

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.
Petitioner

v.

DYNAMIC MESH NETWORKS, INC.
D/B/A MESHDYNAMICS
Patent Owner

Case No. IPR2026-00127
U.S. Patent No. 8,477,762

**DECLARATION OF CHRISTOPHER HANSEN, PH.D.,
UNDER 37 C.F.R. § 1.68 IN SUPPORT OF PETITION
FOR *INTER PARTES* REVIEW**

TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION	1
II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE	2
III. LEGAL STANDARD	6
IV. LEVEL OF ORDINARY SKILL IN THE ART	8
V. OVERVIEW OF THE '762 PATENT	9
A. Prosecution History	11
B. Effective Priority Date	13
VI. CLAIM CONSTRUCTION	13
A. “means of connecting the isolated cluster to an external network”(Claim 7).....	14
B. “VoIP optimized services” (Claim 9)	14
C. “communications means” (Claim 15)	15
VII. SPECIFIC GROUNDS FOR CHALLENGE	16
A. Ground I: Saridakis In View Of Wu Renders Obvious Claims 1-4, 8, And 9.....	16
1. Saridakis (EX1003).....	16
2. Wu (EX1004)	22
3. Saridakis In View Of Wu (“Saridakis-Wu Combination”)	24
4. Claim 1	33
5. Claim 2	55
6. Claim 3	60
7. Claim 4	63

Declaration of Christopher Hansen, Ph.D.
Inter Partes Review of U.S. Patent No. 8,477,762
Claims 1–10, 12–21

8.	Claim 8	65
9.	Claim 9	66
B.	Ground II: Saridakis In View Of Wu And Bauer Renders Obvious Claims 1-4, 7-10, And 12-13, 15-17.....	66
1.	Bauer (EX1005)	66
2.	Saridakis-Wu, Further In View Of Bauer (“Saridakis- Wu-Bauer Combination”).....	68
3.	Claims 1-4, 8, And 9	75
4.	Claim 7	77
5.	Claim 10	79
6.	Claim 12	90
7.	Claim 13	91
8.	Claim 15	91
9.	Claim 16	97
10.	Claim 17	97
C.	Ground III: Saridakis In View Of Wu, Bauer, And Kelly Renders Obvious Claims 5, 6, 9, 14, And 18-21.	98
1.	Saridakis-Wu-Bauer, Further In View Of Kelly (“Saridakis-Wu-Bauer-Kelly Combination”)	98
2.	Claim 5	109
3.	Claim 6	110
4.	Claim 9	111
5.	Claim 14	112
6.	Claim 18	112

7.	Claim 19.....	113
8.	Claim 20.....	113
9.	Claim 21	113
VIII.	CONCLUSION.....	114
IX.	AVAILABILITY FOR CROSS-EXAMINATION	114
X.	Right To Supplement.....	114
XI.	JURAT	114

I, Christopher Hansen, Ph.D., do hereby declare as follows:

I. INTRODUCTION

1. I am making this declaration at the request of Cisco Systems, Inc. in the matter of the *Inter Partes* Review of U.S. Patent No. 8,477,762 (the “’762 Patent”) to DaCosta and Dayanandan.

2. I am being compensated for my work in this matter at my standard hourly rate of \$500/hour. I am also being reimbursed for reasonable and customary expenses associated with my work and testimony in this proceeding. My compensation is not contingent on the outcome of this matter or the specifics of my testimony.

3. I have been asked to provide my opinions regarding whether the subject matter of claims 1-10, 12-21 (“the Challenged Claims”) of the ’762 Patent would have been obvious to a person having ordinary skill in the art (“POSITA”) at the time of the alleged invention, in light of the prior art. It is my opinion that the Challenged Claims would have been obvious to a POSITA.

4. In the preparation of this declaration, I have studied:

- The ’762 Patent, EX1001;
- U.S. Patent Publication No. 2005/0138119 to *Saridakis* (“Saridakis”), EX1003;
- U.S. Patent Publication No. 2008/0098121 to *Wu* (“Wu”), EX1004;

- U.S. Patent Publication No. 2007/0140239 to *Bauer* et al. (“Bauer”), EX1005;
- U.S. Patent Publication No. 2006/0126611 to *Kelly* et al. (“Kelly”), EX1006;
- The File History of U.S. Patent No. 8,477,762, EX1007;
- The File History of U.S. Patent No. 7,583,648, EX1008;
- U.S. Patent Publication No. 2008/0198873 to *Huang* et al. (“Huang”), EX1009;
- U.S. Patent No. 7,120,136 to *Upp* et al. (“Upp”), EX1010;
- U.S. Patent Publication No. 2011/0199953 to *Seok* (“Seok”), EX1011;
- U.S. Patent No. 7,454,171 to *Palin* et al. (“Palin”), EX1012;
- U.S. Patent Publication No. 2006/0143304 to *Bodlaender* et al. (“Bodlaender”), EX1013;
- All other publications and materials referenced herein.

II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

5. My complete qualifications and professional experience are described in my *Curriculum Vitae*, a copy of which is provided in Exhibit 1015 of this IPR proceeding. The following is a brief summary of my relevant qualifications and professional experience.

6. I am currently an independent technical consultant based in Los Altos, California. I work at Covariant Corporation, which is a consulting company that I own. My primary areas of expertise are in the fields of wireless networking, wireless standards development, and signal processing for wireless communications. I received a Bachelor of Science (B.S.) degree in Electrical Engineering from Rensselaer Polytechnic Institute in 1987, a Master of Science (M.S.) in Electrical Engineering from the University of Massachusetts, Amherst in 1989, and a Ph.D. in Electrical Engineering from the University of California, Los Angeles (“UCLA”) in 1997.

7. I was employed by Broadcom Corporation (“Broadcom”) in Sunnyvale, California from January 2000 to May 2012. From January 2000 to February 2011, I held several titles, including Sr. Staff Scientist, Engineering Manager, and Sr. Principal Scientist. My duties in these roles included, among other things, Institute of Electrical and Electronics Engineers (“IEEE”) 802.11 (i.e., Wi-Fi) physical layer (“PHY”) application-specific integrated circuit (“ASIC”) development. I also participated in Bluetooth standard development during this timeframe. From March 2011 to May 2012, I served as an Associate Technical Director and my duties included, among other things, performing wireless communications technology research and development (“R&D”) as well as standards and intellectual property development.

8. While employed at Broadcom, I regularly attended meetings for the IEEE 802.11 Working Group. I submitted technical contributions to Task Group E (“TGe”), Task Group H (“TGh”), and Task Group N (“TGn”).

9. I served on the Board of Directors of the Wireless Gigabit Alliance (“WiGig Alliance”) from March 2010 to March 2012. Specifically, I served as the Board’s Secretary. The WiGig Alliance was a trade association focused on the development and promotion of high-speed wireless communications technology. The WiGig Alliance collaborated for multiple years with the Wi-Fi Alliance (an industry organization that owns the “Wi-Fi” brand and certifies devices for interoperability and security), and the two organizations eventually merged in 2013.

10. I served as the Vice Chair of the IEEE 802.11ad Task Group (“TGad”) from May 2011 to March 2012. TGad developed an amendment to the IEEE 802.11 wireless networking standard focused on directional multi-gigabit (i.e., DMG) technology. In this role, I assisted the task group Chair, Eldad Perahia, and Technical Editor, Carlos Cordeiro, with the operation of the task group meetings and developing the 802.11ad draft standards amendment documents.

11. I was employed as a Senior Wireless System Architect by Apple Inc. (“Apple”) in Cupertino, California from June 2012 to July 2013. During my tenure at Apple, I was responsible for, among other things, performing systems engineering for iPhone Operating System (“iOS”) Wi-Fi functionality. During this time, I

participated in multiple IEEE 802.11 groups, including Task Group AF (“TGaf”) and the HEW Study Group, on behalf of Apple. I also regularly accessed and reviewed documents submitted by members of the IEEE 802.11 Working Group, including through the IEEE Mentor server.

12. Since August 2013, I have been employed as President of Covariant Corporation in Los Altos, California. In this role, I provide technical consulting services related to wireless communications, IEEE 802.11/Wi-Fi, signal processing technology, integrated circuits technology, and intellectual property. During the time I have been employed by Covariant, I have submitted multiple technical contributions to Task Group AY (“TGay”) (responsible for 802.11ay) which led to new mmWave features, Task Group M (“TGM”) (responsible for the 802.11-2020 standard), and the Integrated mmWave Study Group (“IMW SG”) (the precursor for TGBq). I received awards from the IEEE for my contributions to TGAY and TGM.

13. I served as a member of the Board of Directors for the Professional and Technical Consultants Association (“PATCA”) in Silicon Valley, California from March 2017 to March 2024. I was President of the Board of Directors from June 2019 to March 2024. PATCA is a non-profit corporation that supports technical consultants in Silicon Valley and elsewhere.

14. Since June 2020, I have been employed as a Guest Instructor for the UCLA Department of Electrical and Computer Engineering. I teach classes on

wireless communications for upper-level undergraduate students and graduate students in electrical engineering. In these classes, I use examples from the IEEE 802.11 standards.

15. I am a named inventor on over 100 issued United States patents related to wireless communications, signal processing, and integrated circuits.

16. I have been a member of the Institute of Electrical and Electronics Engineers (“IEEE”) since 1983 (42 years) and am currently a Senior member. I have participated in the activities of the IEEE Standards Association (“IEEE-SA”) continuously since 2000. I have participated in the IEEE 802.11 Wireless Local Area Networks (“WLAN”) Working Group as a voting member since 2000.

17. I have been familiar with Voice-over-Internet-Protocol (VoIP) and Session Initiation Protocol (SIP) technologies since 2001 as part of my work on the IEEE 802.11e-2005 amendment to the 802.11 standard. IEEE 802.11e provided standardized methods for wireless local area networks to better support VoIP while also carrying normal internet traffic. These improvements made it possible for telephone calls to be carried over Wi-Fi networks.

III. LEGAL STANDARD

18. I am not an attorney. In preparing and expressing my opinions and considering the subject matter of the ’762 Patent, I am relying on certain basic legal principles that Cisco’s counsel has explained to me.

19. I understand that prior art to the '762 Patent includes patents and printed publications in the relevant art that predate the claimed priority date of the '762 Patent. For purposes of this Declaration, I am applying January 12, 2009, as the priority date of the '762 Patent.

20. I have been informed by Cisco's counsel that for a claim in a patent to be entitled to the filing date of an earlier-filed application as a continuation-in-part, the claim must be supported by the earlier-filed application's specification.

21. I have been informed by Cisco's counsel that a claimed invention is unpatentable under 35 U.S.C. § 103 if the differences between the claimed invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a POSITA. I have also been informed by Cisco's counsel that the obviousness analysis considers factual inquiries, including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the claimed subject matter.

22. I have been further informed by Cisco's counsel that there are several recognized rationales for combining references or modifying a reference to show obviousness. These rationales include: (a) combining prior art elements according to known methods to yield predictable results; (b) simple substitution of one known element for another to obtain predictable results; (c) use of a known technique to improve a similar device (method, or product) in the same way; (d) applying a known

technique to a known device (method, or product) ready for improvement to yield predictable results; (e) choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and (f) some teaching, suggestion, or motivation in the prior art that would have led a POSITA to modify the prior art or to combine prior art teachings to arrive at the claimed invention.

23. I understand that one of ordinary skill in the art has ordinary creativity and is not an automaton.

24. I understand that in considering obviousness, it is important not to determine obviousness using the benefit of hindsight derived from the patent being considered.

IV. LEVEL OF ORDINARY SKILL IN THE ART

25. I understand that, in the context of an invalidity analysis, a person having ordinary skill in the art (“POSITA”) is a hypothetical person who looks to prior art at the time of the invention. I further understand that the factors that may be considered in determining the level of ordinary skill in the art include: (1) the problems encountered in the art; (2) the prior art solutions to the problems encountered in the art; (3) the rapidity of innovation; (4) the sophistication of the technology; and (5) the education level of active workers in the field. I understand that these factors need not all be taken into account for the analysis and that one or more of these factors may control.

26. A POSITA for the '762 Patent, as of the priority date of January 12, 2009, would have had: (1) a bachelor's degree in computer science, computer engineering, electrical engineering, or equivalent training, (2) approximately two years of experience working in the field of communications network, and (3) knowledge of Voice over Internet Protocol (VoIP) standards such as RFC 3261 (Session Initiation Protocol (SIP)).

V. OVERVIEW OF THE '762 PATENT

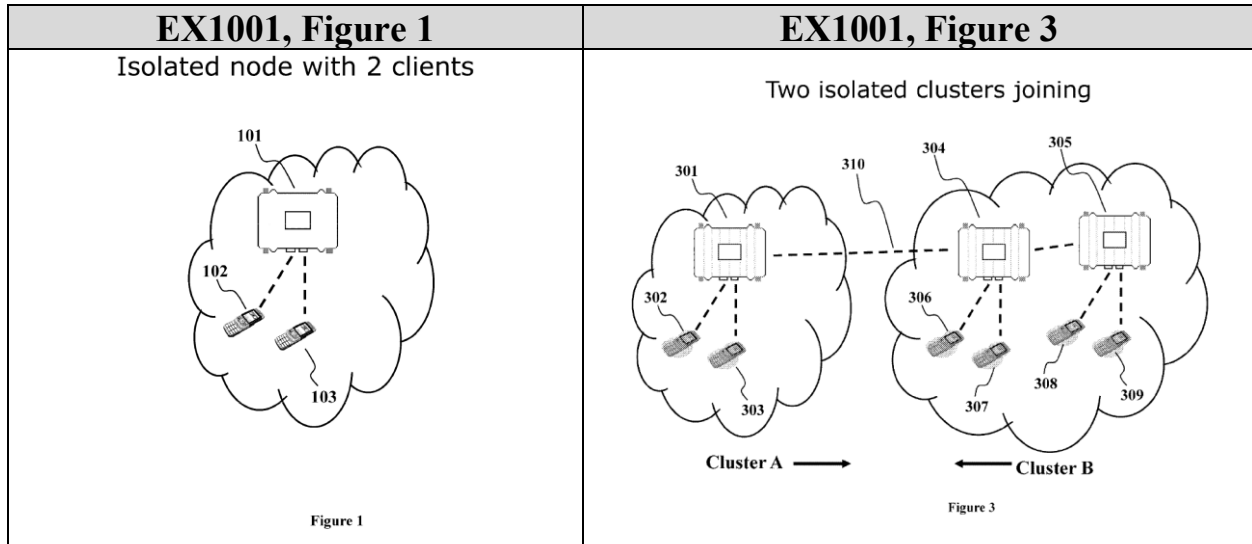
27. The '762 Patent concerns a “data network that supports VoIP [(Voice over Internet Protocol)] communications.” EX1001, 1:19-26, 1:36-40. According to the '762 Patent, conventional VoIP systems rely on a centralized SIP server that maintains a “central registry which acts like a ‘phone book’ for the VoIP devices.” EX1001, 1:36-40, 1:56-57. When that server connection is lost—due to, for example, a failure in the network backhaul—VoIP communication between clients cannot continue, even if local connectivity among the client nodes remains intact. EX1001, 1:60-66. To overcome this limitation, the '762 Patent proposes employing distributed Session Initiation Protocol (SIP) registries in each VoIP node within a cluster. Specifically, each VoIP node within a cluster maintains its own *local* SIP registry and functions as an “autonomous SIP server.” EX1001, 5:65-6:21. By exchanging SIP registration information (such as IP and MAC addresses) to its connected clients and peer VoIP nodes, each node is capable of forming its own

“distributed SIP registry” across the cluster without reliance on any central server.

EX1001, Abstract, 3:3-8, 4:19-37, 8:43-52. Each VoIP node’s “distributed SIP registry” is then updated with new SIP registration information exchanged by other VoIP nodes in the cluster. EX1001, 11:65-12:4. With SIP registration information stored in the *local* SIP registry in each VoIP server, the VoIP clients connected to VoIP nodes in the cluster can establish SIP sessions among each other, even when there is no connection to an external SIP server. EX1001, Abstract, 6:3-5.

28. As shown in Figure 1 of the ’762 Patent, a VoIP node 101 is connected to two clients 102, 103. EX1001, 7:42-47. “Once a second client 103 is available, a call originating from client 102 will contact the local SIP server on the single network node 101, and since the SIP registry of node 101 contains the IP address and the hardware address for clients 102 and 103, a VoIP conversation between clients 102 and 103 is possible” without relying on the external SIP server. EX1001, 7:62-67. As further illustrated in Figure 3 of the ’762 Patent, VoIP nodes form clusters A and B, in which VoIP clients connected to VoIP nodes in each cluster can maintain VoIP sessions with each other across the clusters using locally stored SIP information without relying on the external SIP server. EX1001, 8:64-9:47. “Cluster A node 301 . . . establishes a new network connection 310 between Cluster A node 301 and Cluster B node 304” and facilitates “communications between any of the clients 302, 303, 306, 307, 308, and 309 present in the system” by updating

the “local SIP registries of Cluster A and Cluster B nodes are updated to reflect the information of all client devices in contact with nodes comprising Cluster A and Cluster B.” EX1001, 9:20-30.



A. Prosecution History

29. The '762 Patent was examined by the patent office as U.S. Patent Application No. 12/352,457, which was filed January 12, 2009, as a continuation-in-part of U.S. Patent Application No. 11/266,884 (“’884 Application”), which was filed November 4, 2005, and issued as U.S. Patent No. 7,583,648. EX1007, 154-155; EX1008.

30. The Examiner allowed the '762 Patent’s claims after a single round of substantive office action. EX1007, 92. Specifically, on May 2, 2012, the Examiner rejected originally filed claims 14 and 15 as anticipated by U.S. Patent Publication

No. 2008/0320148 (“Capuozzo”), and claims 16-22 as dependent from claims 14 and 15, while allowing claims 1-13. EX1007, 62-63, 37. On June 12, 2012, the ’762 Patent was allowed after the Applicant cancelled claim 14, amended claim 16 to include all limitations of claim 14, and amended claim 15 to depend from claim 16. EX1007, 82-88, 92.

31. The Applicant subsequently requested for continued examination of its amendment to the specification, which inserted a priority claim to the ’884 Application, on September 6, 2012. EX1007, 106-107. In a November 2, 2012 office action, the Examiner rejected the Applicant’s request, explaining that the application “is not entitled to benefit of the earlier filing date” because the ’884 Application does not contain disclosure for the ’762 Patent’s claimed invention, including for example, “a self-forming VoIP connection or isolated cluster capability for exchanging SIP information between nodes in each isolated cluster using a local SIP registry or server.” EX1007, 132. In its January 25, 2013 response, the Applicant stated: “Whether the claims of the present application are entitled to the benefit of the filing date of the parent application is irrelevant to the determination of whether the present application properly claims status as a continuation-in-part of the parent application.” EX1007, 145. The ’762 Patent with the priority claim was then issued. EX1007, 154-155.

B. Effective Priority Date

32. For purposes of this Declaration, I am applying January 12, 2009 as the priority date of the '762 Patent. During prosecution of the '762 Patent, the Examiner stated that the application “is not entitled to benefit of the earlier filing date” of the '884 Application because while the '762 Patent is directed to “a self-forming VoIP connection or isolated cluster capability for exchanging SIP information between nodes in each isolated cluster using a local SIP registry or server,” “none of these features and design is disclosed in” the '884 Application. Based on my review of the '884 Application, I agree with the Examiner that the '884 Application does not contain any written description support for any of the features required by the independent claims of the '762 Patent, including “SIP information,” “local SIP registry,” or “SIP registry information.”

VI. CLAIM CONSTRUCTION

33. It is my understanding that in order to properly evaluate the '762 Patent, the terms of the claims must first be interpreted.

34. It is my understanding that for the purposes of *inter partes* review, claims are to be construed under the *Phillips* standard, where claim terms are given their ordinary and customary meaning as would have been understood by a POSITA in light of the specification and prosecution history, unless the inventor has set forth a special meaning for a term.

35. I have also been informed that claim terms only need to be construed to the extent necessary to resolve the obviousness inquiry.

36. I have reviewed the entirety of the '762 Patent, as well as its prosecution history and its parent's prosecution history. EX1007; EX1008.

37. It is my opinion that for purposes of applying the prior art presented herein to evaluate the patentability of the Challenged Claims, no terms require formal construction aside from the term identified below.

A. “means of connecting the isolated cluster to an external network” (Claim 7)

38. I have been informed that a term claiming a “means” for performing a function is interpreted under 35 U.S.C. 112 ¶6.

39. I have identified that the claimed function of “a means of connecting the isolated cluster to an external network” is “connecting the isolated cluster to an external network.”

40. The structure for this claimed function disclosed in the '762 Patent is a “software and/or hardware element” that perform the identified function. *See* EX1001, 3:33-47.

B. “VoIP optimized services” (Claim 9)

41. In this Declaration, I have interpreted the term “VoIP optimized services” to include a SIP Server Service or DHCP Server service based on the

prosecution history of the '762 Patent. In particular, during prosecution, the Applicant added two claims, including the issued claim 9 (EX1007, 143) and represented that the newly added claims have written description support in the specification of the application for the '762 Patent:

[T]he limitation introduced therein provides that the mesh nodes must include VoIP optimized services within the nodes. ***Support for adding VoIP optimized services to a mesh node*** is found in the instant application ¶37 which provides for the addition of a ***SIP Server Service “within the network node 101.”*** In ¶41, the instant application further discusses the addition of a ***DHCP Server service***: “the node may also incorporate DHCP server capability . . .”

EX1007, 145-146 (underlined emphasis in original; bold-italics emphasis added).

42. I have interpreted the Applicant’s explanation to mean that “VoIP optimized services” includes “a SIP Server Service” or “a DHCP Server service.” EX1007, 145-146. Thus, although I cannot clearly define the full extent of this term “VoIP optimized services,” I have interpreted it to include a SIP Server Service or DHCP Server service.

C. “communications means” (Claim 15)

43. In this Declaration, I have interpreted the term “communications means” to have its plain and ordinary meaning—a component for communication.

44. I was informed and understand that the use of the word “means” in “communications means” may create a presumption that it should be interpreted as

a means-plus-function limitation under 35 U.S.C. 112 ¶6. But I was also informed and understand that the presumption is not conclusive. For example, where a claim uses the word “means,” but specifies no corresponding function for the “means,” it does not implicate 35 U.S.C. § 112 ¶6.

45. Claim 15 recites “the first isolated node further comprises *communications means* with other isolated no[d]es.” EX1001, Claim 15.

46. Nothing in claim 15 requires the “communications means” to perform any specific function; rather, it merely specifies a structural component that facilitates communication with other isolated nodes.

47. Therefore, I have interpreted the term “communications means” under its plain and ordinary meaning: a component for communication.

