UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO. LTD., and SAMSUNG ELECTRONICS AMERICA, INC.,

Petitioner,

v.

MASSIVELY BROADBAND LLC,

Patent Owner.

U.S. Patent No. 8,725,700

"Clearinghouse systems and methods for collecting or providing quality or performance data for enhanced availability of wireless communications"

DECLARATION OF KEVIN C. ALMEROTH, PH.D., IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF

U.S. PATENT NO. 8,725,700

TABLE OF CONTENTS

LIST OF EXHIBITS

Exhibit	Description
EX1001	U.S. Patent No. 8,725,700 ("'700 Patent")
EX1002	Declaration of Kevin C. Almeroth
EX1003	Curriculum Vitae of Kevin C. Almeroth
EX1004	Prosecution History for U.S. Pat. No. 8,725,700
EX1005	Patent Owner's District Court Infringement Contentions for '700 Patent
EX1006	U.S. Provisional Patent Application 60/971,175 filed Sep. 10, 2007
EX1007	U.S. Provisional Patent Application 60/977,582 filed Oct. 4, 2007
EX1008	U.S. Provisional Patent Application 61/028,261 filed Feb. 13, 2008
EX1009	U.S. Patent Publication No. 2007/0207800 A1 ("Daley")
EX1010	U.S. Patent Publication No. 2008/0305747 A1 ("Aaron")
EX1011	U.S. Patent Publication No. 2008/0186882 A1 ("Scherzer")
EX1012	U.S. Patent Publication No. 2006/0253453 A1 ("Chmaytelli")
EX1013	U.S. Patent Publication No. 2003/0216953 A1 ("Dawson")
EX1014	Intentionally Omitted
EX1015	J. Schiller, Mobile Communications, Addison-Wesley, 2nd Ed., 2003
EX1016	M. Stemm and R. Katz, "Vertical handoffs in wireless overlay networks," Mobile Networks and Applications, vol. 3, pp. 335-50, 1998
EX1017	R. Chalmers, G. Krishnamurthi, and K. Almeroth, "Enabling Intelligent Handovers in Heterogeneous Wireless Networks," ACM Journal on Mobile Networks and Applications (MONET), vol. 11, num. 2, pp. 215-227, April 2006

Exhibit	Description
EX1018	S. Soliman, P. Agashe, et al., "gpsOne™: A hybrid position location system." IEEE, 0-7803-6560-7, pp. 330-35, 2000
EX1019	K. Wang, L. Yan, H. Wen, and K. He, "GpsOne: a New Solution to Vehicle Navigation," IEEE, 0-7803-8416-4, pps. 341-46, 2004
EX1020	U.S. Patent Publication No. 2003/0125044 A1 ("Deloach")
EX1021	*Fryer's TowerSource Acquired by Biby Publishing* (Dec. 29, 2005), available at https://wirelessestimator.com/content/articles/?pagename=wireless+tower+news, p. 13
EX1022	FCC ASR Registration Form 854 (January, 2006)
EX1023	Sample FCC ASR Record
EX1024	FCC ASR Search Screenshot
EX1025	Intentionally Omitted
EX1026	Richard Shim, *Boingo, T-Mobile Team On Wireless Roaming*, CNET (Mar. 18, 2003), available at: https://www.cnet.com/tech/mobile/boingo-t-mobile-team-on-wireless-roaming/
EX1027	Intentionally Omitted
EX1028	U.S. Patent No. 6,332,127 ("Bandera")
EX1029	U.S. Patent No. 6,545,596 ("Moon")
EX1030	U.S. Patent Publication No. 2002/0046084 A1 ("Steele")
EX1031	U.S. Patent No. 7,110,749 ("Zellner")
EX1032	G. Heine, GSM Networks: Protocols, Terminology, and Implementation, Artech House, 1999.
EX1033	U.S. Patent No. 6,978,138 ("Japenga")
EX1034	Intentionally Omitted
EX1035	Telcom Network Planning for evolving Network Architectures, Reference Manual, Draft Version 4.1, ITU, 28 February 2007.

