350; *see also* ¶ 0285 (disclosing six handoff cases).

181. This allows a mobile phone to acquire a WLAN Access Point by “a person roaming in Germany on one of the German Networks.” *EX-1005*, ¶ 0130.

C. Ground 2: Kottilingal alone or in view of Politis, Teaches Every Element of Claims 1-28

1. Kottilingal

182. Kottilingal (EX-1006) was filed as U.S. Patent Application No. 11/211,249 on August 24, 2005, published as U.S. Patent Application Publication 2007/0064684 on March 22, 2007, and issued as U.S. patent 8,467,377 on June 18, 2013. *EX-1006*, Cover.

183. Kottilingal is directed toward VoIP packet communications between, e.g., IP telephones that have one interface for wireless LAN communication and another for cellular i.e., WAN) communication and is therefore directed toward the same field of endeavor as the '554 patent. *Compare EX-1006*, Title, Abstract, 1:53-2:41, *with EX-1001*, 1:9-18.

184. Because Kottilingal seeks to switch networks seamlessly to avoid call interruptions and voice quality degradation, it is also reasonably pertinent to the problem faced by the '554 patent inventors. *Compare EX-1006*, 1:33-49, *with EX-1001*, 2:5-24.

185. Kottilingal is directed towards the “[i]nterleaving of VOIP/VIP transmission in multiple sessions to increase quality of service in mobile devices,” and is thus in the same field of endeavor as the '554 patent. *EX-1006*, Cover. Moreover, it is relevant to the problem cited by the '554 patent inventors, because it is concerned with the seamless switching of data payloads from the first to the second session. *EX-1006*, 10:19-21.

186. Kottilingal describes a mobile communication device that can switch between two air interfaces for wireless communication. *EX-1006*, 1:53-2:24. Kottilingal’s device can use one air interface for a media stream and then switch to the other air interface when the first interface is no longer available or the QoS degrades. *EX-1006*, 1:53-2:24.

187. To make this switch, “PARTY A’s mobile communication device sends a SPAWN SIP message to PARTY B’s target communication device.” *EX-1006*, 2:26-28. The second session is created using “a SIP INVITE request,” which “contains a spawn identifier.” *EX-1006* 2:29-36. “The target communication device uses the spawn identifier received in the SIP INVITE request to associate the first and second sessions” (*EX-1006*, 2:38-41), as depicted in Figure 7:

SPAWN SIP:BOB@BILOXI.COM SIP/2.0
 VIA: SIP/2.0/UDP PC33.ATLANTA2.COM;BRANCH=ADFS
 MAX-FORWARDS: 70
 TO: BOB <SIP:BOB@BILOXI.COM>
 FROM: ALICE <SIP:ALICE@ATLANTA2.COM>;TAG=876767776
 CALL-ID: D7878-0-A2@PC33.ATLANTA2.COM
 CSEQ: 314160 SPAWN
 CONTACT: SIP:ALICE@PC33.ATLANTA2.COM.
 CONTENT-TYPE: APPLICATION/SDP
 CONTENT-LENGTH: 142

MASTER VIA: PC33.ATLANTA1.COM;BRANCH=Z9HG4BK776ASDHDS
 MASTER TO: BOB <SIP:BOB@BILOXI.COM>
 MASTER FROM: ALICE <SIP:ALICE@ATLANTA1.COM>;TAG=1928301774
 MASTER CALL-ID: A84B4C76E66710@PC33.ATLANTA1.COM
 MASTER CSEQ: 314159 INVITE
 MASTER CONTACT: <SIP:ALICE@PC33.ATLANTA.COM>

} SO CALLEE CAN
 IDENTIFY WITH
 FIRST SESSION

SPAWN MESSAGE

FIG. 7

EX-1006, Fig. 7 (annotated).

2. Politis

188. Politis (EX-1007) is directed toward VoIP heterogeneous network handoffs and is therefore directed toward the same field of endeavor as the '554 patent. *Compare EX-1007*, Figs. 1, 2, 4, pp. 1, 3, with *EX-1001*, 1:9-18.

189. Because Politis seeks to switch between networks seamlessly to avoid call interruptions and voice quality degradation, it is also reasonably pertinent to the problem faced by the '554 patent inventors. *Compare EX-1007*, Figs. 1, 2, 4, pp. 4-5, with *EX-1001*, 2:5-24.

190. Politis is directed towards “mobility management architectures based on SIP and Mobile IP protocols,” it is in the same field of endeavor as the ’554 Patent. Because it is concerned with the “disruption caused during a handoff” and the data packets lost during handoffs, it is also reasonably pertinent to the problem faced by the ’554 Patent’s inventors. *EX-1007*, p. 4.

191. Politis, a conference paper published April 23, 2003, describes two multilayer mobile communications architectures that enable mobile devices to switch between different networks, including those that employ NAT functionality. *EX-1007*, p. 3.

192. The first architecture uses SIP messages sent between a mobile host and its corresponding hosts to support the mobile host’s mobility amongst distinct networks. *EX-1007*, p. 2.

193. The second architecture uses SIP in combination with Mobile IP functionality, with SIP signaling supporting the inter-network mobility of real-time data traffic, and MIP supporting the same for non-real-time traffic. *EX-1007*, p. 3. The second architecture involves the use of NAT/STUN² functionalities to overcome the challenges posed by NAT-enabled networks. *EX-1007*, p. 3.

² “STUN,” a naming convention used in 2008, refers to Session Traversal Utilities for NAT, which is a type of protocol used for IP network voice, video and messaging

3. Motivation To Modify Kottilingal With The Teaching Of Politis

194. A POSITA would have been motivated to combine the teachings of Kottilingal and Politis.

195. First, both disclosures are directed toward the same field of endeavor in that both concern the enablement of inter-network mobility of, for example, VoIP devices. *Compare EX-1006*, Abstract (“A first mobile device has two air interfaces. The first mobile device uses its first interface to transmit VoIP/VIP packets to a second device in a first session. If a quality of service decreases, then the first device causes a second session to be set up where the second session uses the second air interface.”), *with EX-1007*, p. 1 (“In this paper, we present two mobility management architectures based on SIP and Mobile IP protocols. These configurations mainly allow/provide mobility in two different layers namely the application and network layers.”).