VII. SPECIFIC GROUNDS FOR CHALLENGE

A. Ground I: Saridakis In View Of Wu Renders Obvious Claims 1-4, 8, And 9.

1. Saridakis (EX1003)

48. Saridakis discloses “an ad hoc, peer-to-peer network” (e.g., Bluetooth or WLAN networks) that “operate[s] without relying on any network infrastructure,” such as SIP registrar or DNS, in which “the use of SIP” is enabled using distributed user location services. EX1003, [0001], [0004]. Saridakis explains that conventional network architecture relies on “centralized entity” such as “the Domain

Name Server and the SIP Registrar” residing on “a stable infrastructure (the cellular network)” to “provide information about the presence of machines, services or content in a network.” EX1003, [0004], [0074]. Specifically, those centralized entities—or “directory services”¹—map user a user address (e.g., SIP or e-mail addresses) to a “network address where the specified user can be contacted.” EX1003, [0004], [0026]. As Saridakis explains, such reliance on centralized entities to provide directory services is “unsuitable for ad hoc, peer-to-peer networks,” which are “created with the spontaneous join or leave of their constituent nodes and . . . operate without relying on any network infrastructure.” EX1003, [0002], [0004], [0074] (“This deployment of SIP entities is not suitable for SIP usage in ad hoc, peer-to-peer networks because it places SIP Registrars and Proxies on a stable infrastructure (the cellular network).”).

49. Saridakis introduces a “distributed user-location service (DULS) fit for ad hoc, peer-to-peer networks” so that those ad hoc, peer-to-peer networks are not dependent on services provided by a centralized entity. EX1003, [0014]. “The DULS is based on *local repositories* in terminals present in an ad hoc, peer-to-peer network, which store mappings of user-addresses to network addresses of the terminals present in the network.” EX1003, [0014]. By storing “mappings of user-

¹ Saridakis explains that those directory services are akin to a user-location service. EX1003, [0004].

addresses to network addresses of the terminals present in the network”—or “mapping lists”—in the local repositories in the terminals—or peers—in the ad hoc network, Saridakis facilitates “the joining and leaving of terminals in the network” and allows user-location to be located “without the need to locate a central facility for user-location.” EX1003, [0015].

50. Saridakis teaches enabling SIP services in the ad hoc network, and doing so by “deploying the entities specified in the SIP protocol among peers in an ad hoc network and combining the SIP Registrar with the DULS.” EX1003, [0018]. Saridakis’ “peers (a peer is an instance of the DULS running on a mobile terminal) in an ad hoc network are each arranged with a SIP User Agent (UA), a local SIP Proxy, a local SIP Registrar and an instance of the DULS.” EX1003, [0026]. As shown in Figure 4 of Saridakis (reproduced below), each of the peers in the ad hoc network (shown in dotted green line)—“mobile phones 210, 220, and 230”—include “a SIP UA (211, 221, and 231 respectively), a local SIP Proxy (212, 222, and 232 respectively), a local SIP Registrar (213, 223, and 233 respectively) and a DULS instance (214, 224, and 234 respectively).” EX1003, [0078]. Via a SIP proxy server 250, the ad hoc network can communicate with external entities and devices, such as SIP registrar 260 or mobile phone 240, that reside on the external cellular network 200. EX1003, [0078].

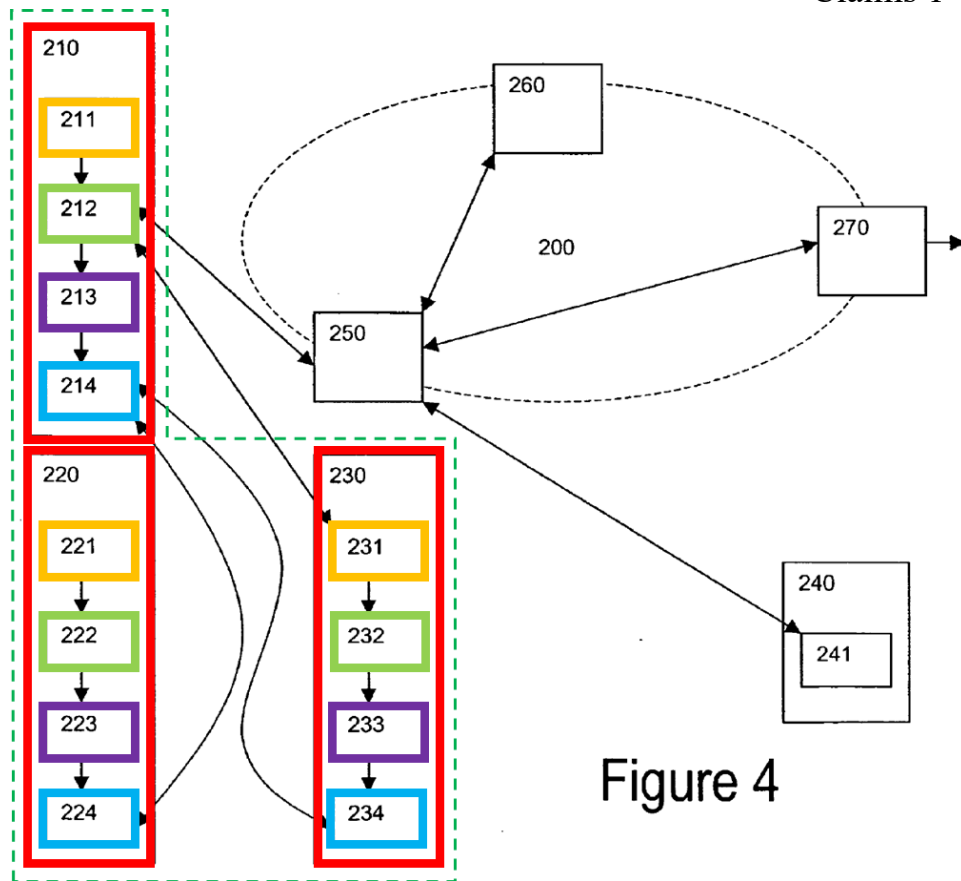


Figure 4

EX1003, Figure 4².

51. As Saridakis explains, “the deployment of SIP entities over an ad hoc network . . . conform to the SIP specifications,” wherein the SIP UA “handles SIP communication” by creating and sending/receiving SIP requests/responses to/from other peers. EX1003, [0021], [0026], [0068]. Those SIP requests are routed through the local SIP proxy, which forwards to the local SIP registrar “to resolve a SIP

² All annotations are added unless stated otherwise.

address to the network address” of the intended recipient with the DULS instance.

EX1003, [0026], [0070], [0079].

52. Specifically, for example, “the SIP UA 211 sends a SIP request to the SIP UA 231” when device 210 wishes to establish SIP communication with device 230. EX1003, [0079]. To establish a SIP session, the SIP entities and DULS instance on device 210 perform the following series of steps: “First, the **local Proxy 212** receives the SIP request, extracts the SIP address of the intended recipient and tries to resolve it with the **local Registrar 213**, which, in turn, retrieves the correct mapping from the **DULS instance 214**. Having resolved the SIP address of the intended recipient, the local Proxy 212 forwards over the ad hoc network (e.g. a Bluetooth piconet) the SIP request to the SIP UA 231.” EX1003, [0079].

53. The local registry of each DULS instance in the ad hoc network stores “mappings of user-addresses to network addresses of the terminals present in the network” needed to establish a SIP session. The local registry is formed and kept up-to-date (or synchronized) with the contents of the local registries of other DULS instances in the ad hoc network using one of two protocols: (1) the “distributed synchronization protocol” or (2) the “lazy update protocol.” EX1003, [0023], [0025], [0037], [0052].

54. Under the distributed synchronization protocol, a peer (e.g., device 210 in Figure 4) is designated as a “coordinating peer,” which “has in its local repository

a view of the network composition.” EX1003, [0022]. The local repository of the coordinating peer is updated in response to the “joins and leaves of peers” in the ad hoc network and is “multicast[] to all peers whose addresses are present in the updated view.” EX1003, [0022], [0038]-[0051], Figure 1. On receipt of handshake requests, a peer acting as a coordinating peer multicasts handshake responses containing “contents of its local Repository to ALL network addresses present in the local Repository.” EX1003, [0044]-[0046]. For any network addresses that do not respond, the coordinating peer receives a synchronize request from other peers, updates its local repository and multicasts that updated repository to other peers. EX1003, [0047]-[0049]. DULS instances on other peers receiving those contents use them to synchronize their local repositories. EX1003, [0046].

55. Under the lazy update protocol, when a DULS instance in a peer cannot resolve the user address for the SIP request because the local repository does not contain mapping information needed to resolve that user address, the DULS instance “employs the device discovery capabilities of the network protocol to find other devices that are currently in the ad hoc network” and multicasts an update request that includes “fragments of the local Repository, e.g. the most up-to-date or the most recently acquired” to those other peers. EX1003, [0052]-[0067], Figure 2. Other peers receiving that content “parse it and use it, entirely or selectively, to update the local Repository” and also send back responses containing “fragments of the local

Repository, e.g. the most up-to-date or the most recently acquired.” EX1003, [0060]-[0062]. The requesting peer uses that content to update its local repository. EX1003, [0063].

56. If the DULS instance does not have mapping to provide to the local SIP registrar to resolve the user (SIP) address, the local SIP proxy instead forwards the SIP requests to the external SIP infrastructure, where the centralized SIP registrar is located. EX1003, [0080]. The centralized SIP registrar “returns the network address” of the intended recipient, to which the external SIP proxy uses to forward the SIP request. EX1003, [0080].

2. Wu (EX1004)

57. Wu discloses a “multimedia network communication system” that enables provision of SIP services in a peer-to-peer overlay network. EX1004, [0001], [0005], [0060]. Like Saridakis, Wu teaches “eliminating the need for centralized servers” used in a conventional SIP system by integrating SIP functionality in each peer in a peer-to-peer overlay network. EX1004, [0003], [0040].

58. As shown in Figure 6 of Wu (copied below), the P2P SIP-enabled network is composed of “two different entities, APs (Access Points) and user terminals (MH, Mobile Host).” EX1004, [0058], [0059]. “Rather than a traditional SIP architecture where many SIP UAs connect to a central proxy server, the APs

(peers) connect directly to a few other APs (peers), forming a virtual network of peers referred to as a P2P network.” EX1004, [0059]. Within Wu’s peer-to-peer overlay network, the APs “perform the roles of *registrar*, redirection server and *location server* in traditional SIP networks” (EX1004, [0060]) while the “[u]ser terminals only act as *SIP user agents*.” EX1004, [0061], [0072]. A “[m]ultimedia session, such as audio, video and instant message session, through the P2P SIP enabled network can be established among two or more user terminals.” EX1004, [0061].

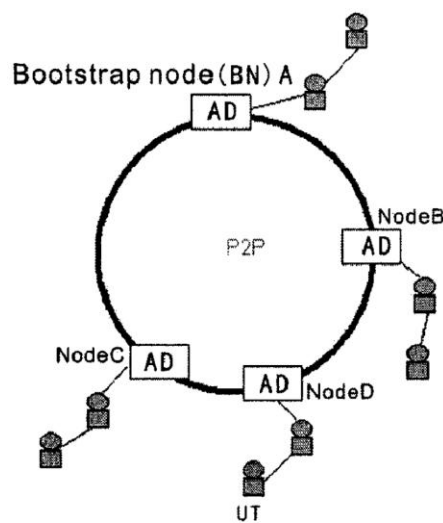


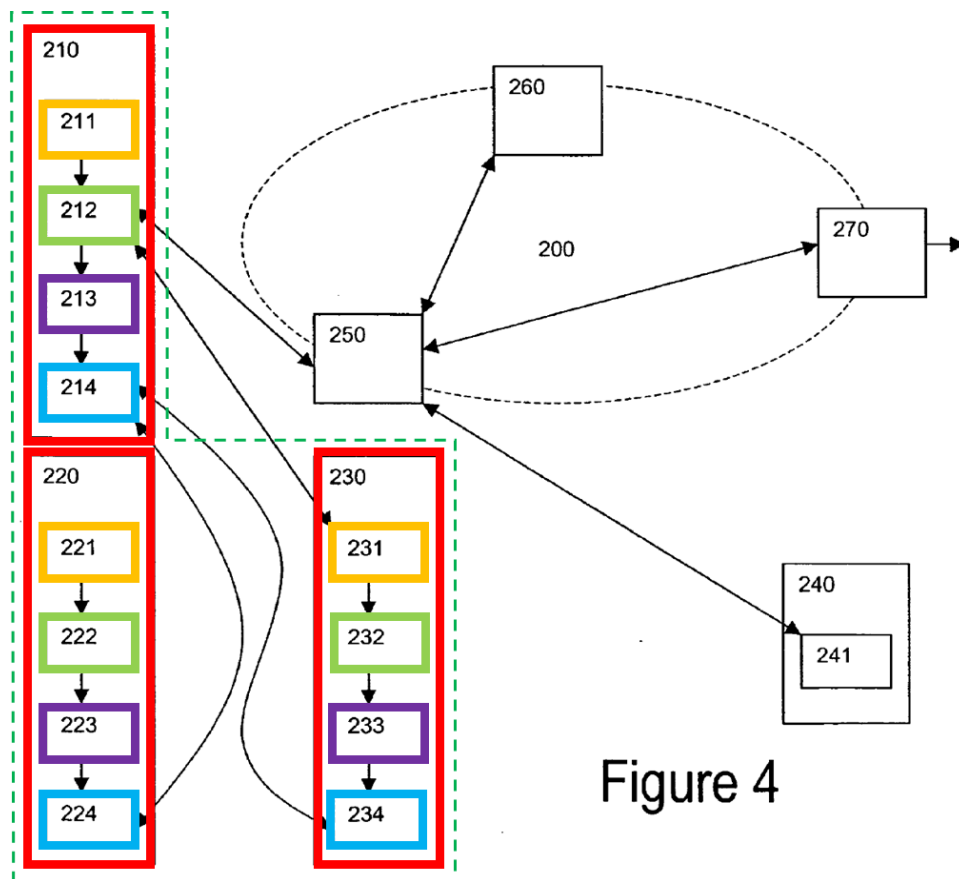
FIG. 6

EX1004, Figure 6.

3. Saridakis In View Of Wu (“Saridakis-Wu Combination”)

a) Separate VoIP Client Device And VoIP Node In View Of Wu

59. As discussed in Section VII.A.1 [Saridakis], Saridakis teaches forming a peer-to-peer network by multiple peers (i.e., mobile phones), each equipped with a SIP UA, a local SIP proxy, a local SIP registrar, and a DULS instance. EX1003, [0078].



EX1003, Figure 4.

60. As discussed in Section VII.A.2 [Wu], Wu teaches implementing a peer-to-peer overlay network using *APs* that “act as traditional SIP outbound *proxy*

servers for user terminals ... [and] perform the roles of *registrar*, redirection server and *location server* in traditional SIP networks” and *user terminals* that “act as *SIP user agents*” to establish “[m]ultimedia session, such as audio, video and instant message session, through the P2P SIP enabled network.” EX1004, [0059]-[0061].

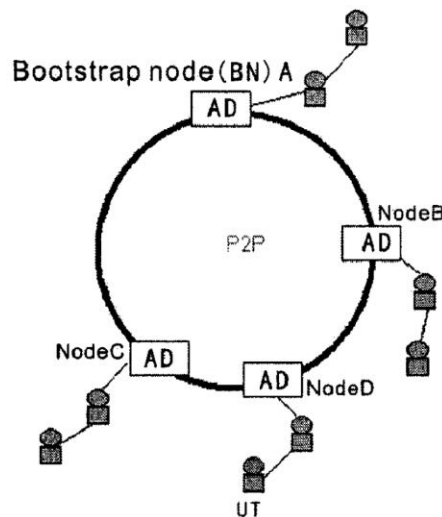


FIG. 6

EX1004, Figure 6.

61. It would have been obvious to combine Saridakis with Wu by replacing or modifying Saridakis’ peers (mobile phones) in the ad hoc peer-to-peer network with: (1) **APs** that each incorporates a **local proxy**, a **local SIP registrar**, and a **DULS instance**; and (2) **user terminals (UTs)** containing a **SIP UA** communicating with each other in the ad hoc network through their corresponding **APs**.

Saridakis-Wu Combination

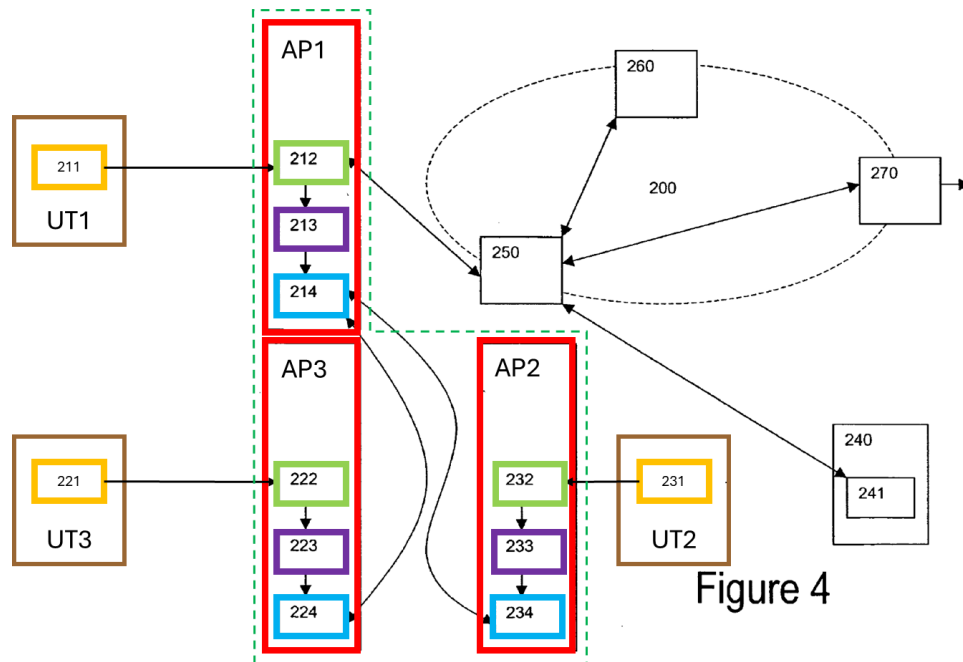


Figure 4

EX1003, Figure 4.

62. It would have been obvious for a POSITA to combine Saridakis and Wu, as described above, because a POSITA would have recognized it to be a simple modification. In particular, the Saridakis-Wu combination described above involves merely introducing two components with specific functions, as taught by Wu, to the ad hoc network—i.e., a peer node (AP) and a client (user terminal)—that collectively perform the same function as Saridakis’ peer device. Specifically, for example, Wu’s APs perform the same function as the service entities in Saridakis’ peer device—the local registrar (e.g., 213 in Figure 4), the local Proxy (e.g., 212 in Figure 4), and the DULS (e.g., 214 in Figure 4), respectively—because both provide SIP functionality in place of a centralized SIP server. *See* EX1003, [0026], [0027] (“The

use of the DULS to provide SIP address resolution to the SIP Registrar enables the deployment of SIP on ad hoc networks without having to rely on a single instance of the SIP Registrar as it is the practice in the SIP deployment on cellular networks.”); EX1004, [0060] (“The APs participating in this overlay act as traditional SIP outbound proxy servers for user terminals and allow user terminals to place and receive calls, but, *when viewed collectively with the other peers, perform the roles of registrar, redirection server and location server in traditional SIP networks.*”).

63. Likewise, Wu’s “[u]ser terminals only act as *SIP user agents*” (EX1004, [0061]) and performs the same role as Saridakis’ “SIP User agents (UAs)” —namely, to establish SIP communication between user terminals. EX1003, [0069]; *see* EX1003, [0026] (“The SIP UA handles SIP communication, i.e. it creates SIP requests/responses to be sent to other peers and parses SIP requests/responses sent by other peers.”); EX1004, [0061] (“User terminals only act as SIP user agents. A Multimedia session, such as audio, video and instant message session, through the P2P SIP enabled network can be established among two or more user terminals.”). A POSITA would have readily understood from Saridakis’ and Wu’s teachings to implement Saridakis’ peers as two components—APs consisting of local SIP Proxy, local registrar and DULS instance and user terminals consisting of SIP UA, as taught by Wu. Therefore, this modification would have been a

straightforward implementation and predictable design choice in accordance with established wireless networking principles known to a POSITA.

64. A POSITA would have been motivated to combine Saridakis and Wu as provided above for two reasons.

65. **First**, the Saridakis-Wu combination, as described above, would have enabled the provision of SIP services for ordinary mobile devices that would have only been equipped with a standard SIP UA—without integrated SIP proxy, DULS instance or local registrar—in an ad hoc peer-to-peer network without having to communicate with a central SIP server. EX1003, [0014]-[0015]; EX1004, [0072]-[0074]. Specifically, by implementing SIP proxy, DULS instance and local registrar in APs (i.e., access points) to “perform the roles of registrar, redirection server and location server” (EX1004, [0060]), as taught by Wu, Saridakis’ distributed SIP functionality can be used by any device that joins the ad hoc peer-to-peer network, without having to be modified to include DULS instance or local registrar. A POSITA would have readily recognized that such modification would have resulted in a peer-to-peer SIP network with a more organized architecture and enhanced scalability, as more ad hoc devices join the network and wish to establish and maintain local SIP communication.

66. **Second**, the Saridakis-Wu combination, as described above, by deploying SIP entities other than SIP UAs in APs (access points), would have

enabled multiple devices to connect to a single AP to establish a SIP session. Such sharing of AP resources would have eliminated the need for the peer-to-peer network to deploy multiple peer devices and thus lower the cost and alleviate the complexity of deploying the peer-to-peer network. For example, as seen in Wu's Figure 6 (above), a single AP can be connected to multiple user terminals and thus can provide distributed SIP functionality to those user terminals connected to it. Accordingly, a POSITA would have readily recognized that Saridakis' modified system in view of Wu would have enhanced scalability, allowing for more devices to take advantage of Saridakis's distributed SIP functionality without operating a large number of APs to host SIP proxy, DULS instance and local registrar.

67. A POSITA would have had a reasonable expectation of success in combining Saridakis with Wu.

68. **First**, a POSITA would have recognized that the teachings of Saridakis and Wu are highly compatible. Both Saridakis and Wu are directed to ad hoc peer-to-peer networks that deploy distributed IP services by incorporating the functionality of IP entities in peer nodes in the ad hoc network so that SIP services are provisioned within the ad hoc network without reliance on a centralized server on the external network. *See* EX1003, [0001], [0014]-[0015], [0018]; EX1004, [0001], [0040], [0058], [0059]. As explained above, Saridakis teaches "deploying the entities specified in the SIP protocol among peers in an ad hoc network and

combining the SIP Registrar with the DULS in order to allow the use of SIP in ad hoc, peer-to-peer networks.” EX1003, [0018]. Likewise, Wu teaches deploying a peer to peer module in each AP, which includes memory storing registration information of user terminals in the P2P network “on the user’s behalf” “since there is no central registrar.” *See* EX1004, [0064], [0086], [0079]. Accordingly, a POSITA would have readily recognized that Wu’s teachings could be seamlessly applied to enhance the network architecture described in Saridakis.

69. ***Second***, as discussed above, Saridakis’s local registrar and DULS instance are functionally similar to Wu’s APs, and Saridakis’s SIP UAs are functionally similar to Wu’s user terminals. Accordingly, a POSITA would have recognized that that the modification would have merely amounted to partitioning the SIP entities mounted on Saridakis’ peer device into two separate devices (AP and UT) as taught by Wu, to perform the same functions taught by Saridakis. For these reasons, a POISTA would have had a reasonable expectation of success in implementing Saridakis’s local registrar and DULS instance within APs, while maintaining SIP UA instance within user terminals, in accordance with the combination described above.