Exhibit	Description
EX1036	A. Sinclair, GSM Goes to Market, GSM Association, March 2007
EX1037	Intentionally Omitted
EX1038	Intentionally Omitted
EX1039	*Bitfone Solutions*, Bitfone (Oct. 22, 2006), available at https://web.archive.org/web/20061022001229/http:/www.bitfone.com/usa/enter.shtml
EX1040	U.S. Patent Application Publication 2004/0097260 ("Stenton")
EX1041	Sandeep Adwanker, et al., *Universal Manager: Seamless Management of Enterprise Mobile and Non-mobile Devices*, IEEE International Conference on Mobile Data Management (2004).
EX1042	U.S. Provisional Patent Application No. 60/774,406 ("Daley Provisional")
EX1043	Gary Krakow, *The first Palm-Microsoft smart phone debuts*, NBC News (January 5, 2006), available at https://www.nbcnews.com/id/wbna10698983
EX1044	Pui-Wing Tam, *How Palm's Treo Capitalized On BlackBerry's Patent Fracas*, Wall Street Journal (Mar. 23, 2006), available at https://www.wsj.com/articles/SB114308086956305949
EX1045	E.P. 1,624,710 ("Smith")
EX1046	W.O. 2004/030393 ("Korale")
EX1047	*MySpace, Facebook and Other Social Networking Sites: Hot Today, Gone Tomorrow?*, Knowledge at Wharton (May 3, 2006), available at https://knowledge.wharton.upenn.edu/podcast/knowledge-at-wharton-podcast/myspace-facebook-and-other-social-networking-sites-hot-today-gone-tomorrow/
EX1048	U.S. Patent No. 7,373,246 ("O'Clair")
EX1049	U.S. Patent No. 8,666,821 ("Xie")
EX1050	U.S. Patent Publication No. 2007/0213925 ("Sharma")

I. Introduction

1. I have been retained by Quinn Emanuel Urquhart & Sullivan, LLP on behalf of the Petitioner Samsung Electronics Co., Ltd. ("Petitioner") as an independent expert in this *inter partes* review (this "Proceeding") before the Patent Trial and Appeal Board of the United States Patent and Trademark Office (the "Board") to review claims 1-16 ("the challenged claims") of U.S. Patent No. 8,725,700 ("the '700 patent"). I have been asked by the Petitioner to assist in evaluating the claims and the disclosure of the '700 patent.

A. Qualifications

2. EX1003 is a true and correct copy of my current CV, which describes my education, patents and publications, employment and research history, and professional activities and awards.

1. Educational Background

3. I hold three degrees from the Georgia Institute of Technology: (1) a Bachelor of Science degree in Information and Computer Science (with minors in Economics, Technical Communication, and American Literature) earned in June 1992; (2) a Master of Science degree in Computer Science (with specialization in Networking and Systems) earned in June 1994; and (3) a Doctor of Philosophy (Ph.D.) degree in Computer Science (Dissertation Title: Networking and System Support for the Efficient, Scalable Delivery of Services in Interactive Multimedia

System, minor in Telecommunications Public Policy) earned in June 1997. I have taken a wide variety of courses as demonstrated by my minor. My undergraduate degree also included a number of courses more typical of a degree in electrical engineering, including digital logic, signal processing, and telecommunications theory.

2. Career

4. I am a Professor Emeritus in the Department of Computer Science at the University of California, Santa Barbara (UCSB). While active at UCSB, I held faculty appointments and was a founding member of the Computer Engineering (CE) Program, Media Arts and Technology (MAT) Program, and the Technology Management Program (TMP). I was the Associate Director of the Center for Information Technology and Society (CITS) from 1999 to 2012. I have been a faculty member at UCSB since July 1997.

5. One of the major concentrations of my research has been the delivery of multimedia content and data between computing devices, including various network architectures. In my research, I have studied large-scale content delivery systems, and the use of servers located in a variety of geographic locations to provide scalable delivery to hundreds or thousands of users simultaneously. I have also studied smaller-scale content delivery systems in which content is exchanged between individual computers and portable devices. My work has emphasized the

exchange of content more efficiently across computer networks, including the scalable delivery of content to many users, mobile computing, satellite networking, delivering content to mobile devices, and network support for data delivery in wireless networks.