196. Second, both disclosures are concerned with the issue of preserving the reliability of data transmission during the inter-network handoffs. *Compare EX-1006*, 10:19-22 (a payloads of the media stream are therefore seamlessly switched

transmissions to help users communication behind NAT firewalls that keeps local network (LAN) IP addresses private. *See, e.g.,* <https://www.pcmag.com/encyclopedia/term/stun>.

from the first active session to the second active session without the call being perceptively broken.”), *with EX-1007*, p. 1 (The two mobility architectures are evaluated in terms of various performance metrics, i.e. hand off latency and packets loss.”).

197. Third, to the extent Kottilingal did not already disclose solutions to traversing NAT-enabled networks, a POSITA would have desired to apply the solutions found in Politis to Kottilingal to enable the traversal of NAT-enabled networks.

198. Specifically, a POSITA would have been aware of the issues posed by NAT-enabled networks to data traffic supported by SIP signaling. *EX-1007*, p. 3 (“The use of NAT for real-time traffic introduces problems . . . because the IP voice and video devices behind the NAT have private IP addresses that are not . . . on the public Internet.”).

199. Thus, a POSITA facing the issue of switching a SIP-supported data transmission from one network to another, where one of the networks employs NAT, would have sought out a solution such as that posed by Politis: “NAT/STUN functionalities” may be used during network handoff of a SIP-supported data stream. *EX-1007*, p. 3. In other words, Politis’s STUN request and response help Kottilingal’s network “see” local network devices concealed behind LAN firewalls

before connecting to them using SIP protocols, allowing more users to benefit from Kottilingal's SIP-based switching methods. *EX-1007*, Fig. 5, 3.

200. Furthermore, Politis was published well in advance of Kottilingal. Thus, a POSITA seeking to implement the teachings of Kottilingal would have been well-aware of the NAT/STUN functionalities taught by Politis when faced with the challenge posed by network handoff involving a NAT-enabled network.

201. In view of the above, it would have been obvious to a POSITA to modify Kottilingal using Politis' teachings, to the extent any modification was necessary. Both references enable inter-network mobility of SIP-supported data transmissions, concern the preservation of data transmission quality during network handoff, and to the extent necessary, a POSITA would have wanted to use the teachings provided by Politis to solve the obvious problem of network handoff involving a NAT-enabled network.

202. For these reasons, modifying Kottilingal in view of Politis would have been obvious to a POSITA.

4. Detailed Application to Independent Claim 1

- a. Claim 1.0: A method of enhancing the reliability of a transmission from a source to a destination in a communications network using a network protocol that operates on top of the Internet Protocol (IP), the method comprising:**

203. To the extent the preamble is limiting, then Kottilingal discloses or suggests this limitation. *EX-1006*. For example, Kottilingal discloses two-party (Party A and Party B) VoIP calls between IP telephones and switching the IP packet routing between different “interface[s]” such as a local area network (LAN) or cellular telephone network. *EX-1006*, 1:53-2:24, 3:11-18. Kottilingal switches calls should a longer (cellular) or shorter (LAN) range for the call be desired or if call quality (quality of service) drops to an “undesirable or unacceptable level.” *EX-1006*, 2:6-24, 3:19-31. The VoIP packets are stacked using Real-Time Protocol (RTP) over User Datagram Protocol (UDP) over Internet Protocol (IP) and Session Initialization Protocol (SIP) over Transmission Control Protocol (TCP) over IP. *EX-1006*, 1:61-2:41.

204. Accordingly, Kottilingal discloses or suggests a process of switching between networks to maintain acceptable call quality (“a method of enhancing the reliability of a transmission from a source to a destination in a communications network”) using RTP or SIP over IP in VoIP transmissions (“using a network protocol that operates on top of the Internet Protocol (IP)”).

b. Claim 1.1: transmitting data between a source and destination over a first network path made up of one or more network links where at least one of the network links is to a local area network that is remote from the transmission source; and

205. Kottilingal discloses or suggests 1.1. For example, Kottilingal discloses a source, corresponding to Party A's IP Phone, and a destination, corresponding to Party B's IP Phone:

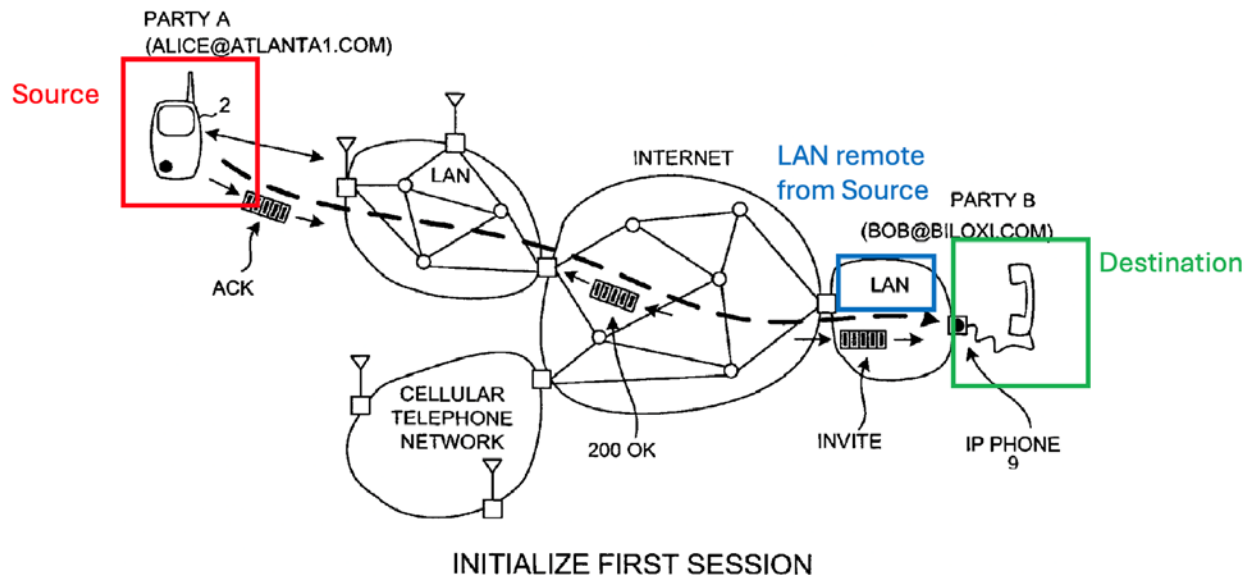


FIG. 5

EX-1006, Figure 5 (annotated); (“Both the first and second air interfaces are then used to communicate packets of a single media stream from the first device to the second device.”).