70. For the foregoing reasons, a POSITA would have readily recognized that the proposed combination, as described above, represents a straightforward application of a known technique—namely, implementing a SIP-enabled peer-to-

peer network using APs and user terminals, as taught by Wu—to enhance a comparable system taught in Saridakis. This modification would have allowed enhanced scalability and reduction of deployment costs while producing predictable results, specifically enabling the network to deliver distributed SIP services efficiently to user terminals (i.e., mobile devices).

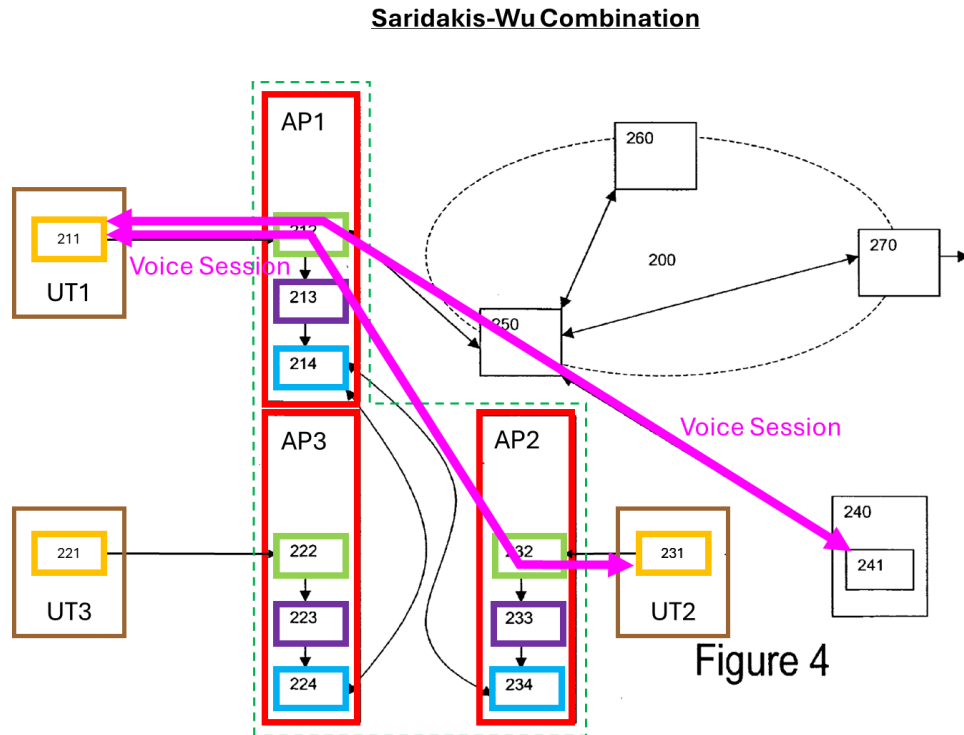
b) Voice SIP Session In View Of Wu

71. Saridakis teaches that SIP UAs “handle[] SIP communication,” by “creat[ing] SIP requests/responses to be sent to other peers and parses SIP requests/responses sent by other peers.” EX1003, [0026]. Specifically, Saridakis teaches using SIP protocol to establish a SIP session. *See* EX1003, [0068] (“A further embodiment of this invention refers to the use of DULS (with the distributed synchronization or the lazy update protocol) to enable the deployment of SIP entities in an ad hoc, peer-to-peer network. In brief, SIP [IETF RFC 3261] is a protocol that describes, given a SIP identifier (a user address in a SIP-specific format), how to find the device where the specified user can be reached and sent an invitation for a session.”), [0069] (“SIP User agents (UAs) create and send, but also receive and process, SIP requests and responses on behalf of users. The recipient of SIP requests and responses is a SIP address.”). Saridakis does not disclose what type of session is established between users by SIP UAs using SIP protocol. However, it would

have been obvious to a POSITA that SIP UAs in Saridakis' system can set up voice communication sessions using SIP, as discussed below.

72. For example, Wu teaches SIP UAs are used to establish a “[m]ultimedia session, such as audio, video and instant message session, through the P2P SIP enabled network . . . among two or more user terminals.” EX1004, [0061]. Wu further explains that “SIP is becoming dominant for its simplicity of protocol design. It is a general protocol for establishing and controlling multimedia sessions and can establish *voice sessions*.” EX1004, [0002], Claim 17. Thus, a POSITA would have readily recognized that Saridakis's SIP session can be used for voice communication. Combining Wu's SIP-enabled voice communication into Saridakis' system would have merely amounted to substituting Saridakis's SIP session with a media-specific SIP voice session, as taught by Wu, to obtain predictable results of providing voice communication over Saridakis's ad hoc network. A POSITA would have been motivated to implement this modification because SIP was well established and commonly employed for managing voice calls in network communication systems. *See, e.g.*, EX1009 (Huang), [0002] (describing “voice communications system utilizing Session Initiation Protocol (SIP) to implement voice communications”). Moreover, given that both Saridakis and Wu rely on the same SIP signaling framework to establish communication session, and

are thus highly compatible, a POSITA would have a reasonable expectation of success to implement this modification.



EX1003, Figure 4.

4. Claim 1

a) [1Pre] A VoIP-capable network comprising:

73. If the preamble is limiting, Saridakis-Wu teaches [1Pre].

74. **First**, Saridakis discloses a “*network*.” In particular, Saridakis teaches a system that includes “an ad hoc, peer-to-peer ***network***” (the green-dotted annotation in the figure below) and a “cellular ***network*** 200.” EX1003, [0068], [0077]-[0078], Figure 4. *See also* EX1003, [0001], [0007], [0014].

Saridakis-Wu Combination

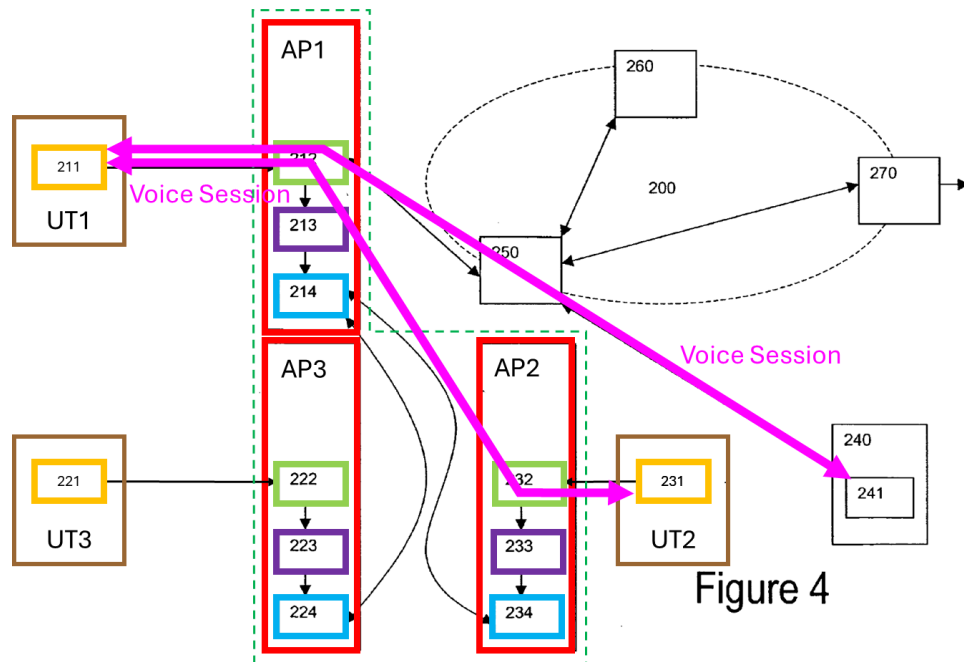


Figure 4

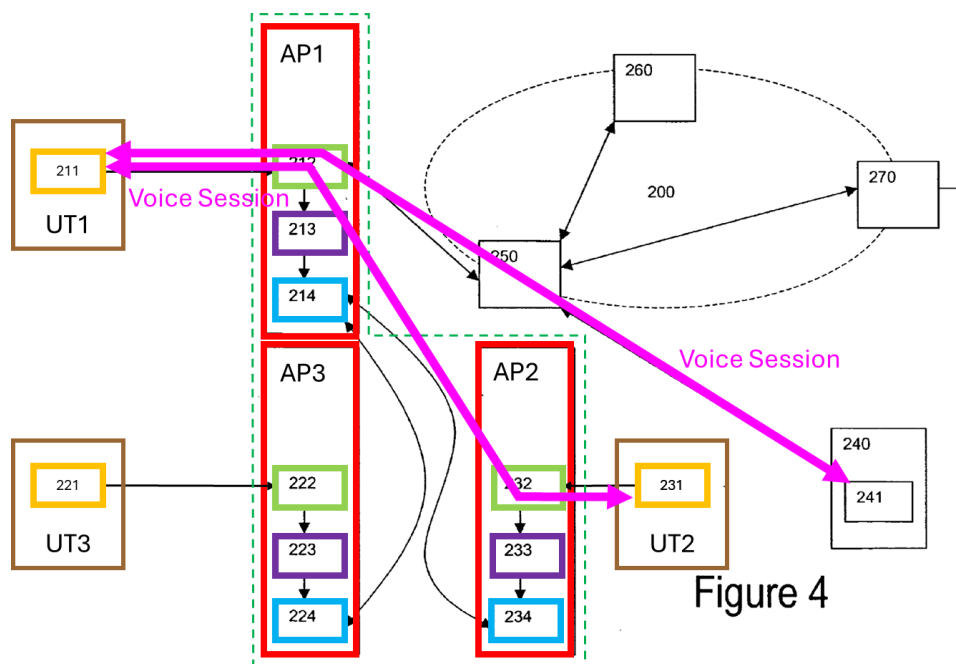
EX1003, Figure 4.

75. **Second**, Saridakis-Wu discloses a “VoIP-capable” network. Saridakis-Wu’s distributed SIP functionality allows SIP session to be established within the “ad hoc network” and “cellular network.” In particular, Saridakis discloses “deploying the entities specified in the SIP protocol among peers in an ad hoc network and combining the SIP Registrar with the DULS in order *to allow the use of SIP in ad hoc, peer-to-peer networks*” to make “*the use of SIP* [IETF RFC3261] *possible* in ad hoc networks.” EX1003, [0018]; *see also* EX1003, [0034] (“The following describes in more detail two embodiments of the method according to the invention and the deployment of SIP entities on mobile terminals, which *allows the use of SIP in ad hoc, peer-to-peer networks.*”). In Saridakis-Wu, the ad hoc

network can further establish a SIP session with an external device on the cellular network. *See* EX1003, [0080] (“Subsequently, the local Proxy 212 forwards the initial SIP request to the **SIP Proxy 250 on the cellular network** ... which forwards the initial SIP request to the right mobile phone where it reaches **the SIP UA 241**.”).

76. Furthermore, as explained in Section VII.A.3.b) [Saridakis-Wu], a POSITA would have readily recognized that Saridakis’s SIP session can be used for voice communication in view of Wu. *See* EX1004, [0002] (“SIP ... is a general protocol for establishing and controlling multimedia sessions and can establish **voice sessions**.”); Claim 17 (“wherein the session is a **multimedia session**, which includes **video** and voice.”).

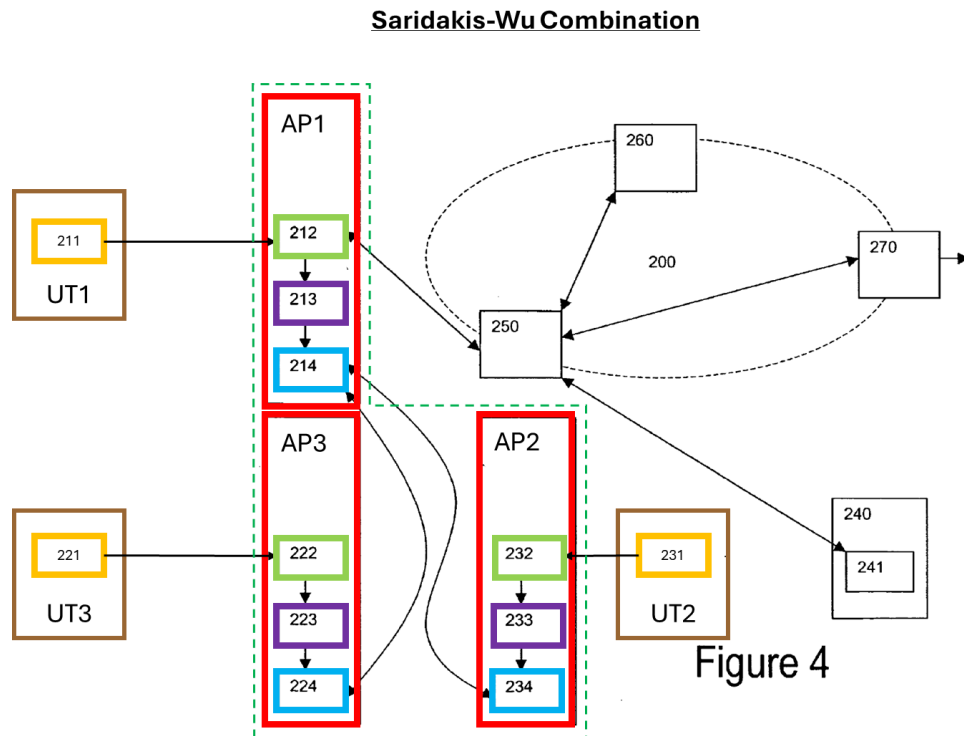
77. Finally, Saridakis’s ad hoc network is a WLAN-based system that operates using **Internet Protocol**. EX1003, [0001] (“ad hoc, peer-to-peer networks such as those that can be created over a short-range wireless medium like Bluetooth and **WLAN**.”); [0036] (“802.11 (WLAN) MAC addresses and **IP** addresses.”). *See also* EX1010 (Upp), 2:45-50 (“WLANs may utilize one or more of various networking protocols, such as TCP/IP (Transmission Control Protocol/**Internet Protocol**)”). Accordingly, it would have been obvious that a SIP-enabled voice session established in Saridakis-Wu’s system is a voice-over-Internet Protocol (“**VoIP**”) session.



EX1003, Figure 4.

78. Saridakis-Wu teaches [1A].

conversations and thus are VoIP clients in the '762 Patent. For example, as explained in Section VII.A.3 [Saridakis-Wu], the **user terminals** comprise SIP UAs, as shown below, which are “*for sending/receiving a SIP request message/SIP response message to/from the access AD thereof*, in order to register with the P2P network and *establish a session between the user terminals*.” EX1004, [0021], [0061], [0072], Claim 15. As explained in Section VII.A.3.b) [Saridakis-Wu], the SIP session established between the **user terminals** includes a “*voice session*[.]” EX1004, [0002].



EX1003, Figure 4.

- c) **[1B] two or more VoIP nodes forming an isolated cluster wherein the two or more VoIP nodes in the isolated cluster are in communication with one another;**

80. Saridakis-Wu teaches [1B].

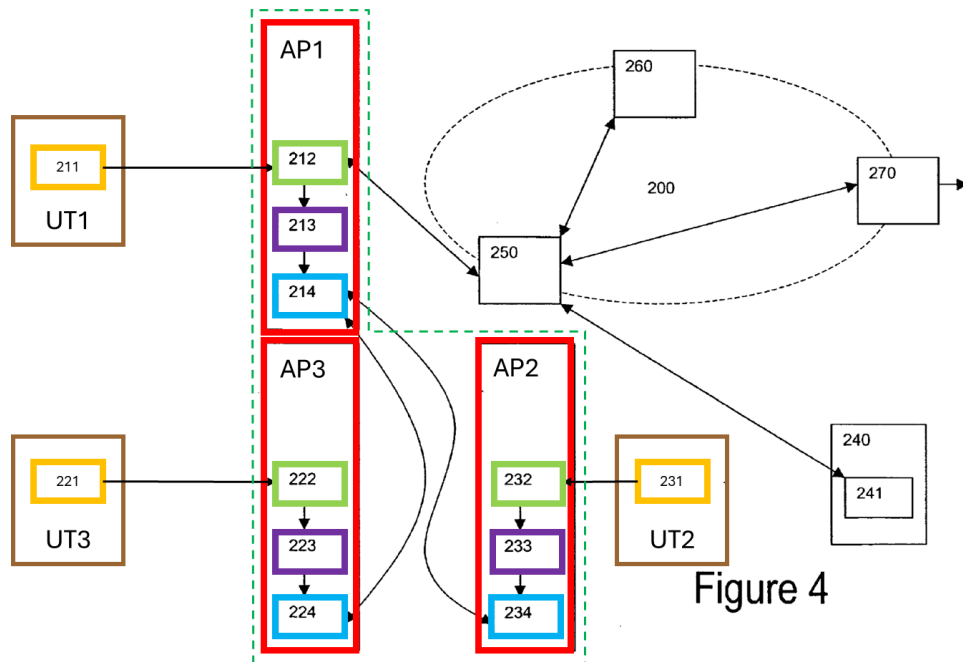
81. **First**, Saridakis-Wu discloses “*two or more VoIP nodes.*” The ’762 Patent describes that “a ‘node’ may include any of a number of network connectivity elements.” EX1001, 2:56-57. It further describes that “[i]f [the network is] wireless, the node could be an access point.” EX1001, 2:59-62, 6:2 (“each VoIP node functions as an autonomous SIP server”). Thus, the access points (APs) in Saridakis-Wu, as with the access points in the ’762 Patent, are “*two or more VoIP nodes.*”

82. As discussed in Section VII.A.3 [Saridakis-Wu], **access points (APs)** form the ad hoc, peer-to-peer network, wherein each AP includes the **local SIP proxy**, **local SIP registrar**, and the **DULS instance**, as shown below. EX1004, [0023] (“The network communication system comprises a P2P network and a plurality of user terminals. The P2P network comprises a plurality of access devices acting as nodes thereof. And each of the user terminals is connected to the P2P network by an access device thereof.”); [0059] (“[T]he network based on ‘SIP using P2P’ includes two different entities, **APs (Access Points)** and user terminals (MH, Mobile Host). ... the APs (peers) connect directly to a few other APs (peers),

forming a virtual network of peers.”); [0066] (“when viewed as a whole, APs connected each other form a P2P SIP enabled network providing SIP services.”).

83. Similar to the ’762 Patent’s VoIP nodes, which form a “network topology,” “wherein VoIP client devices gain connectivity to a network (either a local network or a wider network, such as the Internet) through communication with a nearby ‘node’” (EX1001, 3:35-39), the user terminals (“*VoIP client devices*”) in Saridakis-Wu gains connectivity to a network through communication with a nearby AP. EX1004, [0023] (“And each of the user terminals is connected to the P2P network by an *access device* thereof.”); [0030] (“The P2P network comprises a plurality of *access devices acting as nodes* thereof. And each of the user terminals is connected to the P2P network by an access device thereof.”); [0060] (“The APs participating in this overlay act as traditional SIP outbound proxy servers for user terminals and allow user terminals to place and receive calls, but, when viewed collectively with the other peers, perform the roles of registrar, redirection server and location server in traditional SIP networks.”); [0066] (“APs also act as SIP proxy for user terminals and perform certain SIP server functions, such as registration, location and redirect functions”).

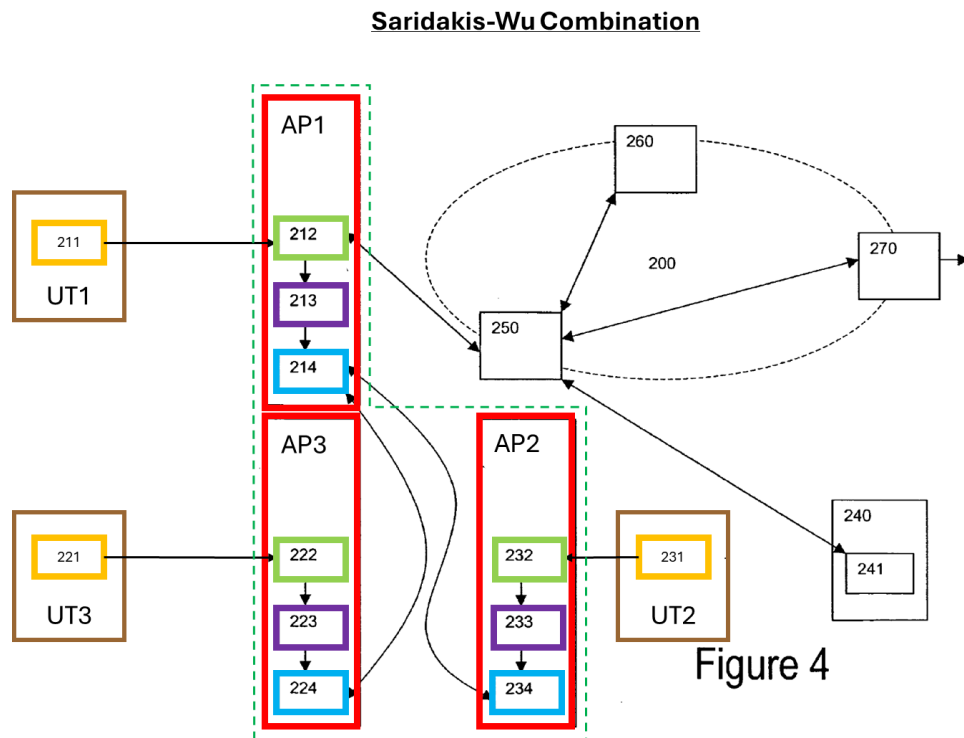
Saridakis-Wu Combination



EX1003, Figure 4.

84. **Second**, Saridakis-Wu discloses that the APs “form[] an isolated cluster.” Like the ’762 Patent’s explanation that an isolated cluster of nodes is formed when “*no connection exists to an external SIP server*,” wherein “the SIP registry is located on a centralized server attached to the same network as any VoIP devices” (EX1001, 5:20-21.), Saridakis-Wu teaches an hoc network formed by AP1, AP2, and AP3 without reliance on the cellular network 200 with centralized SIP entities 250, 260, and 270. EX1003, [0078], Figure 4. Saridakis-Wu teaches distributed SIP functionality in the ad hoc network, wherein “repositories facilitate[] the joining and leaving of terminals in the network *without the need to locate a central facility for user-location*.” EX1003, [0015]. See also EX1003, [0079];

EX1004, [0003] (“P2P systems inherently solve the [‘single point failure’] problem because there is *no centralized server* and the network self-organizes.”), [0059] (“Unlike a traditional SIP architecture, the network based on ‘SIP using P2P’ in accordance with the present invention requires no central servers.”). Because Saridakis-Wu’s ad hoc network provides SIP services completely isolated from the cellular network 200, the ad hoc network is an “*isolated cluster.*”



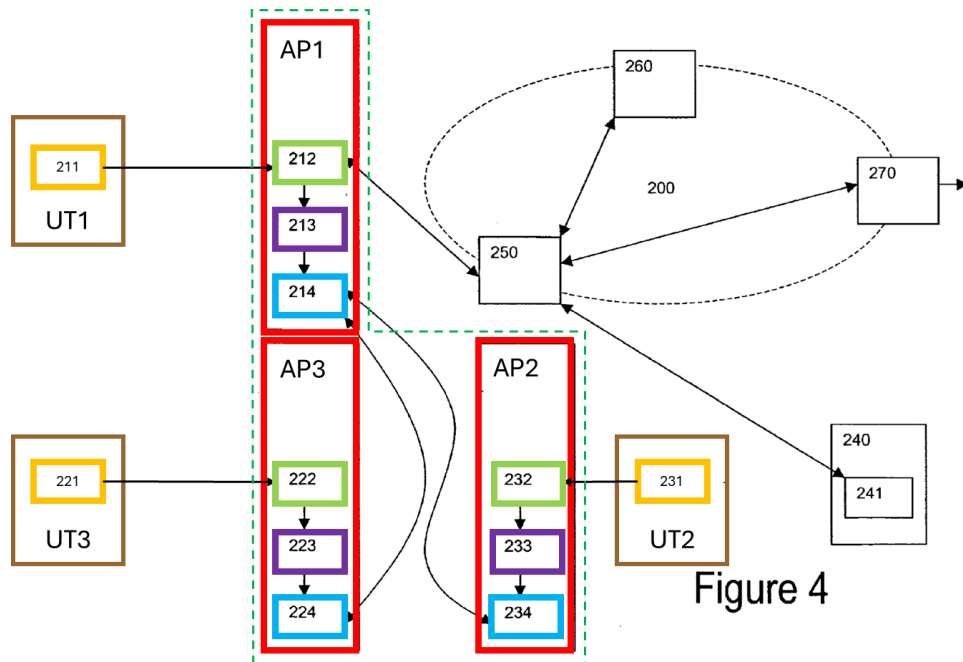
EX1003, Figure 4.