6. In 1992, the initial focus of my research was on the provision of interactive functions (e.g., VCR-style functions like pause, rewind, and fast-forward) for near video-on-demand systems in cable systems; in particular, how to aggregate requests for movies at a cable head-end and then how to satisfy a multitude of requests using one audio/video stream broadcast to multiple receivers simultaneously. This research has continually evolved and resulted in the development of techniques to scalably deliver on-demand content, including audio, video, web documents, and other types of data, through the Internet and over other types of networks, including over cable systems, broadband telephone lines, and satellite links.

7. An important component of my research has been investigating the challenges of communicating multimedia content, including video, between computers and across networks including the Internet. I have worked on a variety of research problems and used a number of systems that were developed to deliver multimedia content to users. One content-delivery method I have researched is the one-to-many communication facility called "multicast," first deployed as the

Multicast Backbone, a virtual overlay network supporting one-to-many communication. Multicast is one technique that can be used on the Internet to provide streaming media support for complex applications like video-on-demand, distance learning, distributed collaboration, distributed games, and large-scale wireless communication. The delivery of media through multicast often involves using Internet infrastructure, devices and protocols, including protocols for routing and TCP/IP.

8. Starting in 1997, I worked on a project to integrate the streaming media capabilities of the Internet together with the interactivity of the web. I developed a project called the Interactive Multimedia Jukebox (IMJ). Users would visit a web page and select content to view. The content would then be scheduled on one of a number of channels, including delivery to students in Georgia Tech dorms delivered via the campus cable plant. The content of each channel was delivered using multicast communication.

9. More recently, I have also studied issues concerning how users choose content, especially when considering the price of that content. My research has examined how dynamic content pricing can be used to control system load. By raising prices when systems start to become overloaded (i.e., when all available resources are fully utilized) and reducing prices when system capacity is readily available, users' capacity to pay as well as their willingness can be used as factors

in stabilizing the response time of a system. This capability is particularly useful in systems where content is downloaded or streamed on-demand to users.

10. Protecting networks, including their operation and content, has been an underlying theme of my research almost since the beginning of my research career. Starting in 2000, I have been involved in several projects that specifically address security, network protection, and firewalls. After significant background work, a team on which I was a member successfully submitted a $4.3M grant proposal to the Army Research Office (ARO) at the Department of Defense to propose and develop a high-speed intrusion detection system. Key aspects of the system included associating streams of packets and analyzing them for viruses and other malware. Once the grant was awarded, we spent several years developing and meeting the milestones of the project. A number of my students worked on related projects and published papers on topics ranging from intrusion detection to developing advanced techniques to be incorporated into firewalls. I have also used firewalls, including their associated malware detection features, in developing techniques for the classroom to ensure that students are not distracted by online content.

11. Recent work ties some of the various threads of my past research together. I have investigated content delivery in online social networks and proposed reputation management systems in large-scale social networks and marketplaces. On the content delivery side, I have looked at issues of caching and cache placement,

especially when content being shared and the cache has geographical relevance. We were able to show that effective caching strategies can greatly improve performance and reduce deployment costs. Our work on reputation systems showed that reputations have economic value, and as such, creates a motivation to manipulate reputations. In response, we developed a variety of solutions to protect the integrity of reputations in online social networks. The techniques we developed for content delivery and reputation management were particularly relevant in peer-to-peer communication.

12. My involvement in the research community extends to leadership positions for several academic journals and conferences. I am the co-chair of the Steering Committee for the ACM Network and System Support for Digital Audio and Video (NOSSDAV) workshop and on the Steering Committees for the International Conference on Network Protocols (ICNP), ACM Sigcomm Workshop on Challenged Networks (CHANTS), and IEEE Global Internet (GI) Symposium. I have served or am serving on the Editorial Boards of IEEE/ACM Transactions on Networking, IEEE Transactions on Mobile Computing, IEEE Network, ACM Computers in Entertainment, AACE Journal of Interactive Learning Research (JILR), and ACM Computer Communications Review. I have co-chaired a number of conferences and workshops including the IEEE International Conference on Network Protocols (ICNP), IEEE Conference on Sensor, Mesh and Ad Hoc

Communications and Networks (SECON), International Conference on Communication Systems and Networks (COMSNETS), IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS), the International Workshop On Wireless Network Measurement (WiNMee), ACM Sigcomm Workshop on Challenged Networks (CHANTS), the Network Group Communication (NGC) workshop, and the Global Internet Symposium, and I have served on the program committees for numerous conferences.