206. And, as depicted above, at least one of the network links is to a local area network that is remote from the transmission source. The “first network path” is illustrated by the dotted line in Figure 5. EX-1006, Figure 5.

207. Accordingly, Kottilingal discloses or suggests a Party A IP phone calls a remote Party B IP phone over a LAN, the Internet, and another LAN (“transmitting data between a source and destination over a first network path made up of one or

more network links where at least one of the network links is to a local area network that is remote from the transmission source”).

c. Claim 1.2: switching the transmission from the first network path to one of a plurality of alternative network paths;

208. Kottilingal discloses or suggests 1.2. Kottilingal discloses various reasons for switching a call from a first air interface to another air interface. *EX-1006* 2:6-24.

209. For example, the switch may be desired “due to the air interface initially being used being a short range wireless LAN interface. PARTY A may move out of the coverage area of the short range wireless LAN. It is desired to continue the call by switching to using the longer range cellular telephone air interface.” *EX-1006* 2:8-13. Or:

it may be desired to switch from using the first air interface to the second air interface where the first interface is a longer range cellular telephone interface and the second air interface is a shorter range wireless LAN interface. Initially, the cellular telephone air interface is used, but then PARTY A moves into the coverage area of the wireless LAN. If, for example, PARTY A’s cellular telephone provider charges to carry a voice conversation on its cellular telephone network, then it may be desirable for PARTY A to stop using the cellular air interface and

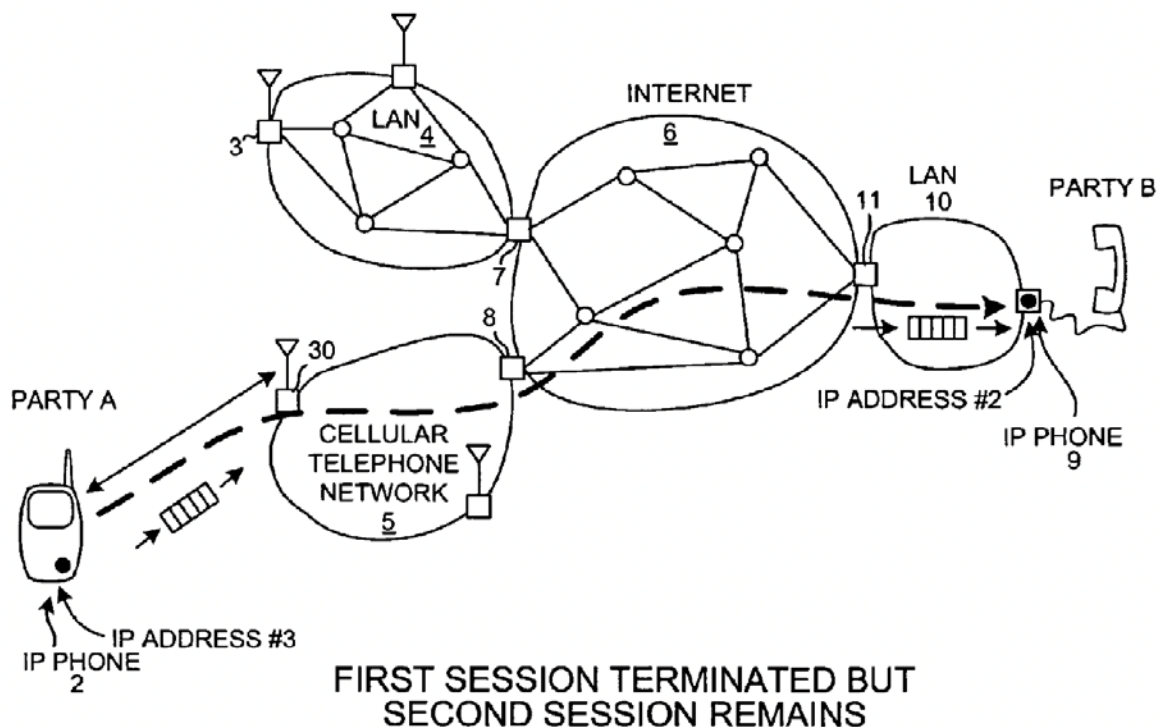


FIG. 17

EX-1006, Figures 10, 17.

211. The first session and second session in Kottilingal are illustrated in Fig. 10, where the lower dashed network path is being established by invitation (“INVITE”), whereas the upper dashed network path is already established. In Fig. 17, even though the first (upper) network path is terminated, the second network path remains.

212. Accordingly, Kottilingal discloses or suggests switching a VoIP call from or to a LAN or cellular telephone network (“switching the transmission from the first network path to one of a plurality of alternative network paths”).

d. Claim 1.3.1: wherein said transmission is not disrupted as a result of said switch to the one of a plurality of alternative network paths,

213. Kottilingal discloses or suggests 1.3.1. For example, Kottilingal discloses “a subsequent step wherein payload data media flow between IP phone **2** and IP phone **9** is switched (or ‘handed off’) from the first session to the second session.” *EX-1006* 9:49-51.

214. As part of this switch, IP phone 2 (the source) transmits a “media flow handoff control packet” to IP phone 9 (the destination). *EX-1006* 10:3-7, Figures 13 and 14. “After sending the media flow handoff control packet, IP phone 2 switches from sending data payloads of the media stream in the first session to sending data payloads of the media stream in the second session.” *EX-1006* 10:7-10.

215. The destination device (IP phone 9), then orders packets using a first-in-first-out (FIFO) memory according to RTP sequence number and timestamps. *EX-1006* 10:16-19. “Data payloads of the media stream are therefore **seamlessly switched** from the first active session to the second active session **without the call being perceptively broken.**” *EX-1006* 10:19-22.

216. Accordingly, Kottilingal discloses or suggests seamless data media payload handoffs that avoid broken VoIP calls (“wherein said transmission is not disrupted as a result of said switch to the one of a plurality of alternative network paths”).

e. Claim 1.3.2: said transmission contains audio or video data and

217. Kottilingal discloses or suggests 1.3.2. For example, Kottilingal expressly discloses transmitting “data payload VoIP packets of a media stream” including “voice data for a conversation” between Party A and Party B.” *EX-1006*, 2:2-5, *see also* 2:62–3:3. Kottilingal’s SIP sessions between the parties also expressly transmit “IP packets having voice and/or video data payloads.” *EX-1006*, 8:2-17.