85. *Third*, the APs in Saridakis-Wu “*are in communication with one another.*” As discussed in Section VII.A.3.a) [Saridakis-Wu], each AP includes a DULS instance that communicates with each other to synchronize or update mapping information in the local repository at each DULS instance using one of two

protocols—“distributed synchronization” protocol or “lazy update protocol.”
EX1003, [0017], [0020], [0068].

86. For example, under the lazy update protocol, “the DULS instance sends to ALL devices [i.e., APs] discovered in STEP 2d an update request that contains the user address that needs to be resolved (multicast can be used if available).” EX1003, [0059]. *See also* EX1003, [0054], [0058], Figure 2. On receipt, the DULS instances in other APs send messages back to the first DULS instance. *See* EX1003, [0061] (“if the requested user address extracted in STEP 2 f is one of those initially loaded to the local Repository in STEP 2 a, the DULS instance MUST send back to the requesting DULS instance an update response”); [0062] (“if the requested user address extracted in STEP 2f is NOT one of those initially loaded to the local Repository in STEP 2a, . . . the DULS instance may reply with an update response that is composed of an empty first part and a second part that contains fragments of the local Repository”). As illustrated by arrows between the DULS instances 214, 224, and 234 in Saridakis’ Figure 4 below, DULS instances 214, 224, and 234 are in communication with one another. Accordingly, the APs in the ad hoc network (“two or more VoIP nodes in the isolated cluster”) “are in communication with one another” via communication between DULS instances 214, 224, and 234, which are part of those APs.

Saridakis-Wu Combination



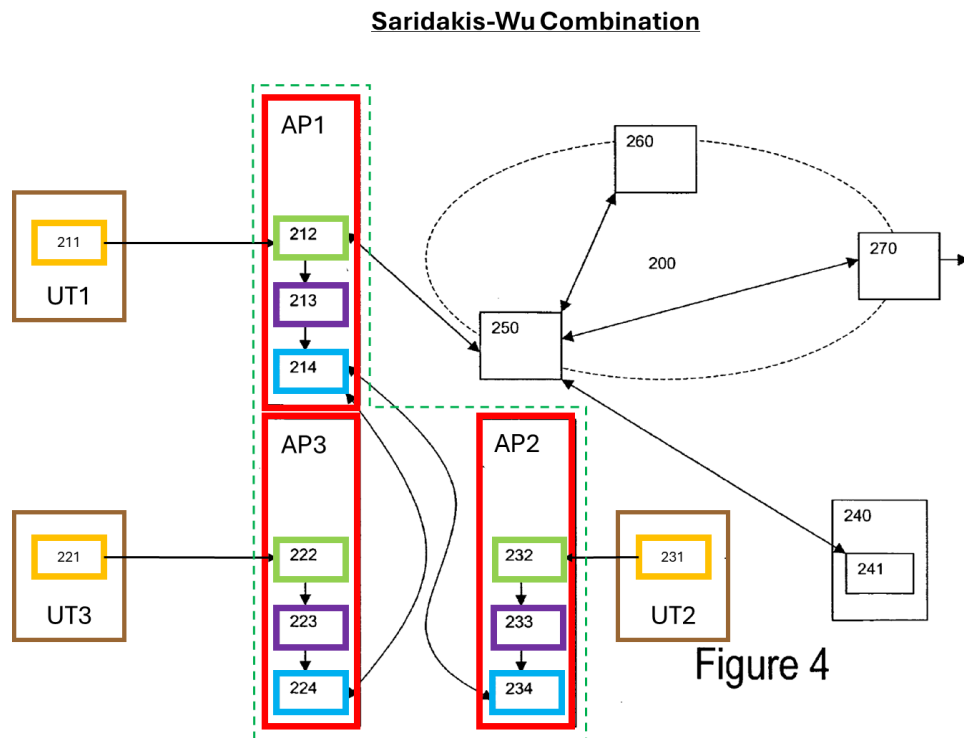
EX1003, Figure 4.

d) [1C] wherein each of the VoIP client devices communicates with at least one VoIP node;

87. Saridakis-Wu teaches [1C].

88. Saridakis discloses that when a SIP UA needs to send SIP requests to another SIP UA on another device, the SIP UA **contacts** the associated local SIP Proxy to route the SIP requests. EX1003, [0076] (“**a SIP UA** is configured to contact the local **SIP Proxy** residing on the same terminal.”); [0079] (“when the SIP UA 211 sends a SIP request to the SIP UA 231, the following sequence of interaction happens. First, the local Proxy 212 receives the SIP request”). As discussed in Section VII.A.3.a) [Saridakis-Wu], in Saridakis-Wu, the SIP UA is a component of

a user terminal and the local SIP proxy is a component of an AP. Thus, each user terminal (“*VoIP client device*”) “*communicates with*” a corresponding AP (“*at least one VoIP node*”) via communication between its local SIP UA and the SIP proxy (as well as a local registrar and a DULS instance) located on the AP. In fact, Wu further describes that an “AP also provides a SIP interface for exchanging SIP messages with user terminals.” EX1004, [0069].



EX1003, Figure 4.

- e) [1D] wherein each of the VoIP nodes further comprises a local SIP registry built by exchanging SIP information with the remaining VoIP nodes in the isolated cluster; and

89. Saridakis-Wu teaches [1D].

90. **First**, Saridakis-Wu discloses “*each of the VoIP nodes further comprises a local SIP registry.*” As explained in Section VII.A.3.a) [Saridakis-Wu], each AP (“*VoIP node*”) includes a local Registrar and a DULS instance. The DULS instance contains user-to-network mapping information that is used by the local Registrar in the same AP to resolve a SIP request, thereby establishing and maintaining a SIP session. For example, the DULS instance “includes a local Repository that contains mappings of user addresses to network addresses.” EX1003, [0038]. As Saridakis explains, the user address may be a SIP address, and the network address may take the form of a MAC address or IP address. See EX1003, [0004] (“a **user address**, usually expressed as a URI [IETF RFC2396] like a **SIP address** (e.g. sip:titos.saridakis@snokia.com)”), [0039] (“if **MAC addresses** are used as network addresses ...”; “if **IP addresses** are used as network addresses”). Saridakis further explains:

When the **SIP UA** sends a SIP request, it is received by the local Proxy, which in turn requests from the **local Registrar** to resolve the SIP address. The **local Registrar** uses **DULS** to **find the network address** that corresponds to the given SIP address. If the SIP address is resolved, the resulting network address is returned to the local Proxy, which uses it to forward the initial SIP request.

EX1003, [0077], [0079]. In other words, the DULS instance stores the address “mappings” used to establish a SIP session.

91. The DULS instance in Saridakis is the “*local SIP registry*.” First, the DULS instance is “*local*” to the AP because the DULS instance is located on (i.e., local to) the AP itself. See EX1003, [0079] (“the DULS instances on the mobile phones provide SIP address resolution to the local SIP Registrar.”). Furthermore, the DULS instance stores SIP information, i.e., user address, which is “usually expressed as a URI . . . like a SIP address,” in “mappings” with a device’s current network address, such as a MAC or IP address. EX1003, [0004], [0039]. That information must be “resolved” to initiate a SIP session (see EX1003, [0077], [0079]), and is the same information that ’762 Patent describes as stored in the SIP registry. See EX1001, 3:3-8 (“‘SIP registry information’ . . . may include . . . the hardware (commonly-referred to as a device’s ‘*MAC address*’) and *IP addresses*, and/or other information that is required in order to initiate and maintain VoIP communications between two or more VoIP client devices.”). As Saridakis explains, to make “*the use of SIP . . . possible* in ad hoc networks,” “the entities specified in the SIP protocol” are deployed peers in an ad hoc network, including “*combining the SIP Registrar with the DULS*.” EX1003, [0018].

92. *Second*, Saridakis discloses that the mappings in the DULS instance are “*built by exchanging SIP information with the remaining VoIP nodes in the isolated cluster*.” For example, Saridakis discloses that the DULS instance can be built using the “lazy update protocol” as described in Figure 2 below. See EX1003, [0053].

The lazy update protocol begins with the assumption that all local Repositories of DULS instances are properly initialized: “when a DULS instance is activated ..., it loads to the local Repository the entries that contain the mappings of the current user addresses ... to the current network address of the device.” EX1003, [0039], [0055],

Figure 2 (step 2a).

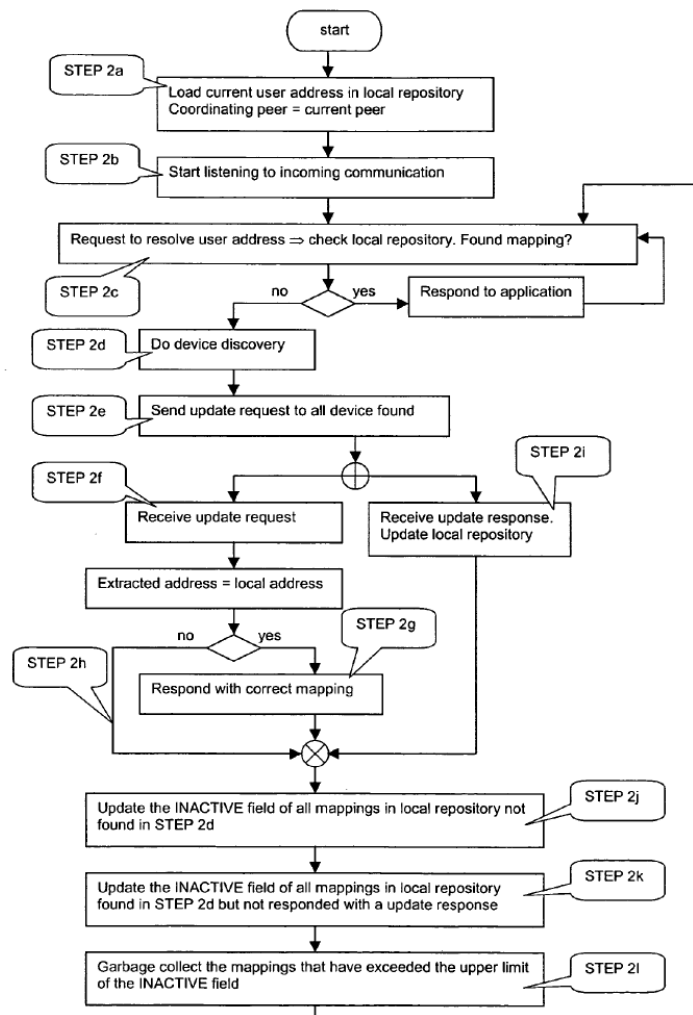


Figure 2

EX1004, Figure 2.

93. Under the lazy update protocol, the mappings of DULS instance are synchronized when “the information in the local repository is invalid (e.g. because the indicated peer has left the network) or the local repository does not have any information regarding a specified user.” EX1003, [0024]. The synchronization process is performed as follows:

94. First, when a DULS instance receives “a request to resolve a user address, it checks the local Repository.” EX1003, [0057], Figure 2 (step 2c). “If the user address is NOT in the local Repository” (EX1003, [0057]), that requesting DULS instance: (1) “employs the device discovery capabilities of the network protocol to find other devices that are currently in the ad hoc network” (*i.e.*, APs in Saridakis-Wu) (EX1003, [0058], Figure 2 (step 2d)); and (2) “sends to ALL devices discovered” “an update request that contains the user address that needs to be resolved.” EX1003, [0059], Figure 2 (step 2e). That update request includes “fragments of the local Repository, e.g. the most up-to-date or the most recently acquired” mapping information. EX1003, [0059], Figure 2 (step 2e).

95. Second, on receipt of the update request, the DULS instance in another peer (*i.e.*, AP in Saridakis-Wu) “pares [the update request] and extracts the user address that needs to be resolved.” EX1003, [0060], Figure 2 (step 2f). If the update request includes “fragments of the requesting DULS's Repository,” the other DULS

instance also “may parse it and use it, entirely or selectively, to *update [its own] local Repository.*” EX1003, [0060], Figure 2 (step 2f).

96. The responding DULS instance then takes either of the following actions:

97. (1) If the user address extracted from the update request “is one of those initially loaded to the local Repository” of the responding DULS instance, the responding DULS instance “MUST send back to the requesting DULS instance *an update response ... contain[ing] the mapping of the user address extracted from the update request to the network address of the present device.*” EX1003, [0061]. The responding DULS instance can also include, in the update response, “a second part that contains *fragments of [its] local Repository, e.g. the most up-to-date or the most recently acquired.*” EX1003, [0061].

98. (2) If the user address extracted from the update request “is NOT one of those initially loaded to the local Repository” of the responding DULS instance, the responding DULS instance still “may reply with an update response that is composed of an empty first part and a second part that contains *fragments of [its] local Repository, e.g. the most up-to-date or the most recently acquired.*” EX1003, [0062].

99. In either case, when the requesting DULS instance receives the update response, it “extracts the mapping of user address to network address” and “[t]he

corresponding mapping is placed in [its] local Repository.” EX1003, [0063]. “If the update response has a second part (this is optional), then the DULS instance MUST parse it and *use its contents to update [its] local Repository*.” EX1003, [0063]. Accordingly, a requesting DULS instance builds its local Repository by exchanging update requests and responses with other peers (APs) in the ad hoc network. As explained above, update requests and responses include “a user address,” which Saridakis explains is usually expressed as a “SIP address” (EX1003, [0004], [0059], [0061]) and fragments of local Repositories which, as discussed above, contain mappings containing SIP registry information. Accordingly, the requesting DULS instance (“*local SIP registry*”) is built by exchanging “a user address” and fragments of local Repositories (“*SIP information*”) with the remaining peers in the ad hoc network (“*the remaining VoIP nodes in the isolated cluster*”).

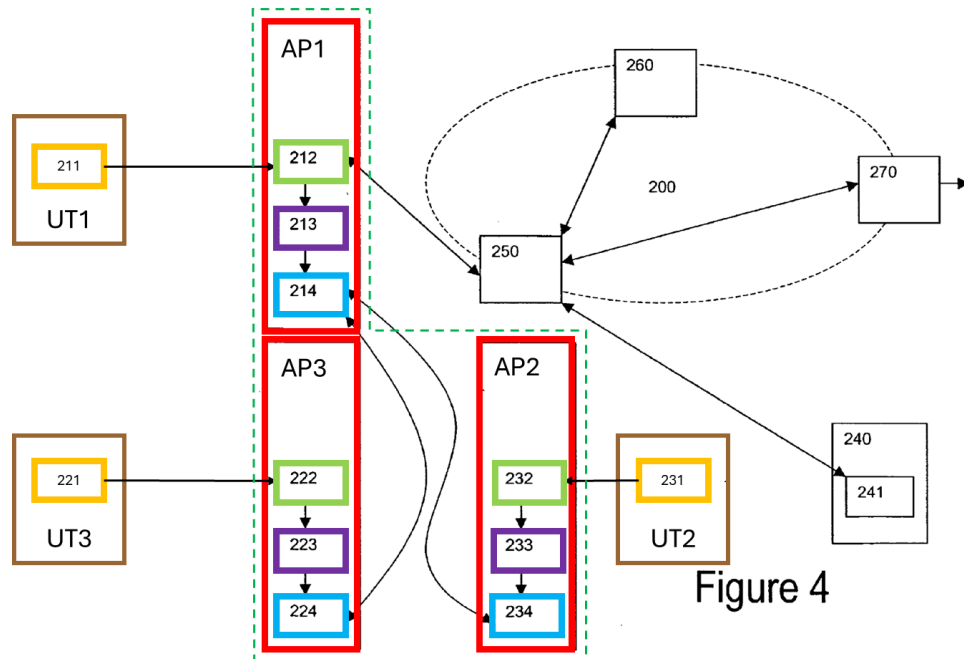
- f) [1E] wherein a first VoIP client device in communication with a first VoIP node establishes a communication with a second VoIP device in communication with a second VoIP node using the local SIP registries of the first VoIP node and the second VoIP node.

100. Saridakis-Wu teaches [1E].

101. **First**, Saridakis-Wu discloses “a first VoIP client device in communication with a first VoIP node” and “a second VoIP device in communication with a second VoIP node.” As discussed in Section VII.A.4.d) [1C], a user terminal

(“VoIP client device”) communicates with its nearby AP (“VoIP node”) via communication between its SIP UA and the associated SIP Proxy residing on the nearby AP. Accordingly, as seen in the figure below, the user terminal 1 (UT1) (“first VoIP client device”) is in communication with its nearby access point 1 (AP1) (“first VoIP node”), and the user terminal 2 (UT2) (“second VoIP client device”) is in communication with its nearby access terminal 2 (AP2) (“second VoIP node”). See also EX1003, [0078]-[0079] (“when the SIP UA 211 [in UT1] sends a SIP request ... the local Proxy 212 [in AP1] receives the SIP request.”); [0027] (“The SIP UA [in UT] knows how to contact the SIP Registrar [in the same UT].”).

Saridakis-Wu Combination



EX1003, Figure 4.

102. **Second**, Saridakis-Wu discloses that UT1 “*establishes a communication*” with UT2. Saridakis describes that “SIP UA ***handles SIP communication***” by exchanging SIP requests and responses with other SIP UAs. EX1003, [0026] (“The SIP UA handles SIP communication, i.e. it creates SIP requests/responses to be sent to other peers and parses SIP requests/responses sent by other peers.”). Saridakis further teaches that “SIP UA 211 sends a SIP request to the SIP UA 231” “over the ad hoc network.” EX1003, [0079]. Accordingly, UT1 “*establishes a communication*” with UT2 via the exchange of SIP messages between SIP UAs residing on each UT.

103. **Third**, Saridakis discloses that the “*communication*” is established “*using the local SIP registries of the first VoIP node and the second VoIP node.*”

104. Saridakis describes that a SIP UA on a peer uses the DULS instance on the associated AP (“*using the local SIP registries of the first VoIP node*”) to resolve the SIP address of the receiving SIP UA. Specifically, “when the SIP UA 211 sends a SIP request to the SIP UA 231, the following sequence of interaction happens”:

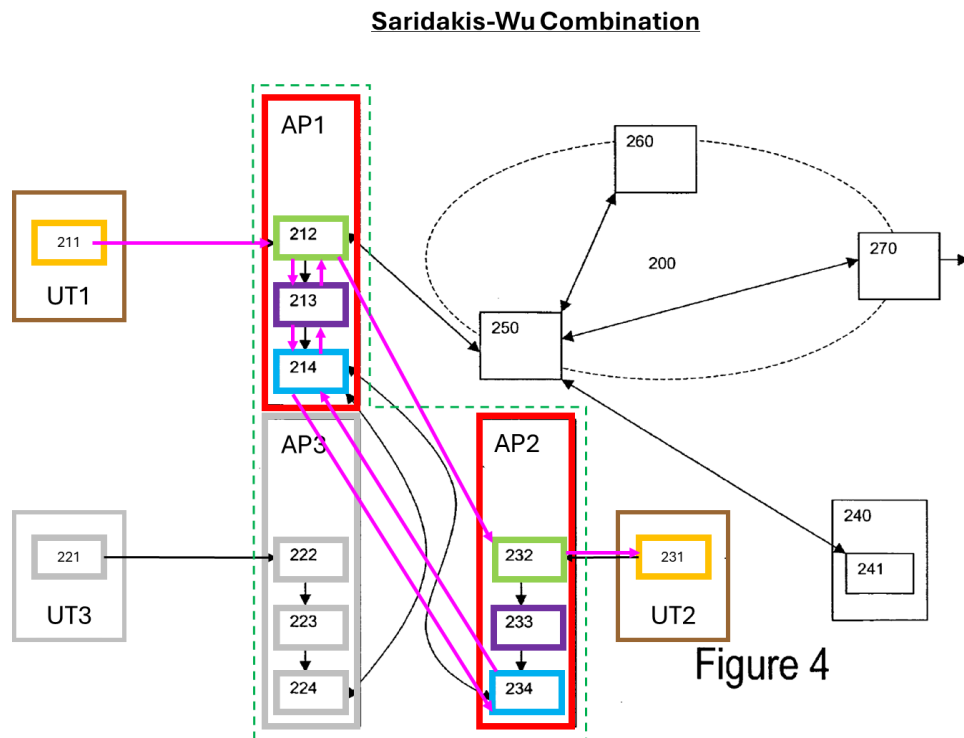
First, the local Proxy 212 receives the SIP request, extracts the SIP address of the intended recipient and tries to resolve it with the local Registrar 213, which, in turn, ***retrieves the correct mapping from the DULS instance 214***. Having resolved the SIP address of the intended recipient, the local Proxy 212 forwards over the ad hoc network (e.g. a Bluetooth piconet) the SIP request to the SIP UA 231.

EX1003, [0079].

105. If, as explained in Section VII.A.4.e) [1D], the DULS instance 214 does not contain mapping information to resolve the user address (i.e., SIP address) of the intended recipient (UT2) in the SIP request, it executes according to the lazy update protocol. For example, in Saridakis-Wu Combination, upon activation, a DULS instance in an AP is initialized with the SIP address and network address of UTs assigned to the AP. *See* EX1003, [0039], [0055]. When the DULS instance 214 cannot resolve the SIP address associated with UT2 in connection with a SIP request, it sends an update request to all other peers in the ad hoc network (i.e., AP2 and AP3) “that contains the user address that needs to be resolved.” *See* EX1003, [0059]. As “the requested user address [of UT2] . . . is one of those initially loaded to the local Repository [of DULS instance 234 in AP2], the DULS instance [234 in AP2] MUST send back to the requesting DULS instance [214] an update response . . . contain[ing] the mapping of the user address extracted from the update request to the network address of [UT2].” EX1003, [0061]. The requesting DULS instance 214 then “parses [the update response] and extracts the mapping of user address to network address,” which is then “placed in the local Repository” and “returned to the application layer as a response to the request for user address [i.e., SIP address associated with UT2] resolution.” EX1003, [0063], [0067]. Accordingly, the DULS

instance of AP2 (“the local SIP registries of the second VoIP node”) is used establish communication between AP1 and AP2.

106. These message exchanges are illustrated using the pink arrows in the illustration below. As illustrated, the communication between UT1 and UT2 is established using the DULS instances 214 and 234 of AP1 and AP2 (“using the local SIP registries of the first VoIP node and the second VoIP node”).