13. Furthermore, in the courses I taught at UCSB, a significant portion of my curriculum covered aspects of the Internet and network communication including the physical and data link layers of the Open System Interconnect (OSI) protocol stack, and standardized protocols for communicating across a variety of physical media such as cable systems, telephone lines, wireless, and high-speed Local Area Networks (LANs). The courses I have taught also cover most major topics in Internet communication, including data communication, multimedia encoding, and mobile application design. My research and courses have covered a range of physical infrastructures for delivering content over networks, including cable, Integrated Services Digital Network (ISDN), Ethernet, Asynchronous Transfer Mode (ATM), fiber, and Digital Subscriber Line (DSL). For a complete list of courses I have taught, see my curriculum vitae (EX1003).

14. I co-founded a technology company called Santa Barbara Labs that was working under a sub-contract from the U.S. Air Force to develop very accurate emulation systems for the military's next generation internetwork. Santa Barbara Labs' focus was in developing an emulation platform to test the performance characteristics of the network architecture in the variety of environments in which it was expected to operate, and, in particular, for network services including IPv6, multicast, Quality of Service (QoS), satellite-based communication, and security. Applications for this emulation program included communication of a variety of multimedia-based services, including video conferencing and video-on-demand.

15. In addition to having co-founded a technology company myself, I have worked for, consulted with, and collaborated with companies for nearly 30 years. These companies range from well-established companies to start-ups and include IBM, Hitachi Telecom, Turner Broadcasting System (TBS), Bell South, Digital Fountain, RealNetworks, Intel Research, Cisco Systems, and Lockheed Martin.

16. Additional details about my employment history, fields of expertise, and publications are further included in my CV (EX1003).

3. Other Relevant Qualifications

17. I am a Member of the Association of Computing Machinery (ACM) and a Fellow of the Institute of Electrical and Electronics Engineers (IEEE).

18. As an important component of my research program, I have been involved in the development of academic research into available technology in the market place. One aspect of this work is my involvement in the Internet Engineering Task Force (IETF). The IETF is a large and open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. I have been involved in various IETF groups including many content delivery-related working groups like the Audio Video Transport (AVT) group, the MBone Deployment (MBONED) group, Source Specific Multicast (SSM) group, the Inter-Domain Multicast Routing (IDMR) group, the Reliable Multicast Transport (RMT) group, the Protocol Independent Multicast (PIM) group, etc. I have also served as a member of the Multicast Directorate (MADDOGS), which oversaw the standardization of all things related to multicast in the IETF. Finally, I was the Chair of the Internet2 Multicast Working Group for seven years.

19. I am an author or co-author of approximately 200 technical papers, published software systems, IETF Internet Drafts and IETF Request for Comments (RFCs). A complete list of my publications is in my CV (EX1003).

20. I have been awarded numerous teaching awards, including Computer Science Outstanding Faculty Member (1997-98, 1998-99, 1999-2000, 2004-06,

UCSB Spotlight on Excellence Award (2000-01), and UCSB Academic Senate Distinguished Teaching Award (2006-07).

B. Previous Expert Witness Testimony

21. The list of recent matters in which I have testified can be found in EX1003.

C. Preparation for this Declaration

22. In forming my opinions, I have considered the ’700 patent specification, including the Abstract, the figures, and the claim language itself, as would have been understood by a person of ordinary skill in the art as of the priority date of the ’700 patent (a “POSITA”). My understanding of “POSITA” and “priority date” are set forth below. I have also reviewed the file history of the ’700 patent, the Exhibits that are listed in the list of Exhibits, and any other material cited in this declaration.