218. Accordingly, Kottilingal discloses or suggests transmitting voice data in VoIP packets of a VoIP media stream (“said transmission contains audio or video data”).

f. Claim 1.3.3: at least one Network Address Translation (NAT) is performed on said transmission;

219. Kottilingal in view of Politis discloses or suggests 1.3.3. Figure 5 of Kottilingal illustrates network switching in the context of a NAT-enabled network.

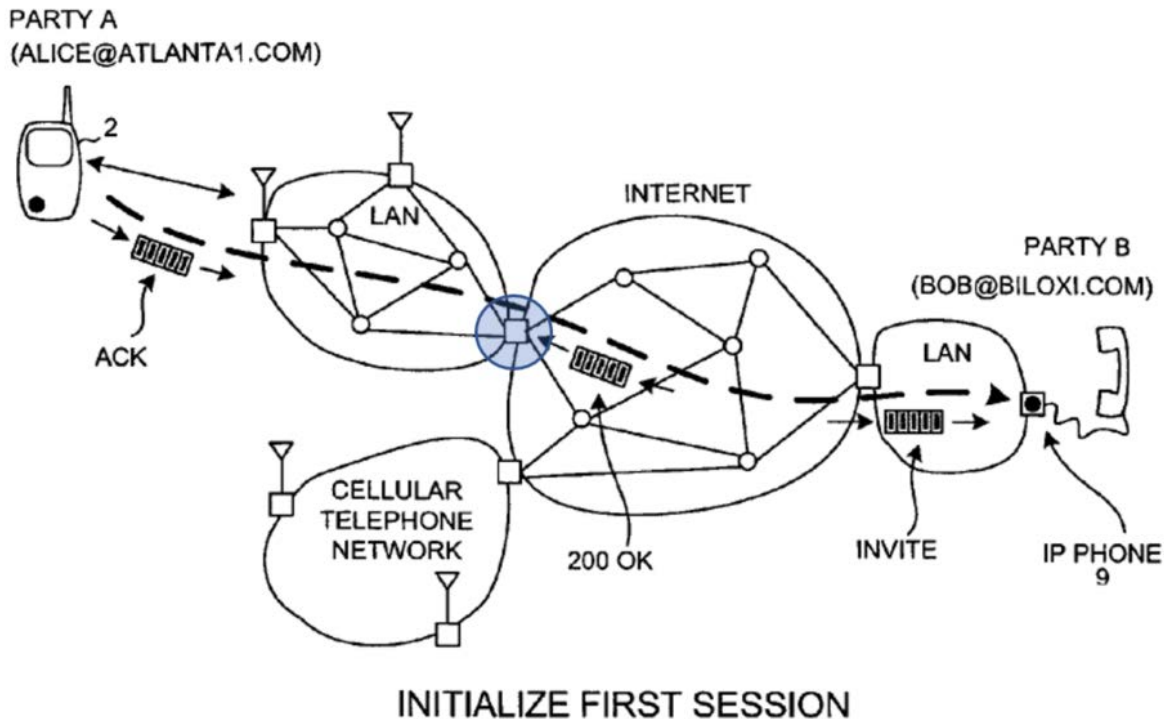


FIG. 5

EX-1006, Fig. 5 (annotated).

220. As seen above, Kottilingal Figure 5 discloses network switching in the context of a multi-node LAN with a single connection (circled in blue) to the internet. This configuration must employ a form of NAT, such as PAT, to enable the nodes of the LAN to receive data transmissions from the rest of the internet via a public-facing IP address. Kottilingal thus discloses the above claim element.

221. A POSITA would find it obvious to combine Politis' teachings with Kottilingal to perform NAT on the transmission in Kottilingal.

222. Politis discloses a mobility management architecture that contemplates inter-network switching of a VoIP data transmission where at least one of the networks involves NAT functionality. *EX-1007*, p. 3.

223. Politis teaches that the use of “NAT/STUN functionalities” could overcome the challenges posed by a NAT-enabled network in this scenario. *EX-1007*, p. 3.

224. Thus, POSITAs would have been motivated to perform NAT translation as taught in Politis on the transmission of Kottilingal where network switching is performed Politis’s STUN request and response help Kottilingal’s network “see” local network devices concealed behind LAN firewalls before connecting to them using SIP protocols, allowing more users to benefit from Kottilingal’s SIP-based switching methods. *EX-1007*, Fig. 5, 3.

225. Accordingly, Kottilingal alone and in combination with Politis, discloses or teaches a NAT-enabled network comprising single-node LAN-to-Internet connections ripe for NAT/STUN translations on that network (“at least one Network Address Translation (NAT) is performed on said transmission”).

g. Claim 1.4: said transmission uses the Real Time Protocol (RTP);

226. Kottilingal discloses or suggests 1.4. Kottilingal discloses that the “VoIP packets are communicated using RTP (Real-Time Protocol) over UDP (User Datagram Protocol) over (IP Internet Protocol).” *EX-1006* 1:67-2:2.

227. Accordingly, Kottilingal discloses or suggests sending VoIP packets using RTP over UDP over IP (“said transmission uses the Real Time Protocol (RTP)”).

h. Claim 1.5: said transmission uses the Session Initiation Protocol (SIP); and

228. Kottilingal discloses or suggests 1.5. Kottilingal discloses a transmission in which Party A’s mobile communication device sends a SPAWN SIP message to Party B’s target communication device, and the SPAWN SIP message is communicated using SIP. *EX-1006* 2:25–41 (“The SPAWN SIP message is communicated using SIP (Session Initialization Protocol).”).

229. Accordingly, Kottilingal discloses or suggests sending SPAWN messages using SIP (“said transmission uses the sessions Initiation Protocol (SIP)”).

i. Claim 1.6: the SIP signaling sequence of the transmission is maintained after said switching from the first network path to the one of a plurality of alternative network paths.