EX1003, Figure 4.

5. Claim 2

- a) [2] The VoIP-capable network of claim 1, wherein the local SIP registries of the isolated VoIP nodes are updated as the VoIP nodes and the VoIP client devices begin communication with the isolated cluster and end communication with the isolated cluster.

107. Saridakis-Wu teaches the additional limitation of claim 2.

108. *First*, Saridakis-Wu discloses that “*the VoIP nodes and the VoIP client devices begin communication with the isolated cluster and end communication with the isolated cluster.*” As Saridakis explains, an ad hoc network (“*isolated cluster*”) is “created with the spontaneous *join* [(i.e., *begin communication with*)] *or leave* [(i.e., *end communication with*)] *of their constituent nodes* and they operate without relying on any network infrastructure.” EX1003, [0002]. *See also* EX1003, [0035] (“peers can *join and leave* the network without any prior notification to other network members.”). In Saridakis-Wu system, as the APs (“*VoIP nodes*”) are the peers and thus can join and leave the ad hoc network freely, the UTs (“*VoIP client devices*”) accordingly would begin and end the communication with the ad hoc network. *See* EX1004, [0059] (“the APs (peers) connect directly to a few other APs (peers), forming a virtual network of peers referred to as a P2P network”); [0060] (“The APs participating in this overlay act as traditional SIP outbound proxy servers for user terminals and allow user terminals to place and receive calls”). *See also* EX1004, [0078], [0086].

109. **Second**, Saridakis-Wu discloses “*wherein the local SIP registries of the isolated VoIP nodes are updated*” as the UTs begin and end communication with the ad hoc network due to the join and leave of their associated APs. As discussed in Section VII.A.1 [Saridakis], DULS instances (specifically their local repositories) may be synchronized using one of two protocols: (1) the “distributed synchronization protocol” or (2) the “lazy update protocol.” EX1003, [0037], [0052].

110. In particular, the distributed synchronization protocol triggers DULS synchronization in response to “networks events (i.e. joins and leaves of peers).” EX1003, [0023]. Under the distributed synchronization protocol, the DULS instance in a peer designated as a coordinating peer maintains an updated view of the network and multicasts synchronization requests *whenever nodes join or leave the ad hoc network*. EX1003, [0038]-[0051] (“the contents of local Repositories [in DULS instances] are synchronized, reacting to network events (i.e. *join and leave of peers*)”), Figure 1. Synchronization requests are used to update the local repositories of the DULS instances. See EX1003, [0048] (“if the DULS instance of the coordinating peer receives a synchronize request, it *removes the non-responding network address* (and the associated user addresses) *from its local Repository* and *sends to ALL remaining network addresses* in the local Repository a synchronize response with the *contents of the local Repository* (multicast can be used if

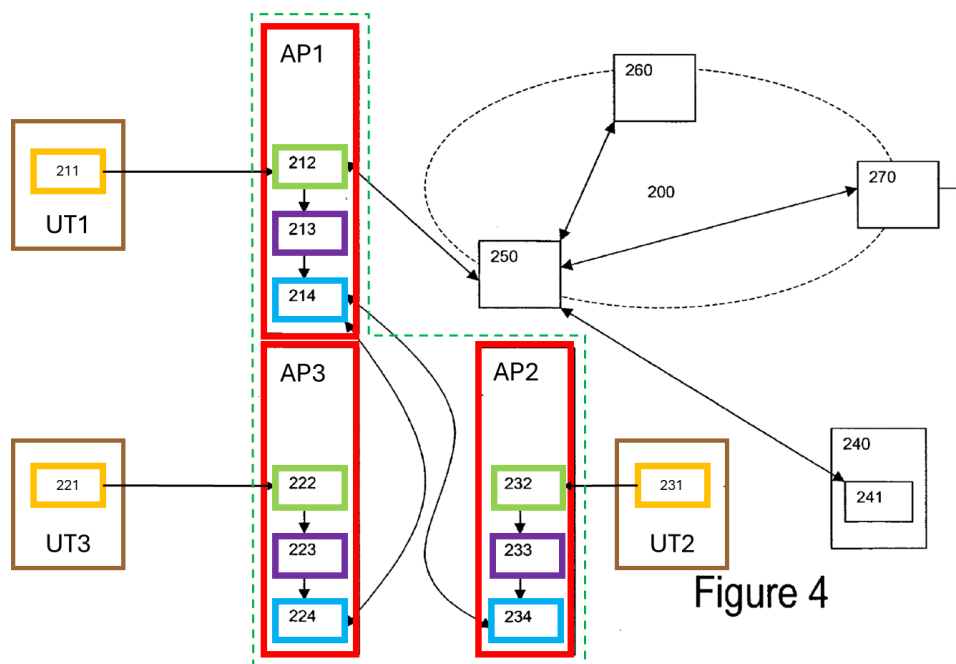
available).”), [0049] (“if a DULS instance receives a synchronize request . . . then it *removes the indicated network address from the local Repository . . . and sends to ALL network addresses* in its local Repository a synchronize response with *the contents of the local Repository.*”).

111. In Saridakis-Wu, the peers in the ad hoc network are APs. Thus, Saridakis-Wu discloses that the DULS instances in the APs are updated as the APs (i.e., peers) join or leave the ad hoc network. EX1003, [0038]-[0051].

112. Saridakis-Wu also discloses that the DULS instances in the APs are updated as the *UTs* join or leave the network (i.e., begin or end communication with the network). Saridakis explains that DULS synchronization events are initiated when peers containing SIP UAs join or leave the network, and in Saridakis-Wu, the SIP UAs reside in the UTs. Accordingly, a POSITA would have understood that in Saridakis-Wu, the DULS synchronization is triggered also when the UTs join or leave the network (i.e., begin or end communication with the network). This interpretation aligns with Wu’s disclosure as well, which explains that “[o]nce a node (AP) has joined the P2P network, the user (in user terminal) that node is responsible for must be registered with the P2P network.” EX1004, [0086].

113. Therefore, when the distributed synchronization protocol is implemented within the Saridakis–Wu system, the DULS instances residing in the APs would update as the APs and/or the UTs join or leave the ad hoc network.

Saridakis-Wu Combination



EX1003, Figure 4.

114. A POSITA would have found it obvious to implement both the “distributed synchronization protocol” and the “lazy update protocol” in Saridakis-Wu. Saridakis identifies the benefits to use each protocol, and does not require choosing only one of two protocols in its system. As Saridakis explains, the distributed synchronization protocol is “suitable for applications that are interested in monitoring such network events” as “joins and leaves of peers” (EX1003, [0023]), while “[t]he advantage of the lazy update protocol ... is that it produces network traffic only when this is necessary” (EX1003, [0067]). Accordingly, a POSITA would have been motivated to enable both protocols within Saridakis-Wu, such that the “distributed synchronization protocol” is for specific applications that require

monitoring network events such as joining and leaving of peers, e.g., “mobile presence applications” or “multiparty gaming sessions” (EX1003, [0023]), and alternatively, the “lazy update protocol” when minimizing network traffic is of higher priority to the applications or network.

115. A POSITA would have had a reasonable expectation of success in implementing both the “distributed synchronization protocol” and the “lazy update protocol” in Saridakis-Wu. First, Saridakis expressly contemplates using both protocols in mutually exclusive scenarios and does not teach implementation is limited to only one protocol. Second, enabling the system to alternate between the two protocols would have been a straightforward software-based adjustment, such as toggling configuration parameters to match network conditions or application requirements. The resulting behavior—employing one update protocol at one time and another at a different time—would have been entirely predictable. Thus, the combination represents the application of a known technique (the “distributed synchronization protocol”) to a known ad hoc network already implementing the “lazy update protocol,” to enable switching between the protocols ready for improvement (to accommodate “applications interested in monitoring such network events” as “joins and leaves of peers” (EX1003, [0023])) to yield predictable routine results (to selectively use one protocol or the other as needed).

6. Claim 3

- a) [3] The VoIP-capable network of claim 1, wherein updates to the local SIP registry of a VoIP node are communicated to remaining VoIP nodes in the isolated cluster by broadcasting one or more information packets containing local SIP registry information of the VoIP node.

116. Saridakis-Wu teaches or renders obvious the additional limitation of claim 3.

117. As discussed in Section VII.A.4.e) [1D], under the lazy update protocol in Saridakis-Wu, when an AP needs to resolve a user address in the SIP request but cannot resolve it using mappings in its DULS instance (EX1003, [0057]), it (via the DULS instance) “sends to ALL devices” discovered on the ad hoc network “an update request that contains the user address that needs to be resolved” and “*fragments* of [its own] local Repository, e.g. the most up-to-date or the *most recently acquired*.” (EX1003, [0059], Figure 2 (step 2e)). Saridakis further expands that the update request can be sent using “*multicast* ... if available.” EX1003, [0059].

118. As discussed in Section VII.A.5.a) [Claim 2], as an alternative, under the distributed synchronization protocol, one peer (e.g., AP in Saridakis-Wu) is designated a coordinating peer and maintains an updated view of the network. On initialization, a DULS instance exchanges handshake messages with all devices

discovered on the ad hoc network. See EX1013 (Bodlaener), [0042]-[0046]. During operation, when a DULS instance in a peer “receives indication ... that a given network address is not responding then it sends to the coordinating peer a *synchronize request* including the network address that is not responding.” EX1003, [0047]. When “the DULS instance of the coordinating peer receives a synchronize request, *it removes the non-responding network address (and the associated user addresses) from its local Repository* and sends to ALL remaining network addresses in the local Repository *a synchronize response with the [updated] contents of the local Repository*,” which are used by the remaining peers in the ad hoc network to update their own local Repositories. EX1003, [0048]-[0049]. Again, Saridakis explains that the synchronization response can be “*multicast* . . . if available.” EX1003, [0048]-[0049].

119. As seen in the discussion above, Saridakis provides that local repository information may be distributed to all devices in the ad hoc network as a “multicast” under either protocol. See EX1003, [0048]-[0049], [0059]. Saridakis further explains that such multicasting to all other nodes in the network is done by broadcasting. For example, in step 1j of the distributed synchronization protocol, Saridakis explains that “multicast can be used” to distribute information. EX1003, [0048]. In the accompanying figure (Figure 1) showing step 1j, Saridakis expressly describes the peer (via its DULS instance) “*broadcast[ing]* its contents to all network

addresses in it.” EX1003, Figure 1 (1j). Accordingly, a POSITA would have understood that Sardakis’ disclosure of multicasting to all devices encompasses broadcasting, as multicasting to all nodes is equivalent to broadcasting. This interpretation aligns with the conventional understanding in the field that “broadcast is special multicast in which the multicast group address specifies all terminals.” EX1011 (Seok), [0008]. At minimum, even if a distinction existed, it would have been obvious to substitute broadcasting for multicasting, since both techniques predictably achieve the same outcome—sending the same information to all receiving nodes in the network

120. Moreover, because Saridakis specifies that the ad hoc network may operate as a WLAN (EX1003, [0001], [0036]), the transmission of updates from a local Repository would occur through multicasting (or broadcasting) to all other APs using “*one or more information packets.*” This is consistent with established WLAN communication practices, as described in EX1012 (Palin), 3:37-38, which explains transmitting a “VoIP packet ... to the mobile terminal ... using the WLAN link.”

121. Accordingly, Saridakis-Wu discloses that updates to the local Repository in the DULS instance (“*updates to the local SIP registry of a VoIP node*”) are communicated to the rest of the peers in the ad hoc network (“*remaining VoIP nodes in the isolated cluster*”) by multicasting the contents of the local Repository to all other VoIP nodes (“*broadcasting ... local SIP registry information of the VoIP*”

node”). And since Saridakis identifies the ad hoc network as a WLAN (EX1003, [0001], [0036]), it follows that these updates would be transmitted as multicast or broadcast messages using “*one or more information packets.*”

7. Claim 4

- a) [4] The VoIP-capable network of claim 1, wherein the local SIP registry of a VoIP node is updated according to information received from another VoIP nodes in the isolated cluster in special information packets that each contain local SIP registry information of another VoIP node.**

122. Saridakis-Wu teaches the additional limitation of Claim 4.

123. As discussed in Section VII.A.4.e) [1D], a DULS instance (*local SIP registry*) in an AP (*VoIP node*) is updated using update response “*received from another VoIP nodes.*” In particular, after the DULS instance sends an “update request that contains the user address that needs to be resolved” to other APs in the ad hoc network (EX1003, [0059], Figure 2 (step 2e)), it receives an update response from one of those APs “contain[ing] the mapping of the user address extracted from the update request to the network address of the present device” obtained from its local Repository (EX1003, [0061]). The requesting DULS instance then “parses its first part and extracts the mapping of user address to network address,” and places “the extracted user address . . . in [its] local Repository.” EX1003, [0063]. “If the update response has a second part”—namely, “fragments of the local Repository,

e.g. the most up-to-date or the most recently acquired” of the responding DULS instance, it “MUST parse it and use its contents to update [its own] local Repository.” EX1003, [0061]-[0063]. As operation continues, this process may occur repeatedly as the DULS instance resolves multiple user addresses, thereby receiving and integrating update responses from various APs within the ad hoc network. Further, as explained in Section VII.A.6.a) [Claim 3], because the ad hoc network may operate as a WLAN, these update responses would be transmitted to the AP in the form of data packets. EX1003, [0001], [0036]; EX1012 (Palin), 3:37-38.

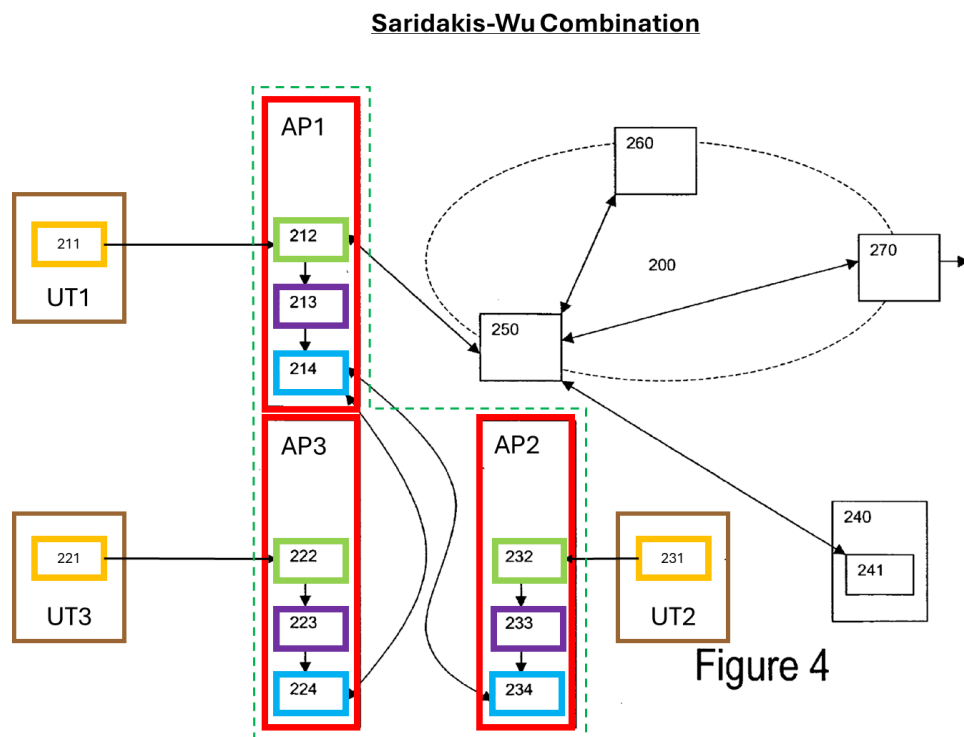
124. Accordingly, the DULS instance of the AP that sent the update request (“*local SIP registry of a VoIP node*”) is updated according to update responses received from other APs in the ad hoc network (“*information received from another VoIP nodes in the isolated cluster*”). Further, these update responses are transmitted from peer APs in the form of packets (“*special information packets*”), each of which includes the “mapping of the user address extracted from the update request to the network address of the present device” obtained from its local Repository (“*local SIP registry information of another VoIP node*”).

8. Claim 8

- a) [8] The VoIP-capable network of claim 1 wherein said nodes comprise mesh nodes.**

125. Saridakis-Wu teaches the additional limitation of claim 8.

126. The APs in Saridakis-Wu are “*mesh nodes*.” As shown in the figure below, for example, AP2 can form a multi-hop chain of communication with AP1 as relay node in a mesh configuration to the SIP Proxy 250 as the destination or communication gateway to the cellular network 200. In fact, Wu expressly discloses that the APs are implemented in “a corresponding multimedia network communication system for wireless *mesh* network.” EX1004, [0011].



EX1003, Figure 4.

9. Claim 9

- a) **[9] The VoIP-capable network of claim 8 wherein said mesh nodes provide VoIP optimized services within said mesh nodes.**

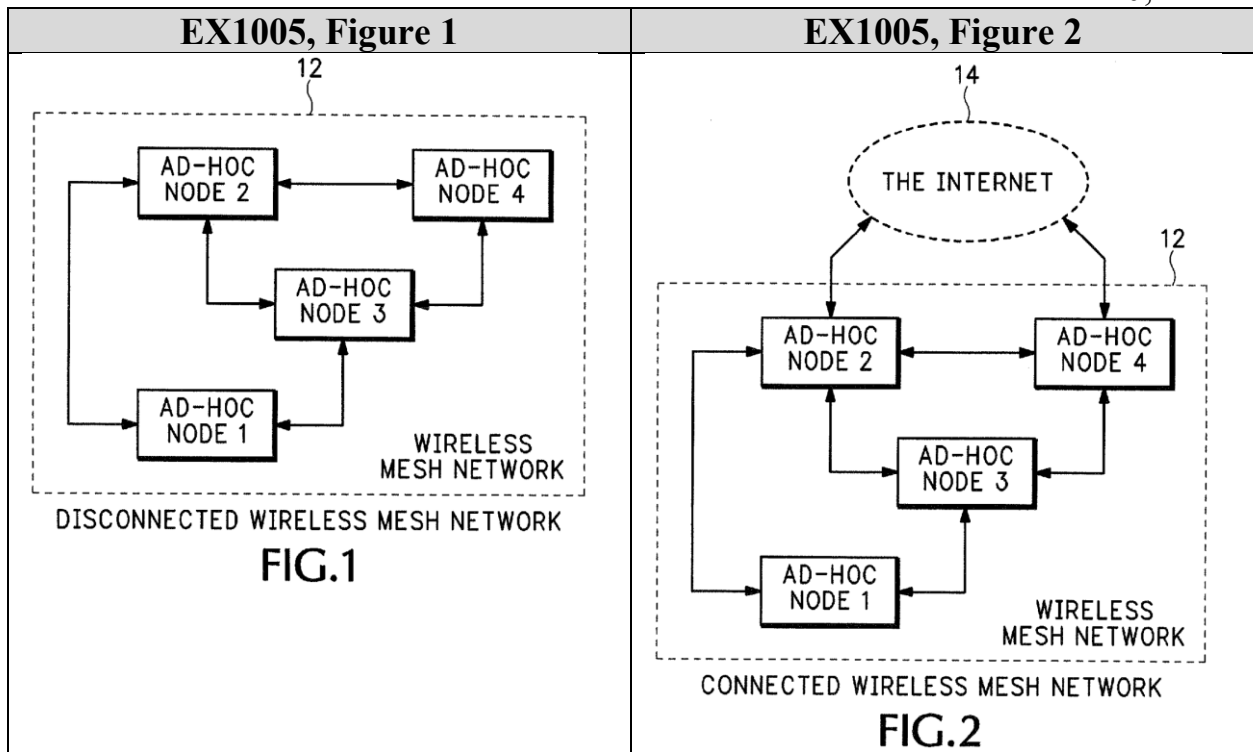
127. Saridakis-Wu teaches the additional limitation of claim 9. As discussed in Section VI.B [Claim Construction], I understand “VoIP optimized services” to include a SIP server service. As discussed in Section VII.A.4.a) [1Pre], Saridakis-Wu discloses an ad hoc network with APs that include distributed SIP functionality to support a SIP server service—namely, a local SIP Proxy, local SIP Registrar, and a DULS instance. *See* EX1003, [0018], [0034], [0078]. In turn, Wu discloses that “SIP ... can establish *voice sessions*.” EX1004, [0002]. Accordingly, the APs (“*said mesh nodes*”) provide a SIP server service within them.

B. Ground II: Saridakis In View Of Wu And Bauer Renders Obvious Claims 1-4, 7-10, And 12-13, 15-17.

1. Bauer (EX1005)

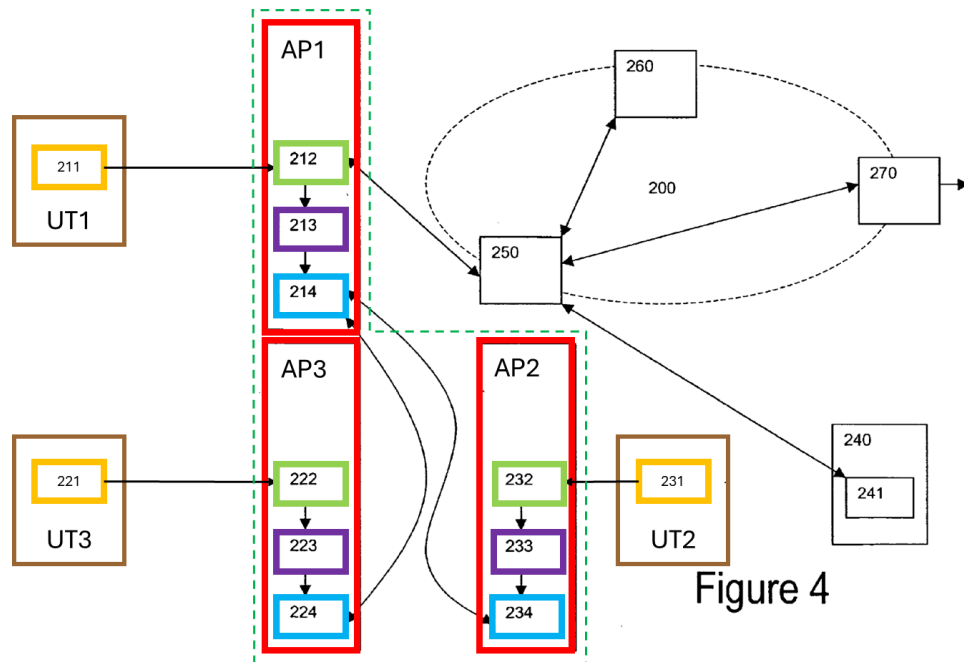
128. Bauer discloses a mesh network system in which nodes “are configured to access centralized Internet Protocol (IP) services whenever the Internet infrastructure is accessible and then dynamically switch to providing the IP services locally in the mesh network when the Internet infrastructure is not accessible.” EX1005, Abstract. Specifically, Bauer enables mesh nodes to “*dynamically switch to providing the IP services locally* in the mesh network when the Internet infrastructure is not accessible.” EX1005, [0005].

129. A mesh network, as Bauer explains, may be “permanently connected or disconnected” or “intermittently connected” to the Internet due to circumstances such as “mobility and radio range” of the mesh nodes; as presence of “centralized IP services . . . are not guaranteed.” EX1005, [0025]. For example, as illustrated below, Figure 1 of Bauer “shows a mesh network 12 that is currently disconnected from an Internet infrastructure,” and Figure 2 of Bauer “shows the same wireless mesh network 12, now connected to an IP infrastructure 14.” EX1005, [0023]-[0024]; *see also* EX1005, [0025] (“FIGS. 1 and 2 demonstrate how the mesh network 12 over its lifetime may be connected or disconnected from the Internet 14.”). In such a mesh network, Mesh Distributed Services (MDS) are used to “to support a wide variety of IP applications both when connected and disconnected from the Internet,” by “mimick[ing] centralized Internet services through collaborative cooperation between individual mesh nodes.” EX1005, [0022]; [0025]. For example, “Mesh Distributed Services (MDS) support any combination of different Internet Protocol (IP) services in a mesh network,” including the Domain Name System (DNS) and the Dynamic Host Configuration Protocol (DHCP). EX1005, [0022].



2. Saridakis-Wu, Further In View Of Bauer (“Saridakis-Wu-Bauer Combination”)

130. As discussed in Section VII.A.4.c) [Ground I, 1B], Saridakis-Wu discloses an “*isolated cluster*” because the ad hoc network in Saridakis-Wu operates in isolation from the cellular network 200, supporting SIP-based communication and related functions without reliance on the centralized infrastructure of the cellular system.



EX1003, Figure 4.

131. Saridakis-Wu teaches that APs in the ad hoc network may communicate with devices external to the ad hoc network (e.g., mobile device 240), by exchanging SIP request and response via the SIP Proxy 250 residing on the cellular network 200. *See* EX1003, [0080].

132. To the extent that the '762 Patent requires that the “*isolated cluster*” to be fully disconnected from the external network, Saridakis-Wu does not disclose the “*isolated cluster*” because its ad hoc network can still contact the cellular network 200. It would have been obvious to modify the system in Saridakis-Wu in view of Bauer to account for the ad hoc peer-to-peer network’s disconnection from the cellular network. The modification would have allowed the Saridakis-Wu system to

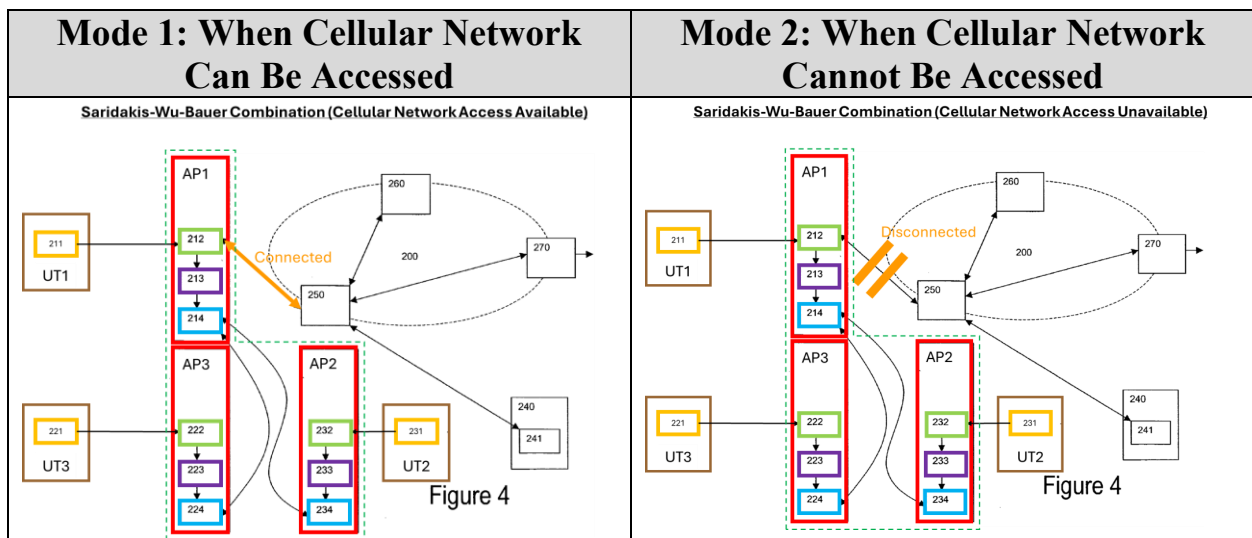
operate in two modes: one mode in which the network is disconnected from external infrastructure and provides IP services locally, and another in which it connects to the external network when connection is available.

133. As discussed in Section VII.B.1 [Bauer], Bauer provides that “[n]odes in a mesh network are configured to access centralized Internet Protocol (IP) services *when the Internet infrastructure is accessible* and then dynamically switch to providing the IP services locally in the mesh network *when the Internet infrastructure is not accessible*.” EX1005, [0005]. Bauer explains that a mesh network “over its lifetime may be connected or disconnected from the Internet 14” “depend[ing] on the circumstances of the mesh network 12, such as the mobility and radio range of the different nodes 1-4.” EX1005, [0025]. Likewise, Saridakis-Wu also teaches that peers in the ad hoc network are mobile due to “the spontaneous join or leave” “at their own will.” EX1003, [0002], [0004], [0006].

134. Accordingly, it would have been obvious to modify Saridakis-Wu to account for situations where the cellular network 200 is not accessible so that the APs continue to provide the SIP services locally, without relying on the centralized SIP entities in the cellular network 200, as Saridakis already describes. EX1005, [0005].

135. When the cellular network 200 is accessible to the ad hoc network, the APs can communicate with the centralized SIP entities in the cellular network 200,

for example, to establish SIP communication with devices external to the ad hoc network, as described in Saridakis. *See* EX1003, [0080]. As illustrated in the figure below, in this combination, the Saridakis-Wu system would “dynamically switch” between two operating modes each mode depending on the ad hoc network’s connectivity to the cellular network. *See* EX1005, [0005], [0027], [0058].



136. A POSITA would have been motivated to combine Saridakis-Wu with Bauer as described above, for three reasons.

137. **First**, Saridakis-Wu already contemplates provision of SIP service within the ad hoc network in two modes: (1) providing SIP service locally among APs isolated from isolated from the cellular network 200, i.e., without reliance on a centralized server (EX1003, [0015], [0079], Section VII.A.4.c) [Ground I, 1B]); and (2) using the central facility in the cellular network 200 to provide SIP service when it is available (*see* EX1003, [0080]). Accordingly, a POSITA would have been

motivated to configure Saridakis-Wu to support both operational modes, dynamically switching between them depending on the accessibility of cellular network access, consistent with Bauer’s teachings. This modification would have been a straightforward application of a known technique (Bauer’s network-dependent mode switching) to an analogous system (Saridakis-Wu’s system that can operate with or without access to the cellular network 200), to achieve predictable results by allowing SIP services to be provided either locally within the ad hoc network or through the cellular network depending on the availability of the cellular network.

138. **Second**, Bauer provides express motivation for the combination. Bauer teaches that that its technique is applicable for DNS applications that “resolv[es] human readable names such as ‘machine.company.com’ into Internet Protocol (IP) addresses.” EX1005, [0052]. As Saridakis explains, “a user-location service is similar to other directory services that provide information about the presence of machines, services or content in a network, including DNS “that maps machine names to IP addresses.” EX1003, [0025]; [0004] (“a user-location service provides a mapping of a user address, . . . like a SIP address (e.g. sip:titos.saridakis@snokia.com) or an email address (e.g. mailto:titos.saridakis@nokia.com), to the network address.”). As such, the DNS service, as taught by Bauer, is akin to the user-location service in Saridakis-Wu, as

both resolve human-readable identifiers (e.g., user addresses) to network addresses.

Accordingly, a POSITA would have recognized that Bauer’s dynamic switching mechanism could readily be applied to the user-location and SIP service framework of Saridakis-Wu, and therefore would have been motivated to adopt Bauer’s technique to enable adaptive SIP service operation based on network connectivity.

139. **Third**, a POSITA would have also appreciated that the ad hoc network formed by the APs in Saridakis-Wu is functionally equivalent to the “wireless mesh network” described in Bauer, making Bauer’s approach directly applicable. Bauer explains that “[a] wireless mesh network generally refers to a set of wireless devices, referred to as nodes, that join together to form an Internet Protocol (IP) based network.” EX1005, [0002]. Similarly, the APs in Saridakis-Wu are wireless nodes that interconnect to form a WLAN—an IP-based network. EX1003, [0001]; EX1004, [0059]. Further, both Bauer and Saridakis-Wu contemplate an ad hoc network. *See* EX1004, Figure 1 (describing a wireless mesh network consisting of “ad-hoc” nodes); EX1003, [0018]. Thus, a POSITA would have readily recognized that Bauer’s dynamic switching technique can be seamlessly implemented in Saridakis-Wu, and thus would have been motivated to apply it.

140. A POSITA would have had a reasonable expectation of success in combining Saridakis-Wu with Bauer, for two reasons.

141. **First**, Saridakis-Wu is highly compatible with Bauer; both disclose deploying distributed IP services without dependence on centralized entities by incorporating the functionality of IP entities within nodes in the ad hoc network. *See* EX1003, [0015]; EX1004, [0003], [0040]; EX1005, Abstract, [0022], [0025]. For example, in Saridakis-Wu, “entities specified in the SIP protocol [are deployed] among peers [(APs)] in an ad hoc network and combining the SIP Registrar with the DULS in order to allow the use of SIP in ad hoc, peer-to-peer networks.” EX1003, [0018]. Likewise, Bauer teaches deploying Mesh Distributed Services (MDS) that “support any combination of different Internet Protocol (IP) services in a mesh network.” EX1005, [0022]. Moreover, as discussed above, the distributed SIP registry services described in Saridakis-Wu closely parallel the distributed DNS service architecture described in Bauer, both employing decentralized mechanisms to maintain and resolve network address mappings.

142. **Second**, Saridakis–Wu already contemplates operation of the ad hoc network independently of the cellular network, and discloses the necessary components to provide SIP services locally. *See, e.g.*, EX1003, [0014]-[0016], [0078]-[0079]; EX1004, [0011]-[0013]. Thus, modifying the system in view of Bauer to detect whether the ad hoc network is disconnected from the cellular network—using standard techniques described in Bauer (EX1005, [0027])—and disabling reliance on centralized SIP entities when disconnected would have been a

routine design choice. Such an implementation would predictably result in the network providing SIP services locally within the ad hoc domain, without dependence on a “central facility.” EX1003, [0015].

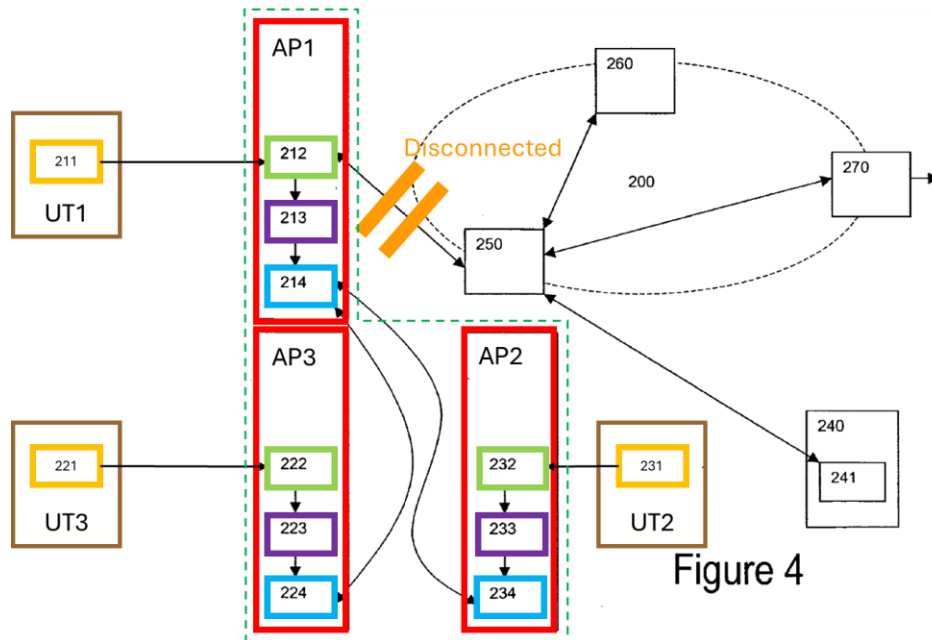
3. Claims 1-4, 8, And 9

143. As discussed in Sections VII.A.4-VII.A.9 [Ground I, Claims 1-4, 8, And 9], Saridakis-Wu renders obvious claims 1-4, 8, and 9. Nonetheless, even supposing that Saridakis-Wu is found not to render these claims obvious because its ad hoc network is determined not to teach the claimed “*isolated cluster*,” claims 1-4, 8, and 9 would still have been obvious in view of Saridakis-Wu-Bauer Combination.

144. Saridakis-Wu-Bauer Combination discloses all limitations of claims 1-4, 8, and 9 except for the “*isolated cluster*,” as discussed in Ground I. See Sections VII.A.4-VII.A.9 [Ground I, Claims 1-4, 8, And 9]. Furthermore, as discussed in Section VII.B.2, in Saridakis-Wu-Bauer, the ad hoc network is an “*isolated cluster*” because the ad hoc network can support provision of the SIP service locally even if it is disconnected or isolated from the cellular network 200 and there is no communication with the cellular network 200. See Section VII.B.2 [Saridakis-Wu-Bauer Combination]. This isolated configuration of the ad hoc network mirrors the “*isolated cluster*” described in the ’762 Patent, which explains that “[i]f one or more network nodes later become *isolated from the path to the external SIP server*, any

VoIP clients connected to an isolated node or nodes that form an *isolated cluster* with network connections within the isolated cluster can still initiate and continue VoIP conversations within the isolated cluster.” EX1001, 4:2-8; 5:4-7.

Saridakis-Wu-Bauer Combination (Cellular Network Access Unavailable)



EX1003, Figure 4.

145. Accordingly, the ad hoc network in its isolated mode is the claimed *“isolated cluster.”*

4. Claim 7

- a) [7] The VoIP-capable network of claim 1, further comprising means of connecting the isolated cluster to an external network, wherein upon connection to an external network, the SIP registry of an external SIP server connected to the external network is updated to include SIP registry information from the VoIP nodes.

146. Saridakis-Wu-Bauer Combination teaches the additional limitation of claim 7.

147. **First**, Saridakis discloses “*means of connecting the isolated cluster to an external network.*” As discussed in Section VI [Claim Construction], the term “means of connecting” should be interpreted as “software and/or hardware elements” for “connecting the isolated cluster to an external network.” In Saridakis-Wu, the local SIP proxy—implemented within an Access Point (AP), which constitutes a hardware element—serves this connecting function by communicating with the SIP proxy 250 located in the cellular network. Through this interaction, the ad hoc network (“*isolated cluster*”) is connected to the cellular network (“*external network*”). EX1003, [0080] (“the local Proxy 212 forwards the initial SIP request to the SIP Proxy 250 on the cellular network.”).

148. **Second**, Saridakis-Wu-Bauer Combination discloses “*wherein upon connection to an external network, the SIP registry of an external SIP server connected to the external network is updated to include SIP registry information*

from the VoIP nodes.” As discussed in Section VII.B.2 [Saridakis-Wu-Bauer Combination], the APs “are configured to access centralized Internet Protocol (IP) services [on the cellular network] ***when the Internet infrastructure is accessible.***” EX1005, [0005]. For example, when a SIP UA (user terminal in Saridakis-Wu-Bauer Combination) registers for SIP services, it can register with the SIP registrar on the cellular network 200. As Saridakis explains, SIP UAs send “REGISTER requests in order register the network address where they are located” to a SIP Registrar, “which they contact to resolve a SIP address to the network address where a SIP request must be sent.” EX1003, [0070]. In Saridakis-Wu, to contact with an external SIP Registrar, the SIP UA is first “configured to contact the local SIP Proxy” in the AP (“*VoIP node*”) assigned to the SIP UA. EX1003, [0076]. The local Proxy then “***forward[s] REGISTER requests*** both to the local Registrar and to ***the SIP Proxy*** residing ***on the cellular network***, which further forwards them to ***the SIP Registrar*** residing on the cellular network” (“*SIP registry of an external SIP server connected to the external network*”). EX1003, [0076]. Accordingly, because the REGISTER request delivers “the network address” of the SIP UA (user terminal in Saridakis-Wu-Bauer Combination) to be registered with the SIP Registrar residing on the cellular network, and subsequently SIP addresses to be resolved to network addresses “where a SIP request must be sent,” the SIP Registrar residing on the

cellular network is thus updated to include network and SIP address information in REGISTER requests forwarded by the local Proxy in the AP (*“VoIP node”*).

149. Accordingly, “when the Internet infrastructure is accessible” (EX1005, [0005]), the SIP Registrar of the cellular network (*“the SIP registry of an external SIP server connected to the external network”*) is updated to include network and SIP address information in the REGISTER requests (*“SIP registry information”*) received from the APs (*“the VoIP nodes”*).

5. Claim 10

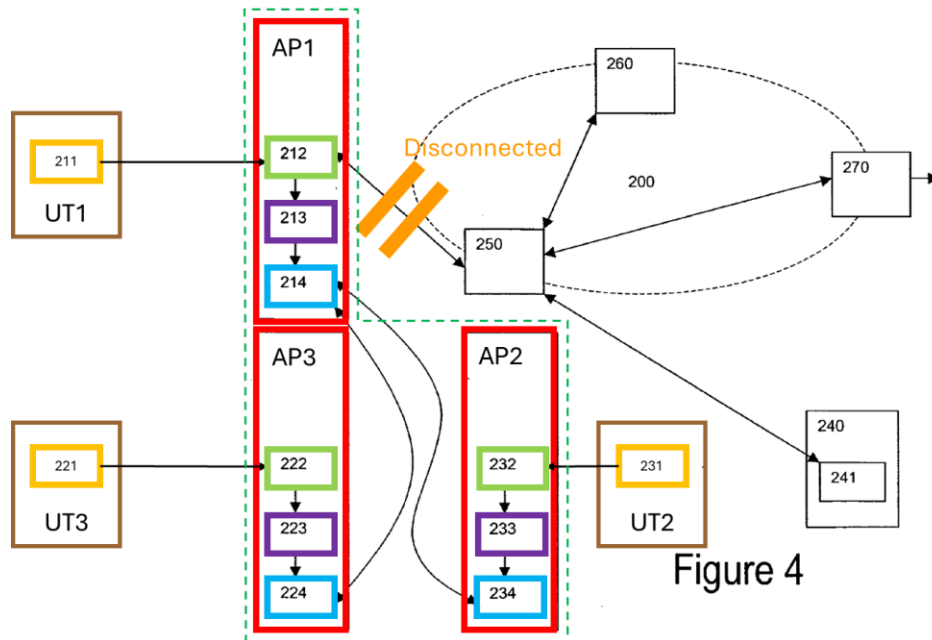
a) [10 Pre] A method of maintaining VoIP capabilities within a network comprising:

150. Saridakis-Wu-Bauer Combination teaches [10Pre] for the reasons provided in Section VII.A.4.a) [Ground I, 1Pre] and Section VII.B.2 [Saridakis-Wu-Bauer Combination].

151. For example, Saridakis describes a *“method* [that] allows the use of SIP in ad hoc, peer-to-peer networks.” EX1003, [0034]. As discussed in Section VII.A.4.a) [Ground I, 1Pre], Saridakis-Wu further demonstrates that the SIP service implemented within the ad hoc network is capable of supporting VoIP functionality. Moreover, as explained in Section VII.B.2 [Saridakis-Wu-Bauer Combination], the SIP/VoIP service can be deployed in a system that includes an ad hoc network—i.e., “within a network.” EX1005, [0005], [0027], [0058].

39), the user terminals in Saridakis-Wu (and, hence, in Saridakis-Wu-Bauer Combination) gain connectivity to a network through communication with a nearby AP. EX1004, [0023], [0030], [0060], [0066].

Saridakis-Wu-Bauer Combination (Cellular Network Access Unavailable)



154. **Second**, Saridakis-Wu-Bauer Combination discloses or renders obvious that “two or more ... network nodes” are “initially isolated,” as explained in Section VII.B.2 [Saridakis-Wu-Bauer Combination]. For example, as Bauer explains, “[n]odes in a mesh network are configured to . . . provid[e] the IP services locally in the mesh network *when the Internet infrastructure is not accessible*.” EX1005, [0005]. “[W]hen the mesh network reestablishes communication with the Internet infrastructure,” Bauer then explains, the nodes “dynamically *switchback* to using the [Internet entity].” EX1005, Claim 8. Accordingly, Bauer, and thus

Saridakis-Wu-Bauer Combination, contemplates an operational model in which the ad hoc network initially functions as an isolated cluster and then “dynamically switch[es]” between isolated and connected modes depending on the availability of the external network. EX1005, [0005], [0027], [0058].

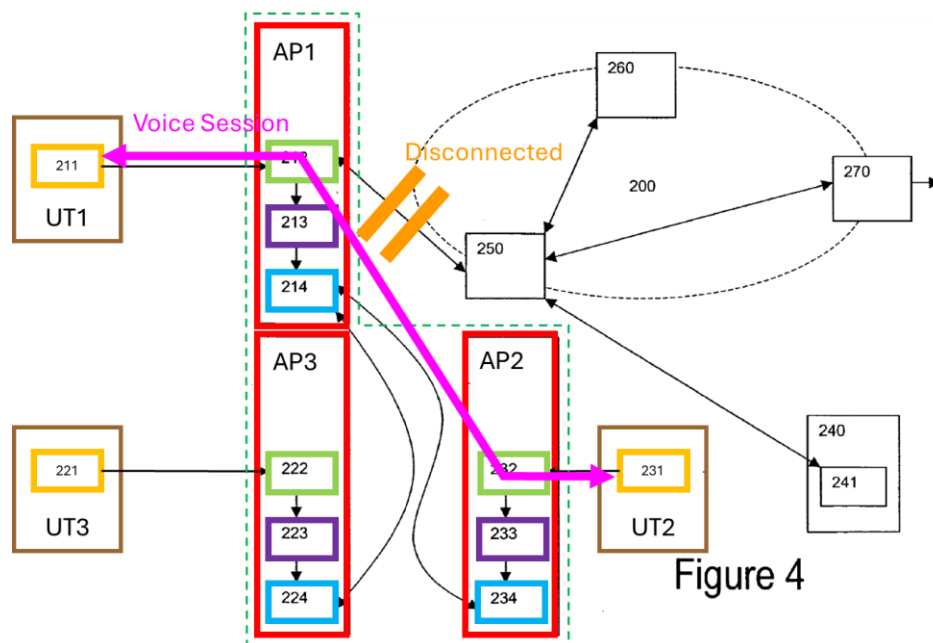
155. To the extent Bauer does not expressly describe the disconnected network as a starting network configuration, it would nonetheless have been obvious to configure the ad hoc network to begin operation as an isolated cluster and then “dynamically switch” between operational modes depending on the availability of the external network. Implementing such a configuration would have been a routine and predictable design choice, as the initial state of the ad hoc network does not affect the functionality or performance of the system in Saridakis-Wu-Bauer Combination.