230. Kottilingal discloses or suggests 1.6. For example, Kottilingal’s Figure 7 discloses a CSEQ value placed at the same sequential position (green) in SIP messaging between an IP phone 2 to IP phone 9 (To→From→Call-ID→CSEQ parallels Master To→Master From→Master Call-ID→Master CSEQ):

```

SPAWN SIP:BOB@BILOXI.COM SIP/2.0
VIA: SIP/2.0/UDP PC33.ATLANTA2.COM;BRANCH=ADFS
MAX-FORWARDS: 70
TO: BOB <SIP:BOB@BILOXI.COM>
FROM: ALICE <SIP:ALICE@ATLANTA2.COM>;TAG=876767776
CALL-ID: D7878-0-A2@PC33.ATLANTA2.COM
CSEQ: 314160 SPAWN
CONTACT: SIP:ALICE@PC33.ATLANTA2.COM.
CONTENT-TYPE: APPLICATION/SDP
CONTENT-LENGTH: 142

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MASTER VIA: PC33.ATLANTA1.COM;BRANCH=Z9HG4BK776ASDHDS
MASTER TO: BOB <SIP:BOB@BILOXI.COM>
MASTER FROM: ALICE <SIP:ALICE@ATLANTA1.COM>;TAG=1928301774
MASTER CALL-ID: A84B4C76E66710@PC33.ATLANTA1.COM
MASTER CSEQ: 314159 INVITE
MASTER CONTACT: <SIP:ALICE@PC33.ATLANTA.COM>

```

}

SO CALLEE CAN
IDENTIFY WITH
FIRST SESSION

SPAWN MESSAGE

FIG. 7

EX-1006, Figure 7 (annotated), 2:25-35, 4:28-30.

231. This use of sequential “CSEQ” values corresponds to the ’554 patent’s description of the meaning of the claim element “the SIP signaling sequence of the transmission is maintained after said switching[.]” *EX-1001*, claim limitation 1.6.

232. Specifically, in the “Flow Chart Description” spanning columns 4 and 5, the ’554 patent explains that as part of the SIP dialogue during a switch, “[t]he state involving the SIP signaling sequence number (often referred to as the ‘cseq’ value, must be maintained throughout the dialog. **For a new ‘transaction’ this number must monotonically increase;** for a re-transmit of an old transaction, it

must remain the same.” *EX-1001*, col. 5, Flow Chart Description Number 210. This description corresponds precisely to Kottilingal’s disclosure of a SPAWN message with a CSEQ value (314159) that has “monotonically increased” from the CSEQ value in the previous SIP “Invite” message (314160). *EX-1006*, Figs. 7-9, 2:25-41, 8:45-67.

233. Accordingly, Kottilingal discloses or suggests sending SPAWN SIP messaging between IP phones when switching between interfaces that places the CSEQ value at the same position in both SIP messages (“the SIP signaling sequence of the transmission is maintained after said switching from the first network path to the one of a plurality of alternative network paths”).

5. Detailed Application to Independent Claim 15

234. Kottilingal alone and in combination with Politis discloses or suggests method claim 15 for substantially the same reasons as method claim 1 because, other than limitation 15.3.3 and 15.5, the claims are substantively identical as shown in the table above. *See* Challenge 1, Claim 15, above.

j. Claim 15.3.3: at least one Port Address Translation (PAT) is performed on said transmission;

235. Kottilingal discloses or suggests this claim element.

236. For similar reasons discussed for limitation 1.3.3 above, Figure 5 of Kottilingal illustrates that it contemplates network switching in the context of a PAT-enabled network:

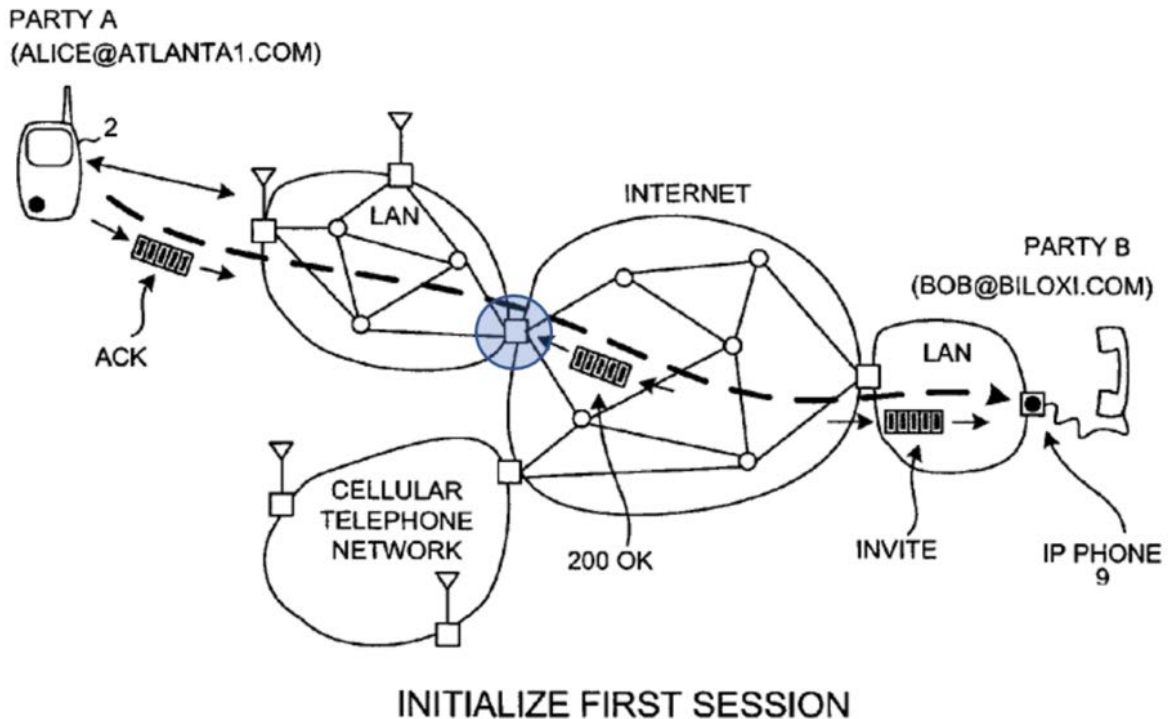
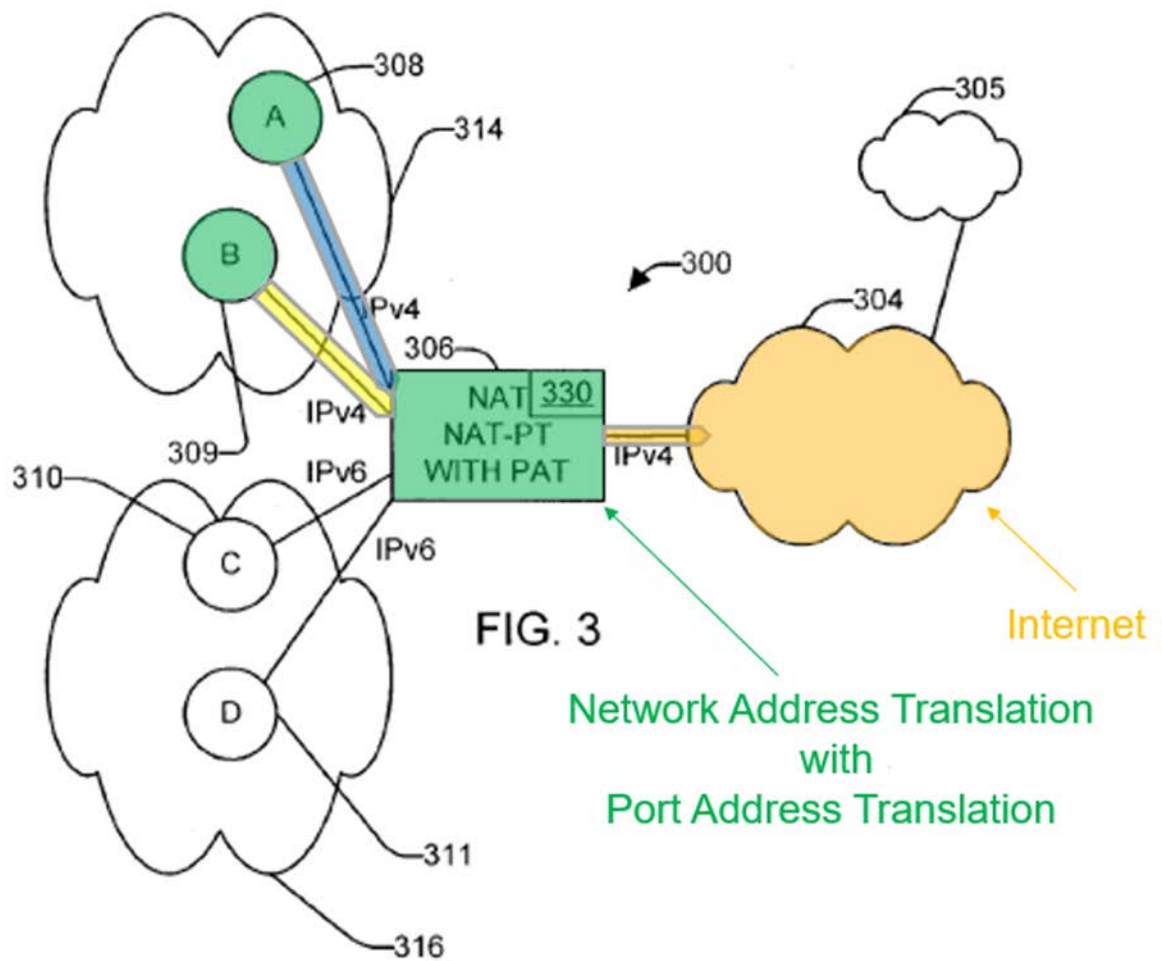


FIG. 5

EX-1006, Fig. 5 (annotated).

237. As seen above, Kottilingal Figure 5 discloses network switching in the context of a multi-node LAN with a single connection (circled in blue) to the internet.

238. A POSITA would have recognized such a network configuration practices PAT to enable the various nodes of the LAN to receive data transmissions from the rest of the internet via a single public-facing IP address as was known in the prior art, also showing a singular connection (green) to connect many local users to the Internet (orange):



EX-1013, Fig. 3 (annotated).

239. Thus, a POSITA would have recognized Kottilingal's network address translation includes port address translation because Kottilingal's system would have replicated the same NAT-with-PAT structure as that known in the prior art to achieve the same result in the same way: improved private network connection to the public internet. *EX-1013*, Fig. 3, ¶¶ 0002-0004, 0019.

240. Furthermore, a POSITA would have recognized Kottilingal's single connection requires IP address and port address processing as a well-known

architecture and technique commonly employed in prior art IPv4 systems that “have more devices than available Internet IPv4 addresses allocated” because including port addresses allows the system to multiplex a single IP address across, e.g., 65,536 devices, thereby allowing many more private network devices to connect to a public network. *EX-1013*, ¶¶ 0002-0004, 0019. Thus, Kottilingal discloses 15.3.3.

k. Claim 15.5: said transmission contains data used in the control of the audio or video transmission;

241. Kottilingal discloses or suggests 15.5.

242. As explained in Ground 1 for this claim element, the '554 Patent discloses moving RTP streams through a series of SIP INVITEs managed by a SIP server. *EX-1001*, Fig. 4, 4:37-5:36. Kottilingal similarly moves RTP streams using a SIP SPAWN message and multiple SIP INVITE requests. *EX-1006*, Figure 7, 8:18-9:32; *see also* limitation 1.2 above.

243. Kottilingal similarly moves RTP streams using a SIP SPAWN message and multiple SIP INVITE requests. *EX-1006*, Figure 7, 8:18-9:32; *see also* limitation 1.2 above.

6. Detailed Application to Independent Claims 8, 22

244. Kottilingal alone and in combination with Politis discloses or suggests system claims 8 and 22 with components executing steps that are substantially identical, other than 8.1-8.4 and 22.1-22.4, to the method steps recited in claims 1 and 15, as shown in the table above. *See* Ground 1, claims 8, 22.

a. Claim limitations 8.1-4/22.1-4: “a transmitting device”; “a receiving device”; “a first network device”; and “a second network device”

245. Kottilingal discloses or suggests 8.1-8.4/22.1-22.4.

246. For example, Kottilingal discloses “a mobile communication device (for example, a cellular telephone)” (“a transmitting device”). *EX-1006* 1:53-54.

247. As another example, Kottilingal also discloses “a target communication device (for example, to another IP telephone that is coupled to the Internet at a remote location)” (“a receiving device”). *EX-1006* 1:64-66.