- c) **[10B] establishing communications between two or more client devices by way of the initially isolated network nodes, wherein in a first configuration, at least two of said initially isolated network nodes are in communication with each other but not in communication with an external SIP server, and wherein each of said at least two initially isolated network nodes supports VoIP communications based on a local SIP registry contained in each of the said nodes according to the method of:**

156. Saridakis-Wu-Bauer Combination teaches [10B].

157. **First**, Saridakis-Wu-Bauer Combination discloses “*establishing communications between two or more client devices by way of the initially isolated network nodes*” as discussed in Section VII.A.4.f) [Ground I, 1E]. As illustrated in the figure below, the user terminal 1 (UT1) and the user terminal 2 (UT2) (“*two or more client devices*”) establish SIP communication with each other using AP1 and AP2 (“*the initially isolated network nodes*”). As discussed in Section VII.A.4.d) [1C], each of user terminals (*two or more client devices*) in Saridakis-Wu’s ad hoc network communicate with its nearby AP (*initially isolated network node*) via communication between its SIP UA and the AP’s local Proxy to route SIP requests. Saridakis explains that “SIP UA [i.e., user terminal in Saridakis-Wu-Bauer] ***handles SIP communication***” by exchanging SIP requests and responses with other SIP UAs. EX1003, [0026]. Specifically, the “SIP UA 211 sends a SIP request to the SIP UA 231” “over the ad hoc network” formed by AP1 and AP2. EX1003, [0079].

Saridakis-Wu-Bauer Combination (Cellular Network Access Unavailable)



EX1003, Figure 4.

158. **Second**, Saridakis-Wu-Bauer Combination discloses “*wherein in a first configuration, at least two of said initially isolated network nodes are in communication with each other but not in communication with an external SIP server.*” As discussed in Section VII.A.4.c) [Ground I, 1B], AP1 and AP2 (“*at least two of said initially isolated network nodes*”) “*are in communication with each other.*” As further discussed in Sections VII.B.5.b) [Ground II, 10A] and VII.B.2 [Saridakis-Wu-Bauer Combination], when the ad hoc network is disconnected from the cellular network 200 (“*in a first configuration*”), AP1 and AP2 are “*not in communication with*” either the SIP Proxy 250 or the SIP Registrar 260 (“*external SIP server*”). EX1003, [0078]; EX1005, [0005], [0027], [0058].

- a) **[10B-1] communicating with at least one other initially isolated node to exchange SIP registry information; [10B-2] updating the local SIP registry in said node as new information is acquired;**

160. Saridakis-Wu-Bauer Combination teaches [10B-1] and [10B-2].

161. As discussed in Section VII.A.4.e) [Ground I, 1D], the DULS instance in an AP (*local SIP registry in said node*) can be built using “a lazy update protocol.” EX1003, [0053], Figure 2. Under the lazy update protocol, a DULS instance sends synchronization request to update its local Repository, which contains mapping information between SIP and network address, when it receives “a request to resolve a user address” but “the information in the local repository is invalid (e.g. because the indicated peer has left the network) or the local repository does not have any information regarding a specified user.” EX1003, [0024], [0057], Figure 2 (step 2c). “If the user address is NOT in the local Repository” (EX1003, [0057]), that DULS instance multicasts to its peers (DULS instances) in residing on other APs in Saridakis-Wu-Bauer Combination in the ad hoc network “*an update request*” (EX1003, [0059], Figure 2 (step 2e)).

162. Upon receipt of an update request by a DULS instance in another AP (“*at least one other initially isolated node*”), that responding DULS instance may “send back to the requesting DULS instance an update response.” EX1003, [0061]. The update response can include two parts: (1) the first part containing “the mapping

of the user address extracted from the update request to the network address of the present device” and, optionally, (2) “a second part that contains fragments of [its] local Repository, e.g. the most up-to-date or the most recently acquired.” EX1003, [0061]-[0062].

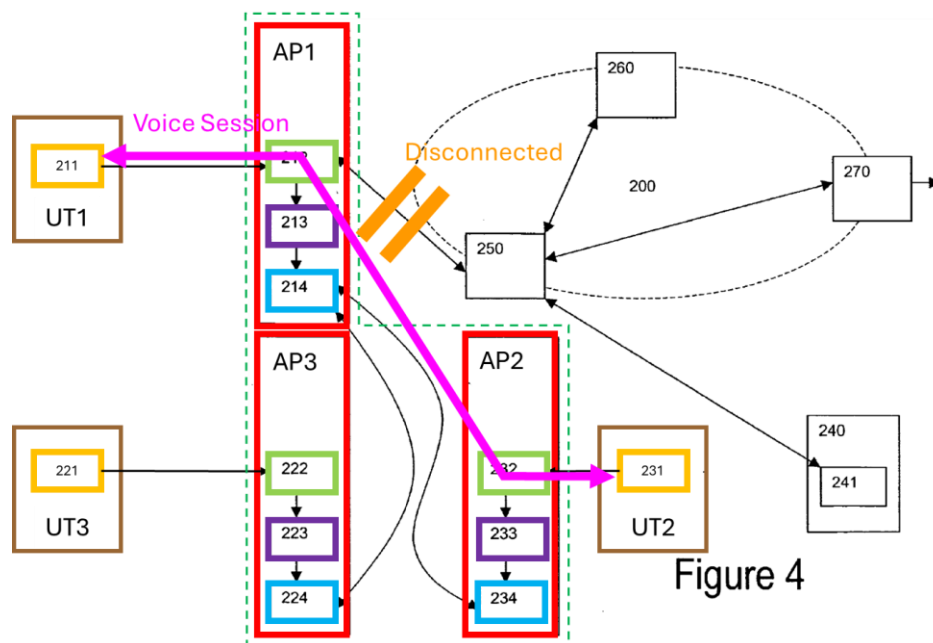
163. When the requesting DULS instance receives the update response, it “parses . . . and extracts the *mapping of user address to network address*” and places “[t]he *corresponding mapping . . . in [its] local Repository*.” EX1003, [0063]. “If the update response has a second part (this is optional), the DULS instance MUST parse it and use its contents to *update the local Repository*.” EX1003, [0063]. Through this process, the requesting DULS instance in one AP communicates the responding DULS instance in a responding AP to exchange information stored in local Repository (“*SIP registry information*”) and to update its local Repository (“*the local SIP registry*”) it receives local Repository information (“*new information*”) from the responding AP.

- b) **[10B-3] sending and receiving VoIP packets from a sender isolated node to one or more recipient isolated nodes based on said local SIP registry functionality when a client device in communication with the sender node establishes communication with a client device in communication with the recipient node.**

164. Saridakis-Wu-Bauer Combination teaches [10B-3].

165. **First**, Saridakis-Wu-Bauer Combination discloses “*sending and receiving VoIP packets from a sender isolated node to one or more recipient isolated nodes.*” Saridakis explains that “SIP UA **handles SIP communication**” by exchanging SIP requests and responses with other SIP UAs. EX1003, [0026] (“The SIP UA handles SIP communication, i.e. it creates SIP requests/responses to be sent to other peers and parses SIP requests/responses sent by other peers.”). Saridakis-Wu-Bauer teaches that “SIP UA 211 sends a SIP request to the SIP UA 231” “over the ad hoc network” formed by APs, as shown below. EX1003, [0079]. As discussed in Section VII.A.4.a) [Ground I, 1Pre], the sending and receiving of SIP requests and responses establish a SIP session, which enables voice communication over an IP network between user terminals. EX1012 (Palin), 3:37-38. As discussed in Sections VII.A.4.a) [Ground I, 1Pre] and VII.A.6.a) [Ground I, Claim 3], in Saridakis-Wu, the ad hoc network can be a WLAN operating using Internet Protocol, which was known to carry packets. Thus, Saridakis-Wu-Bauer Combination discloses that APs in the ad hoc network (“*a sender isolated node*” and “*one or more recipient isolated nodes*”) “*send[] and receiv[e] VoIP packets*” carrying SIP requests/responses and, subsequently, voice communication.

Saridakis-Wu-Bauer Combination (Cellular Network Access Unavailable)



EX1003, Figure 4.

166. **Second**, Saridakis-Wu-Bauer Combination discloses sending and receiving VoIP packets “based on said local SIP registry functionality” for the reasons discussed in Section VII.A.4.f) [Ground I, 1E]. As Saridakis explains, “when the SIP UA 211 sends a SIP request to the SIP UA 231, the following sequence of interaction happens,” wherein the local Registrar (residing on the AP in Saridakis-Wu) is used by the SIP UA 211 (residing on the UT in Saridakis-Wu) to “resolve” the SIP address of the intended recipient of the SIP request:

First, the local Proxy 212 receives the SIP request, extracts the SIP address of the intended recipient and tries to resolve it with the **local Registrar 213**, which, in turn, **retrieves the correct mapping from the DULS instance 214**. Having resolved the SIP address of the intended

recipient, *the local Proxy 212 forwards over the ad hoc network (e.g. a Bluetooth piconet) the SIP request to the SIP UA 231.*

EX1003, [0079].

167. *Third*, Saridakis discloses that the VoIP packets are sent and received “when a client device in communication with the sender node establishes communication with a client device in communication with the recipient node” for the reasons provided in Section VII.A.4.f) [Ground I, 1E]. As Saridakis explains, “SIP UA handles SIP communication” by exchanging SIP requests and responses with other SIP UAs. EX1003, [0026] (“The SIP UA handles SIP communication, i.e. it creates SIP requests/responses to be sent to other peers and parses SIP requests/responses sent by other peers.”). Saridakis further teaches that “SIP UA 211 sends a SIP request to the SIP UA 231” “over the ad hoc network” comprising APs. EX1003, [0079].

6. Claim 12

- a) **[12] The method of claim 10, further comprising updating the local SIP registries of the isolated nodes as nodes and clients join and leave the isolated cluster.**

168. Saridakis-Wu-Bauer Combination teaches the additional limitation of claim 12 for the reasons provided in Section VII.A.5.a) [Ground I, Claim 2].

7. **Claim 13**

- a) **[13] The method of claim 10, wherein updates to the local SIP registry of each node is communicated to remaining nodes in the cluster by broadcasting an information packet containing the local SIP registry information.**

169. Saridakis-Wu-Bauer Combination teaches the additional limitation of claim 13 for the reasons provided in Section VII.A.6.a) [Ground I, Claim 3].

8. **Claim 15**

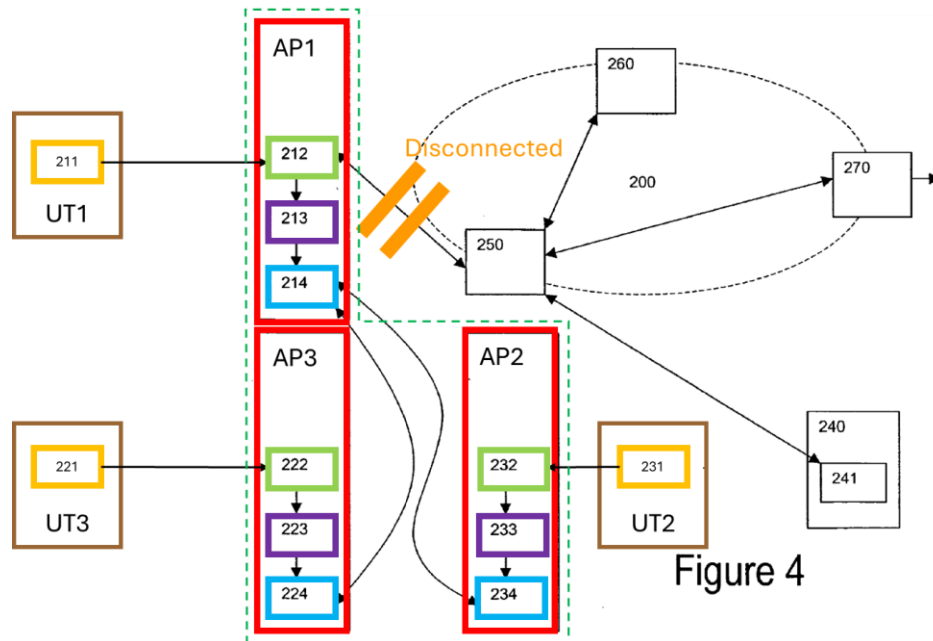
- a) **[15Pre] A VoIP capable network comprising:**

170. Saridakis-Wu-Bauer Combination teaches [15Pre] for the reasons provided in Section VII.A.4.a) [Ground I, 1Pre].

- b) **[15A] a first initially isolated network node in communication with at least two VoIP clients, wherein the first isolated node further comprises a local SIP registry wherein said SIP registry contains address identifiers for each VoIP clients in communication with the first node; and**

171. Saridakis-Wu-Bauer Combination teaches [15A].

172. **First**, Saridakis-Wu-Bauer Combination discloses or renders obvious “a first initially isolated network node in communication with at least two VoIP clients.” As discussed in Section VII.B.5.b) [Ground II, 10A], each AP in Saridakis-Wu-Bauer Combination may be “initially isolated,” or, it would have been at least obvious to configure the ad hoc network to operate in an initially isolated cluster of isolated nodes.



EX1003, Figure 4.

173. Further, in Saridakis-Wu, a single AP can be shared by multiple user terminals. In Saridakis-Wu, the “user terminal can establish a session with *any* user terminals that have registered with the network” as illustrated in Figure 6 (below). EX1004, [0058], [0073]. *See also* EX1004, [0035], [0064], [0095]. As discussed in Section VII.A.3.a) [Saridakis-Wu Combination], a POSITA would have been motivated to combine Saridakis and Wu for enhanced scalability, wherein the ad hoc network can deploy a single AP that is connected to multiple user terminal, without having to set up an AP for each terminal.

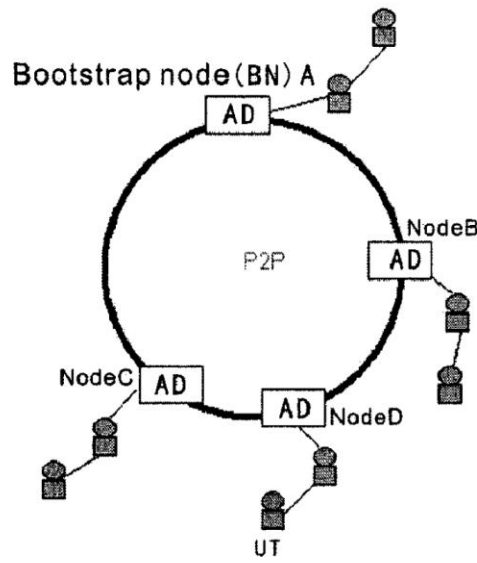


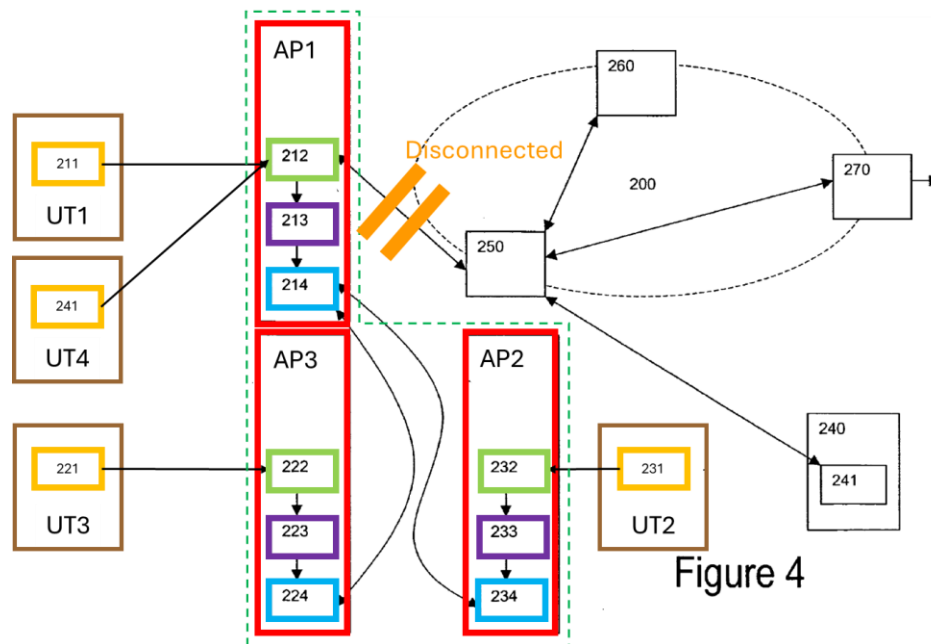
FIG. 6

EX1004, Figure 6.

174. Accordingly, a POSITA would have understood Saridakis-Wu-Bauer Combination to teach a configuration in a single AP resource can be shared by multiple UTs, as illustrated below. It would have been at least obvious to implement such a configuration, since Wu explicitly discloses an arrangement where multiple UTs communicate through a single AP (EX1004, Figure 6). Moreover, the APs in Saridakis-Wu-Bauer include both a local Registrar and a DULS instance, each capable of managing and maintaining mappings for multiple user terminals. *See* EX1003, [0014] (“The DULS is based on local repositories in terminals present in an ad hoc, peer-to-peer network, which store mappings of user-addresses to network addresses of the terminals present in the network.”); [0026]. Thus, the configuration

shown below would have merely involved combining known elements (the system in Saridakis-Wu-Bauer Combination provided in Section VII.B.2 and multiple user terminals in Wu) using established techniques for registering multiple terminals via the local Registrar and DULS instance in an AP. Such a modification would have yielded predictable and expected results, namely enabling a single AP to provide SIP services to multiple user terminals.

Saridakis-Wu-Bauer Combination (Cellular Network Access Unavailable)



EX1003, Figure 4.

175. Thus, Saridakis-Wu-Bauer Combination discloses or renders obvious AP1 (“a first initially isolated network node”) in communication with UT1 and UT4 (“at least two VoIP clients”).

176. **Second**, Saridakis-Wu-Bauer Combination discloses “*the first isolated node further comprises a local SIP registry*” as discussed in Section VII.A.4.e) [Ground I, 1D].

177. **Third**, Saridakis-Wu-Bauer Combination discloses “*wherein said SIP registry contains address identifiers for each VoIP clients in communication with the first node.*” For example, in Saridakis-Wu-Bauer Combination, to register for SIP services, the SIP UAs register with the ad hoc network and resolve SIP address using the local registrar and DULS instance present in the AP. EX1003, [0076] (“The local Proxy is responsible for forwarding REGISTER requests both to ***the local Registrar and to the SIP Proxy*** ...[and] the local Registrar uses the ***DULS*** to ***store and to obtain mappings of SIP addresses to network addresses.***”); [0070]. Accordingly, the local Registrar and the DULS instance (“*SIP registry*”) contain the network addresses and SIP addresses (“*address identifiers*”) for the registered user terminals (i.e., “*each VoIP clients in communication with the first node*”).

- c) **[15B] wherein VoIP communication between said at least two VoIP clients are initiated by utilizing the local SIP registry, wherein the first isolated node further comprises communications means with other isolated nodes wherein the first isolated node broadcasts its SIP registry information to other nodes in communication with the first node.**

178. Saridakis-Wu-Bauer Combination teaches [15B].

179. **First**, Saridakis-Wu-Bauer Combination discloses “*wherein VoIP communication between said at least two VoIP clients are initiated by utilizing the local SIP registry*” for the reasons discussed in Section VII.A.4.f) [Ground I, 1E]. As Wu explains, in Saridakis-Wu, the “user terminal can establish a session with **any** user terminals that have registered with the network.” EX1004, [0073]. See also EX1004, [0064], [0095]. Further, as discussed in Section VII.A.3.a) [Saridakis-Wu Combination], a POSITA would have been motivated to combine Saridakis and Wu for enhanced scalability, wherein the ad hoc network can deploy a single AP that is connected to multiple user terminal, without having to set up an AP for each terminal. Accordingly, Saridakis-Wu-Bauer Combination discloses setting up the VoIP communication between two VoIP clients assigned to the same AP.

180. **Second**, Saridakis-Wu-Bauer Combination discloses “*wherein the first isolated node further comprises communications means with other isolated notes.*” The term “notes” appears to be a typo. For purposes of my Declaration, I interpret the term “notes” as “nodes.” As discussed in Section VI.B [Claim Construction], I interpret “*communications means*” as referring to a component for communication. As discussed in Section VII.A.4.c) [Ground I, 1B], each AP communicates with other APs in the ad hoc network via communication between each AP’s local Proxy and DULS instance. See EX1003, [0042]-[0043], [0059]-[0060], [0078]-[0079].

181. **Third**, Saridakis-Wu-Bauer Combination discloses “*wherein the first isolated node broadcasts its SIP registry information to other nodes in communication with the first node*” as explained in Section VII.A.6.a) [Ground I, Claim 3].

9. Claim 16

- a) [16] The VoIP capable network of claim 15, wherein the local SIP registry of the first isolated node is updated as the VoIP clients establish or terminate a network connection with the first isolated node.

182. Saridakis-Wu-Bauer Combination teaches the additional limitation of claim 16 for the reasons provided in Section VII.A.5.a) [Ground I, Claim 2].

10. Claim 17

- a) [17] The VoIP capable network of claim 15, wherein first isolated node comes into communication with other isolated nodes to form a cluster, and the local SIP registry information of each isolated node in the cluster is updated according to information received from other isolated nodes in the cluster.

183. Saridakis-Wu-Bauer Combination teaches the additional limitation of claim 17.

184. **First**, Saridakis-Wu-Bauer Combination discloses “*wherein first isolated node comes into communication with other isolated nodes to form a cluster.*” As discussed in Section VII.B.3 [Ground II, Claim 1], an AP in the ad hoc

network (e.g., AP1) comes into communication with other APs (e.g., AP2, AP3) to form an isolated cluster.

185. **Second**, Saridakis-Wu-Bauer Combination discloses “*the local SIP registry information of each isolated node in the cluster is updated according to information received from other isolated nodes in the cluster*” as discussed in Section VII.A.4.e) [Ground I, 1D].

C. Ground III: Saridakis In View Of Wu, Bauer, And Kelly Renders Obvious Claims 5, 6, 9, 14, And 18-21.

1. Saridakis-Wu-Bauer, Further In View Of Kelly (“Saridakis-Wu-Bauer-Kelly Combination”)

186. In Saridakis-Wu-Bauer Combination, network components (e.g., APs and UTs) are assigned a network address, such as an IP address. *See* EX1003, [0036] (“according to the first embodiment, the set of network addresses is totally ordered (i.e. for any two network addresses X and Y, either $X \leq Y$ or $Y \leq X$). This assumption implies that there is a single device with ‘smallest’ address in the network, which will play the role of the coordinating peer. It is to be noted that this assumption is hardly restrictive since it is satisfied by Bluetooth MAC addresses, 802.11 (WLAN) MAC addresses and **IP addresses**”). As Saridakis explains, “if **IP addresses** are used as network addresses, the current network address of a device may change every time the device connects to a different network.” EX1003, [0039]. It was well known in the art that the “service to set IP addresses and other relevant network

parameters”—called the Dynamic Host Configuration Protocol (“DHCP”)—is a “centralized IP service[]” provided by an external Internet infrastructure. EX1005, [0002]-[0004]. As both Saridakis and Bauer explain, such “centralized IP service[] [is] not always available” and is “unsuitable for ad hoc, peer-to-peer networks” (EX1003, [0004]), a POSITA would have been motivated to seek out solutions disclosed in the prior art for locally assigning IP addresses within an ad hoc environment, including for client devices (UTs) associated with peer nodes (APs).

187. The concept of implementing a DHCP service in an ad hoc or mesh network, as in the Saridakis-Wu-Bauer configuration, was well known in the art. For example, Bauer itself teaches Mesh Distributed Services are used to “support any combination of different Internet Protocol (IP) services,” including the Dynamic Host Configuration Protocol (DHCP), by “mimick[ing] centralized Internet services through collaborative cooperation between individual mesh nodes.” EX1005, [0022]. For example, Kelly also discloses distributed DHCP service, by “distributing the address space management of an ad-hoc network across multiple computing devices included on the network.” EX1006, [0030]. *See also* EX1006, Abstract.

188. Figure 4 of Kelly (copied below) illustrates such distributed DHCP service. Like Saridakis-Wu-Bauer, Kelly depicts a network architecture that includes “peer-to-peer (P2P) network 402, peer-to-peer (P2P) computing devices

(e.g., mesh boxes) 404, 406, 408, client subnets 410, 420, and client computing devices 412, 414, 416, 420, 422, 426.” EX1006, [0033]. “*The devices (e.g., 406)* that self-form to create P2P network 402, also *provide DHCP services to their client computing devices (e.g., 412).*” EX1006, [0034]. Specifically, “[e]ach mesh box (e.g., 406) *supplies IP (Internet Protocol) addresses* to its clients (e.g., 412).” EX1006, [0034]. As Kelly explains, the devices forming the P2P network are “configured to take advantage of a provided portion of the address space, or to allocate a portion of the address space,” including by “serv[ing] DHCP addresses from multiple locations and multiple devices” and “provid[ing] DHCP services to their client computing devices (e.g., 412) while operating from a single, distributed DHCP database.” EX1006, [0033].

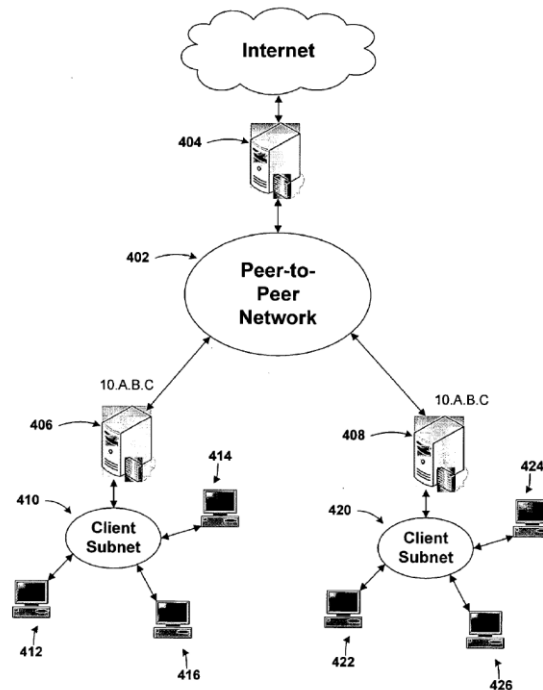


Fig. 4

EX1006, Figure 4.

189. To assign an IP address to a client device, as Kelly explains, each mesh box performs the following operations: (1) the mesh box first randomly assigns a range of IP addresses to the client subnet associated with it, and (2) it then selects and assigns individual IP addresses from within that range to its connected clients.

190. As Kelly explains, the “[m]esh boxes are able to allocate addresses for themselves and for clients connected to them” by acting on a “single logical DHCP database,” in which “[a]ddresses are chosen from the private network **10.B.C.D space.**” EX1006, [0035]-[0036], [0061]. The mesh node randomly selects a range

of IP addresses, including for its client subnet, by choosing all 8 bits for B and C, and 4 bits for D at random. For example:

When the database for a mesh sub-network [of clients] is created, ***a value is chosen at random for the second position [of the address space, i.e., B]. All nodes within that mesh sub-network use that randomly chosen value in the second position [i.e., B].*** For example, if the value 213 is chosen, then ***all nodes in the mesh sub-network have addresses starting with 10.213.*** A subnet mask for this example is 255.255.0.0.

EX1006, [0035].

191. Assuming that the client subnet has at most “16 hosts” (i.e., 16 user terminals), Kelly teaches that the mesh box randomly selects the 8 bits for C and 4 bits for D in the 10.X.C.D address space to generate a randomized IP address range for that subnet:

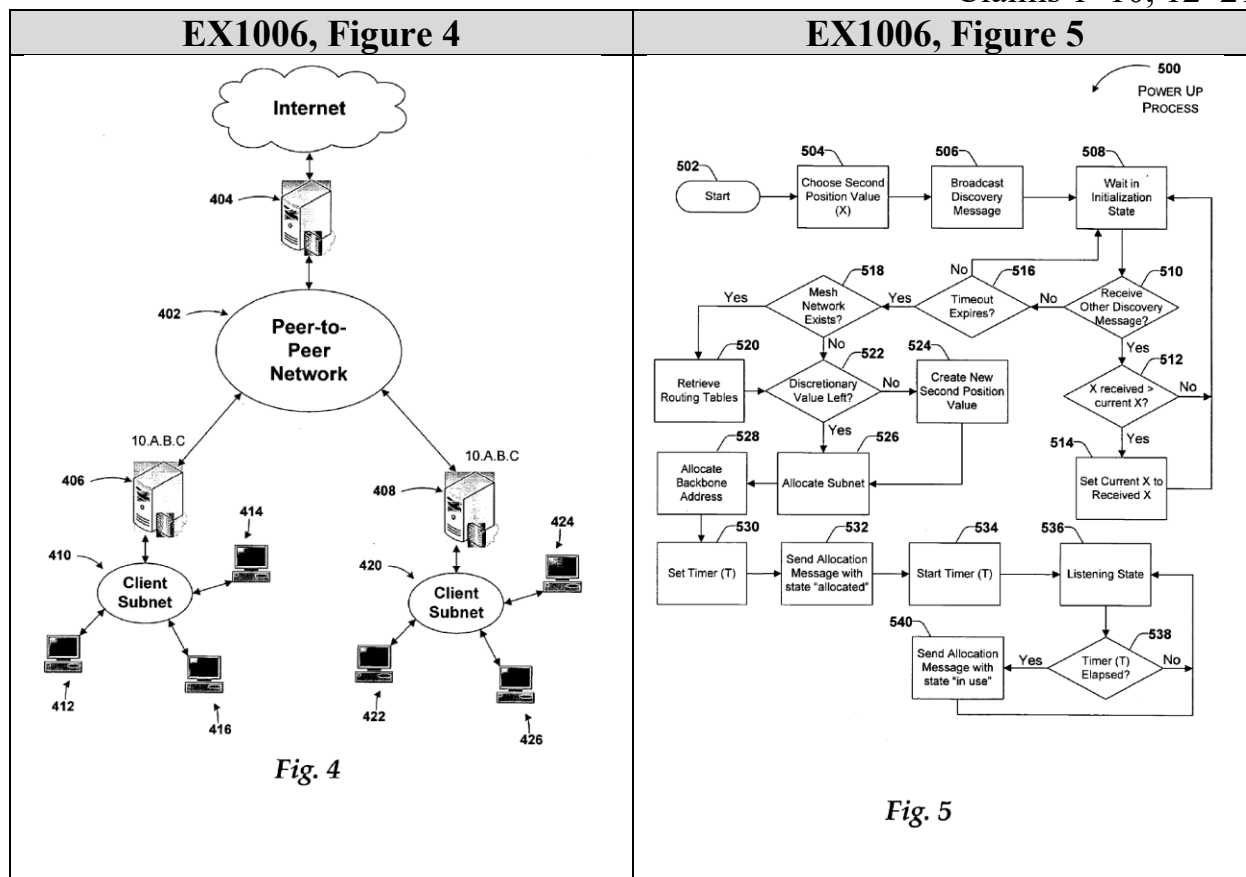
For example, a 4 bit space [] may be used for each client subnet, allowing 16 hosts. With the 4 bit space example, ***the remaining 12 bits [i.e., in the 10.X.C.D private address space, 8 bits for C and 4 bits for a portion of D] that comprise an IP address are randomly chosen values.*** Stated differently, the mesh box is free to choose a ***random value in this range*** when allocating a subnet.

See EX1006, [0036]. This random selection of 8 bits in B and C and 4 bits for D determines a unique range of IP addresses assigned to the client subnet—this is similar to the embodiment of the '762 Patent. See EX1001, 11:21-22 (“IPv4

addresses assigned by DHCP servers take the form A.X.Y.K. ... a 15 bit random number generator is used to generate the values for X and Y.”).

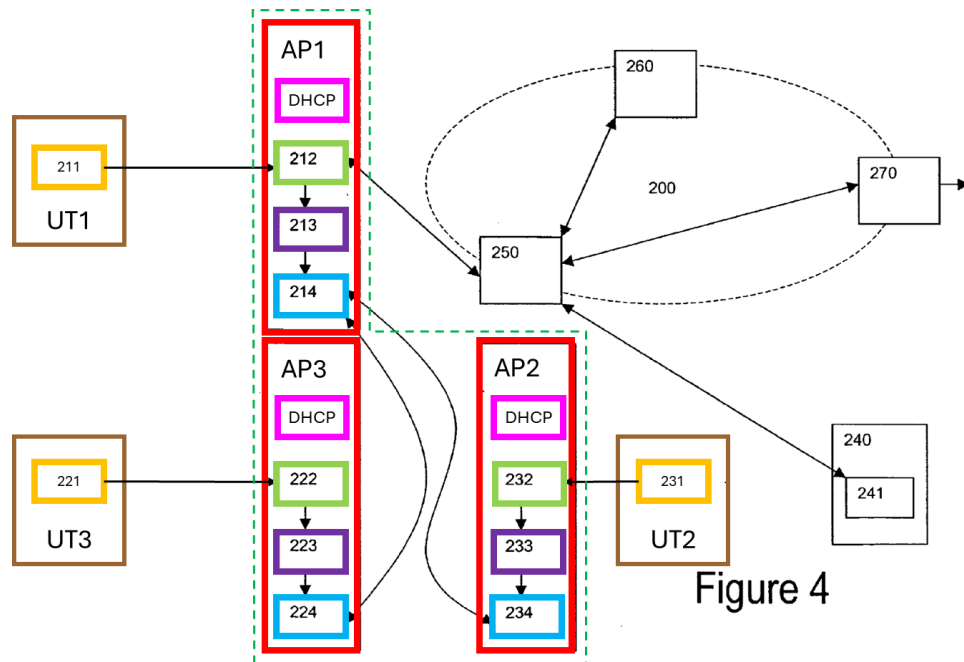
192. Finally, Kelly discloses that each mesh box assigns a distinct IP address to every one of the up to 16 hosts within its client subnet using the lower four bits of D. EX1006, [0061] (when assigning an IP address to a client device, “a selection is made from the allocated client subnet range for an unused value. For example, using the 4 bit client subnet allocation described above, the client computing device may be assigned any one of the possible 16 client addresses.”).

193. In summary, Kelly’s address allocation process involves two steps: (1) the mesh box randomly determines a subnet range by selecting random values for the 8 bits in X, the 8 bits in C, and the upper 4 bits in D within the 10.X.C.D private address space; and (2) it assigns each connected client a unique IP address within that range by varying the remaining four bits of D.



194. It would have been obvious to modify Saridakis-Wu-Bauer Combination in view of Kelly to incorporate distributed DHCP functionality in the APs that form the ad hoc network, as illustrated below. EX1006, [0035]-[0036].

Saridakis-Wu-Bauer-Kelly Combination



EX1003, Figure 4.

195. A POSITA would have been motivated to implement distributed DHCP as taught by Kelly using Saridakis-Wu-Bauer’s APs, for two reasons.

196. **First**, Saridakis acknowledges the necessity to assign IP addresses to devices in its ad hoc peer-to-peer network. Saridakis explains that an IP address—serving a type of network address—specifies “where the specified user can be contacted” (EX1003, [0004]), and that a device has a new IP address whenever it connects to a new network—i.e., because a new IP address is assigned to it (EX1003, [0039]). However, because Saridakis also emphasizes that its ad hoc network “operate[s] without relying on any network infrastructure,” EX1003, [0002], a POSITA would have been motivated to consult prior art references describing

techniques for assigning IP addresses in decentralized environments—specifically, methods that allow address assignment “without relying on any network infrastructure.” EX1003, [0002].

197. A POSITA would have recognized that Kelly’s distributed DHCP service—allowing IP address assignment by peer nodes within an ad hoc network without reliance on a centralized entity—would be an ideal solution for integration into the Saridakis–Wu–Bauer combination. EX1006, Abstract, [0035]–[0036]. Kelly explicitly observes that “[t]raditional models, such as a network using standard DHCP, fail when no infrastructure yet exists” (EX1006, [0002]) and instead introduces a “distributed DHCP database” that functions entirely through cooperative peer nodes within the network. EX1006, [0034]. Thus, a POSITA would have been motivated to incorporate Kelly’s distributed DHCP functionality within the Saridakis–Wu–Bauer Combination.

198. **Second**, Saridakis–Wu–Bauer Combination and Kelly are highly compatible. The ad hoc network in Saridakis–Wu–Bauer Combination is composed of peer nodes (APs) that provide distributed SIP services. *See* Section VII.B.2 VII.B.2 [Saridakis–Wu–Bauer Combination]. Likewise, Kelly describes a peer-to-peer (P2P) network composed of peer nodes (mesh boxes) that provide distributed DHCP services. EX1006, [0035]–[0036]. Given the functional parallels between APs in Saridakis–Wu–Bauer and mesh boxes in Kelly, a POSITA would

have been motivated to integrate Kelly’s distributed DHCP functionality into the APs of the Saridakis–Wu–Bauer network, allowing each AP to perform both SIP and DHCP services in a fully decentralized manner.

199. Adding distributed DHCP service in Saridakis-Wu-Bauer’s ad hoc network would have represented a straightforward combination of known elements from the prior art: Kelly’s distributed DHCP servers operating in peer nodes and the Saridakis–Wu–Bauer peer-to-peer network structure. This combination would have been implemented according to known methods (deploying distributed IP services in ad hoc networks through peer nodes, as taught by Kelly) and the resulting behavior would have been entirely predictable, enabling local IP address management without reliance on centralized infrastructure.

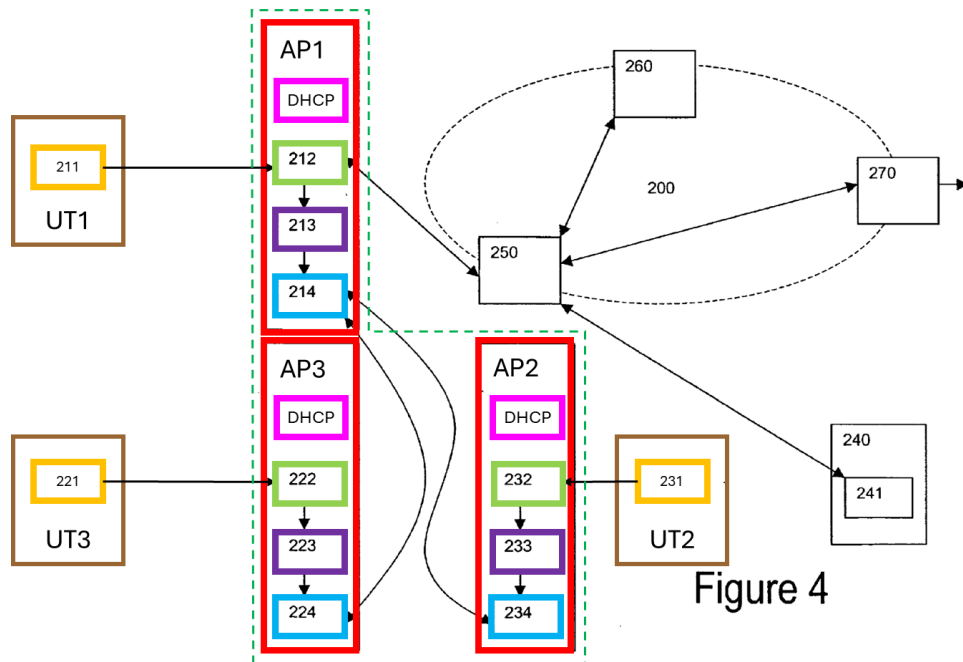
200. A POSITA would have had a reasonable expectation of success in providing Saridakis-Wu-Bauer-Kelly Combination, for two reasons.

201. **First**, as discussed in Section VII.B.2 [Saridakis-Wu-Bauer Combination], Saridakis, Wu, and Bauer all aim to deliver IP-based services without dependence on centralized servers or infrastructure. *See* EX1003, [0015]; EX1004, [0003], [0040]; EX1005, Abstract, [0022], [0025]. Kelly similarly seeks to provide IP services in a distributed manner, eliminating reliance on a central DHCP server. *See* EX1006, [0002], [0035]–[0036]. Both systems accomplish this through the use of peer devices within an ad hoc peer-to-peer network (e.g., APs in Saridakis-Wu-

Bauer Combination; mesh boxes in Kelly). Accordingly, combining Kelly's distributed DHCP approach with the Saridakis–Wu–Bauer architecture would have predictably produced a system offering distributed DHCP services consistent with Kelly's teachings.

202. **Second**, Kelly's distributed DHCP service would have operated seamlessly within the Saridakis-Wu-Bauer Combination. Kelly's distributed DHCP service could be implemented as software logic within the peer node (AP) of the Saridakis–Wu–Bauer system, requiring no substantial alteration to the existing SIP-related components of the AP. As a result, the modified system would have predictably provided distributed DHCP functionality—allowing IP address assignment locally within the ad hoc network—without dependence on external network infrastructure. EX1003, [0039]; EX1004, [0055].

Saridakis-Wu-Bauer-Kelly Combination



EX1003, Figure 4.

2. Claim 5

- a) **[5] The VoIP-capable network of claim 1, wherein each VoIP node has the ability to function as a DHCP server to assign IP addresses to clients in communication with the VoIP node.**

203. Saridakis-Wu-Bauer-Kelly Combination teaches the additional limitation of claim 5.

204. As discussed in Section VII.C.1 [Saridakis-Wu-Bauer-Kelly Combination], the distributed DHCP functionality is provisioned by each AP in the ad hoc network. EX1006, [0032] (“Each mesh box implements a DHCP server”); [0034]-[0035]. Collectively, these APs with distributed DHCP capability operate as

“[a] logical distributed server [] for managing [] Internet Protocol (IP) address allocation for an ad-hoc, self-forming peer-to-peer (P2P) network.” EX1006, Abstract. With integrated DHCP functionality, each AP “supplies IP (Internet Protocol) addresses to its clients (e.g., 412)” (EX1006, [0034]). *See also* EX1006, [0035]. Accordingly, each AP (“*each VoIP node*”) is capable of functioning as a DHCP server to assign IP addresses to clients in communication with the AP. If Patent Owner disputes that the illustration of Saridakis-Wu-Bauer-Kelly-Combination does not show multiple user terminals connected to the same AP, such configuration would nonetheless have been obvious for the reasons discussed in Section VII.B.8.b) [Ground II, 15A].

3. Claim 6

- a) **[6] The VoIP-capable network of claim 5, wherein the IP addresses are assigned from a range of IP addresses produced by a random number generator on each VoIP node.**

205. Saridakis-Wu-Bauer-Kelly Combination teaches or renders obvious the additional limitation of claim 6.

206. As discussed in Section VII.C.1 [Saridakis-Wu-Bauer-Kelly Combination], Kelly discloses that a peer in an ad hoc network assigns an IP address to its client devices through a two-step process: (1) it randomly selects an IP address range for the subnet associated with the client by choosing random values for the 8

bits in X, the 8 bits in C, and the upper 4 bits in D within the 10.X.C.D private address space; and (2) it assigns each client a unique IP address within that range using the remaining 4 bits of D. *See* EX1006, [0034]-[0036], [0061]. A POSITA would have understood that the random values for X, C, and D are generated by a random number generator, which is a known tool for generating randomized numbers, specifically IP addresses, in computing devices in the art. *See* EX1013 (Bodlaender), [0020] (describing using “random number generator” for random IP address generation). Accordingly, Saridakis-Wu-Bauer-Kelly Combination teaches or at least suggests that IP addresses assigned to user terminals are drawn from a range of addresses randomly generated by a random number generator within the corresponding AP.

4. Claim 9

- a) **[9] The VoIP-capable network of claim 8 wherein said mesh nodes provide VoIP optimized services within said mesh nodes.**

207. Saridakis-Wu-Bauer-Kelly Combination teaches the additional limitation of claim 9. As discussed in Section VI.B [Claim Construction], “*VoIP optimized services*” include a DHCP server service. As discussed in Section VII.C.1 [Saridakis-Wu-Bauer-Kelly Combination], Saridakis-Wu-Bauer-Kelly teaches distributed DHCP server service functionality provided by APs in an ad hoc

network. *See* EX1006, [0030], [0034]. Accordingly, the APs (“*said mesh nodes*”) provide a DHCP server service within them.

5. Claim 14

- a) **[14] The method of claim 10, wherein each node functions as a DHCP server to assign IP addresses to clients connected to the node.**

208. Saridakis-Wu-Bauer-Kelly Combination teaches the additional limitation of claim 14 for the reasons provided in Section VII.C.2.a) [Ground III, Claim 5].

6. Claim 18

- a) **[18] The VoIP capable network of claim 15, wherein the first isolated node further comprises a DHCP server to assign IP addresses to clients in communication with the first node.**

209. Saridakis-Wu-Bauer-Kelly Combination teaches the additional limitation of claim 18 for the reasons provided in Section VII.C.2.a) [Ground III, Claim 5].

7. Claim 19

- a) **[19] The VoIP-capable network of claim 18, wherein the IP addresses are assigned from a range of IP addresses produced by a random number generator on the first isolated node.**

210. Saridakis-Wu-Bauer-Kelly Combination teaches the additional limitation of claim 19 for the reasons provided in Section VII.C.2.a) [Ground III, Claim 6].

8. Claim 20

- a) **[20] The VoIP capable network of claim 18, wherein each node in the cluster has the ability to function as a DHCP server to assign IP addresses to clients connected to that node.**

211. Saridakis-Wu-Bauer-Kelly Combination teaches the additional limitation of claim 20 for the reasons provided in Section VII.C.2.a) [Ground III, Claim 5].

9. Claim 21

- a) **[21] The VoIP-capable network of claim 20, wherein each node in the cluster assigns IP addresses from a range of IP addresses produced by a random number generator on that node.**

212. Saridakis-Wu-Bauer-Kelly Combination teaches the additional limitation of claim 21 for the reasons provided in Section VII.C.3.a) [Ground III, Claim 6].

VIII. CONCLUSION

213. In my opinion, the challenged claims 1-10, 12-21 of the '762 Patent are unpatentable.

IX. AVAILABILITY FOR CROSS-EXAMINATION

214. In signing this Declaration, I recognize that the declaration will be filed as evidence in a case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize 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.

X. Right To Supplement

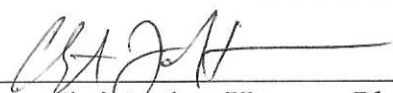
215. I reserve the right to supplement my opinions in the future to respond to any arguments that Patent Owner may raise and to take into account new information as it becomes available to me.

XI. JURAT

216. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further 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 §1001 of Title 18 of the United States Code.

Declaration of Christopher Hansen, Ph.D.
Inter Partes Review of U.S. Patent No. 8,477,762
Claims 1–10, 12–21

Dated: November 20, 2025



Christopher Hansen, Ph.D.