248. As an example of a plurality, Kottilingal discloses a SIP proxy 11 that “relays SIP requests and SIP responses from/to other SIP proxies and SIP session end points” (“a first network device”). *EX-1006*, 6:4-6.

249. And as another example, Kottilingal discloses a SIP proxy 7 that also “relays SIP requests and SIP responses from/to other SIP proxies and SIP session end points” (“a second network device”). *EX-1006*, 5:45-46.

7. Detailed Application of Claims 2, 9, 16, 23

- a. Claim 2 The method of claim 1 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of a stream quality event.**
- b. Claim 9: The system of claim 8 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of a stream quality event.**

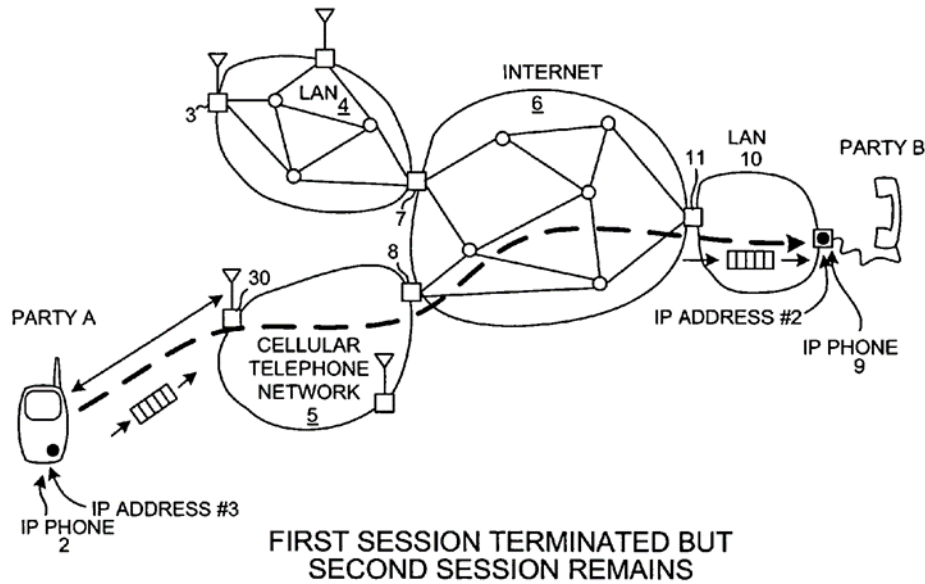
- c. Claim 16: The method of claim 15 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of a stream quality event.**
- d. Claim 23: The system of claim 22 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of a stream quality event.**

250. Kottilingal alone and in combination with Politis discloses or suggests independent claims 1, 8, 15, 22.

251. Additionally, Kottilingal discloses or suggests claims 2, 9, 16, and 23's additional limitations.

252. Kottilingal discloses that the switch from the first network path occurs as a result of a stream quality event. *EX-1006* 8:35-41.

253. As Party A's IP phone 2 moves away from access point 3, the detected signal strength of the 802.11 wireless link between IP phone 2 and access point 3 degrades until a threshold is reached. *EX-1006* 8:35-41. Once the threshold is reached, IP Phone 2 determines it should initialize a second SIP session using its long range cellular telephone transceiver. *EX-1006* 8:35-41.



EX-1006, Fig. 17.

8. Detailed Application of Claims 3, 10, 17, 24

- a. **Claim 3:** The method of claim 1 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of stream load balancing.
- b. **Claim 10:** The method of claim 1 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of stream load balancing.
- c. **Claim 17:** The method of claim 15 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of stream load balancing.
- d. **Claim 24:** The system of claim 22 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of stream load balancing.

254. Kottilingal alone and in combination with Politis discloses or suggests independent claims 1, 8, 15, 22.

255. Additionally, Kottilingal discloses or suggests claims 3, 10, 17, and 24's additional limitations.

256. Kottilingal discloses switching from a first session on a first network to another session on another network when a VoIP/VIP call falls to an unacceptable/undesirable quality (decreasing quality of service). *EX-1006*, 3:19-31. Further, Kottilingal discloses that “[a]s long as the two sessions remain active, the flow of data payload VoIP packets can be switched from one session to the other and back as desired.” *EX-1006*, 3:4-6. Specifically, Kottilingal “change[s] the ratio of VoIP/VIP packets transmitted” between a first and second session to “share the communication load” and “achieve to quality of service characteristics not available using either session by itself.” *EX-1006*, 13:58-14:18.

9. Detailed Application of Claims 4, 11, 18, 25

- a. Claim 4: The method of claim 1 wherein the switch from the first network path to the one of a plurality of alternative network paths occurs as a result of an administrator move.**
- b. Claim 11: The system of claim 8 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of an administrator move.**
- c. Claim 18: The method of claim 15 wherein the switch from the first network path to the one of a plurality of**

alternative network paths occurs as a result of an administrator move.

d. Claim 25: The system of claim 22 wherein said switching from the first network path to the one of a plurality of alternative network paths occurs as a result of an administrator move.

257. Kottilingal alone and in combination with Politis discloses or suggests independent claims 1, 8, 15, 22.

258. Additionally, Kottilingal discloses or suggests claims 4, 11, 18, and 25's additional limitations.

259. The '554 patent describes switching networks to “achieve...desired load balancing results” and because “[t]he administrator may want to move specific RTP streams to a different WAN link.” *EX-1001*, table at column 4, items 120 (“Stream load balancing”), 130 (“Admin move”). Kottilingal’s system switches between interfaces—i.e., networks—depending on a variety of reasons: “[t]he decision of how many air interfaces to use and in what proportion may be a simple or involved function of...variables” including “quality of service and cost information.” *EX-1006*, 15:16-27. As described in claims 3, 10, 17, and 24, one such variable may be to share a communication load between two sessions. And Kottilingal teaches that different sessions carry different costs (e.g., “Party A’s cellular telephone provider charges to carry a voice conversation on its cellular

telephone network” but a “less expensive wireless LAN air interface” can do the same). *EX-1006*, 2:19-24.

260. Therefore, a POSITA would have therefore recognized that an administrator may switch networks to save cost by load balancing. Specifically, because a “cellular telephone provider charges to carry a voice conversation on its cellular telephone network,” a POSITA would have understood that provider as the type of administrator the ’554 patent discloses because the provider has reason to switch users when call quality degrades to meet customer expectations for a service the provider offers, and can do so using Kottilingal’s load balancing mechanisms to avoid dissatisfied customers that can otherwise achieve the same result using a “less expensive wireless LAN air interface.” *EX-1006*, 2:19-24, *see also* 3:4-6; (“as long as the two sessions remain active, the flow of data payload VoIP packets can be switched from one session to the other and back as desired”).

10. Detailed Application of Claims 5, 12, 19, 26

- a. Claim 5: The method of claim 1 wherein a SIP server associated with the one of a plurality alternative network paths may authenticate the transmission before it is switched.**
- b. Claim 12: The system of claim 8 wherein the SIP server associated with the one of a plurality alternative network paths may authenticate the transmission before it is switched.**
- c. Claim 19: The method of claim 15 wherein a SIP server associated with the one of a plurality alternative**

network paths may authenticate the transmission before it is switched.

d. Claim 26: The system of claim 22 wherein a SIP server associated with the one of a plurality alternative network paths may authenticate the transmission before it is switched.

261. Kottilingal alone and in combination with Politis discloses or suggests independent claims 1, 8, 15, 22.

262. Additionally, Kottilingal discloses or suggests claims 5, 12, 19, and 26's additional limitations.

263. Kottilingal discloses that “[t]he SIP protocol processing layer of SIP proxy 7 examines the addressee information . . . then uses a set of policies to determine where to send the SIP INVITE request . . . The SIP protocol processing layer within SIP proxy 7 then resolves the identified SIP proxy #2 to determine the Internet side IP address of SIP proxy #2.” *EX-1006*, 7:19-29.

264. Furthermore, a POSITA would have recognized that a SIP-supported data transmission is authenticated by a SIP server in the network path.

265. For example, Salsano's seamless VoIP call handover solution includes a mobile terminal with SIP client that “relies” on the ability “to authenticate and get an IP address on the different visited networks.” *EX-1011*, pp. 2, 8.

266. Additionally, as published in 1999, the IETF multimedia data and control architecture incorporated a SIP protocol (EX-1015; “RFC 2543”) disclosing

that SIP servers may issue authentication requests and responses. *EX-1015*, pp. 113-14.

267. Thus, a POSITA would have understood that Kottilingal's disclosure of a SIP-supported data transmission included the situation where a SIP server authenticates the transmission before switching.

11. Detailed Application of Claim 6, 13, 20, 27

- a. Claim 6: The method of claim 1 wherein the source device is a mobile device.**
- b. Claim 13: The system of claim 8 wherein the transmitting device is a mobile device.**
- c. Claim 20: The method of claim 15 wherein the source device is a mobile device.**
- d. Claim 27: The system of claim 22 wherein the transmitting device is a mobile device.**

268. Kottilingal alone and in combination with Politis discloses or suggests independent claims 1, 8, 15, 22.

269. Additionally, Kottilingal discloses or suggests claims 6, 13, 20, and 27's additional limitations.

270. Kottilingal discloses a source device, which is a mobile device, using its first interface to transmit VoIP/VIP packets. *EX-1006*, Abstract.

12. Detailed Application of Claims 7, 14, 21, 28

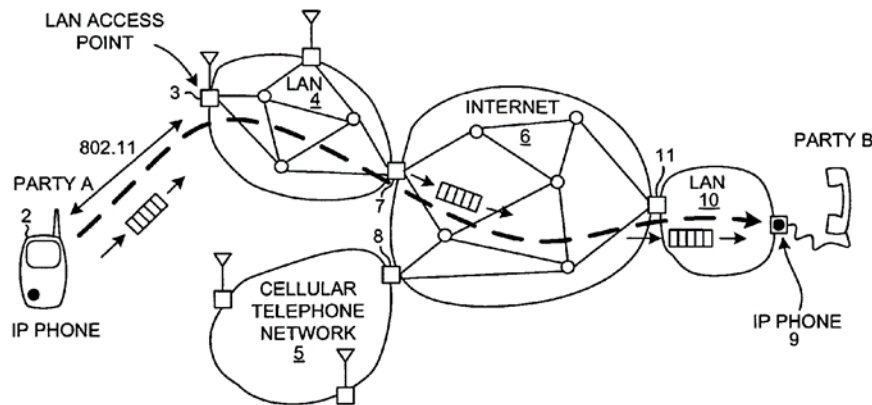
- a. Claim 7: The method of claim 6 wherein one or more of said plurality of alternative network paths become available to the mobile device during roaming.**

- b. **Claim 14:** The system of claim 13 wherein one or more of said plurality of alternative network paths become available to the mobile device during roaming.
- c. **Claim 21:** The method of claim 20 wherein one or more of said plurality of alternative network paths become available to the mobile device during roaming.
- d. **Claim 28:** The system of claim 27 wherein one or more of said plurality of alternative network paths become available to the mobile device during roaming.

271. Kottilingal alone and in combination with Politis discloses or suggests independent claims 6, 13, 20, and 27.

272. Additionally, Kottilingal discloses or suggests claims 7, 14, 21, and 28's additional limitations.

273. Kottilingal discloses that a plurality of alternative networks paths become available to the mobile device:



FIRST SESSION ACTIVE -
PARTY A MOVES AWAY FROM LAN ACCESS POINT

FIG. 6

EX-1006, Figure 6.

274. Kottilingal discloses that as a source, Party A's Phone moves farther from LAN access point 3, the detected signal strength of the 802.11 wireless link between Party A's IP phone and LAN access point 3 degrades until a threshold is reached. Once the threshold is reached, Party A's IP phone determines that it should initialize a second SIP session. *EX-1006*, 8:35-41.

CONCLUSION AND DECLARATION

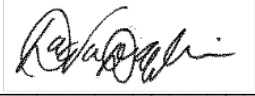
The findings and opinions set forth in this declaration are based on my research and analysis to date. I may continue my examinations in view of additional documents or other factual evidence over the course of this proceeding that may necessitate supplementing and/or refining my opinions. I reserve the right to add to, alter, or delete my opinions and my Declaration upon discovery of additional information. I reserve the right to make such changes as necessary.

In signing this declaration, I understand that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

I declare that all statements made herein on my own knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

[SIGNATURE ON FOLLOWING PAGE]

Dated: Oct 8, 2024

By: 

Dr. Daniel van der Weide