23. In forming my opinions, I have relied on my personal knowledge and professional experience, and on the documents and information referenced in this declaration.

24. This declaration explains, based on facts and information available to me to date, the subject matter and opinions related to this Proceeding. As such, I am prepared to provide expert testimony regarding opinions formed resulting from my

analysis of the issues considered in this declaration if asked about those issues by the Board or by the private parties' attorneys.

25. Additionally, I may discuss my own work, teachings, and knowledge of the state of the art in the relevant time period. I may rely on handbooks, textbooks, technical literature, and the like to demonstrate the state of the art in the relevant period and the evolution of relevant technologies.

26. Throughout this declaration, I refer to specific pages of the '700 patent and other documents. The citations are intended to be exemplary and are not intended to convey that the citations are the only source of evidence to support the propositions for which they are cited.

27. I am being compensated for my time spent on this matter at a rate of $850 per hour, and my compensation is in no way contingent upon the outcome of this matter or on the opinions I offer. All of the opinions expressed in this declaration are my own.

II. Legal Understanding

28. In this section, I describe my understanding of certain legal standards that I have relied upon in forming my opinions set forth in this declaration. I have been informed of these legal standards by Petitioner's attorneys. I am not an attorney and I have not thoroughly researched the law on patent invalidity. I am relying only on instructions from Petitioner's attorneys for these legal standards.

A. Claim Construction

29. I have been instructed by counsel that claim construction is a matter of law for the arbiter of law to decide. I understand that in an *inter partes* review, claims are construed using the same claim construction standard that would be used to construe the claim in a civil action.

30. I understand that a patent may include two types of claims, independent claims and dependent claims. An independent claim stands alone and includes only the limitations it recites. A dependent claim can depend on an independent claim or another dependent claim. I understand that a dependent claim includes all the limitations that it recites in addition to the limitations recited in the claim from which it depends.

B. Anticipation

31. I understand that a patent claim is anticipated when a single piece of prior art describes every element of the claimed invention, either expressly or inherently, arranged in the same way as in the claim. For inherent anticipation to be found, it is required that the missing descriptive material is necessarily present in the prior art. I understand that, for the purpose of an *inter partes* review, prior art that anticipates a claim can include both patents and printed publications from anywhere in the world.

C. Obviousness

32. I understand that a patent claim is unpatentable and invalid if the subject matter of the claim as a whole would have been obvious to a POSITA as of the time of the invention at issue. My understanding of a POSITA is set forth below. I understand that the following factors must be evaluated to determine whether the claimed subject matter is obvious: (1) the scope and content of the prior art; (2) the difference or differences, if any, between each claim of the patent and the prior art; and (3) the level of ordinary skill in the art at the time the patent was filed. Unlike anticipation, which allows consideration of only one item of prior art, I understand that obviousness may be shown by considering more than one item of prior art. Moreover, I have been informed and I understand that the so-called objective indicia of non-obviousness, also known as "secondary considerations," are also to be considered when assessing obviousness. These include: (1) commercial success; (2) long-felt but unresolved needs; (3) copying of the invention by others in the field; (4) initial expressions of disbelief by experts in the field; (5) failure of others to solve the problem that the inventor solved; and (6) unexpected results. I also understand that evidence of objective indicia of non-obviousness must be commensurate in scope with the claimed subject matter.

III. The ’700 Patent

33. The ’700 patent is titled “Clearinghouse systems and methods for collecting or providing quality or performance data for enhanced availability of wireless communications.”

34. The ’700 patent lists inventor Theodore S. Rappaport.

35. The ’700 patent was filed as U.S. Patent Application No. 12/815,165 on June 14, 2010, and issued on May 13, 2014.

A. Priority Date

36. The ’700 patent’s application is a continuation of U.S. Patent Application No. 12/208,007 which claims priority to U.S. Provisional Application No. 60/971,175, filed on September 10, 2007, U.S. Provisional Application No. 60/977,582, filed on October 4, 2007, and U.S. Provisional Application No. 61/028,261, filed on February 13, 2008. I have assumed a priority date of September 10, 2007 date for purposes of my analysis, but do not offer an opinion whether or not the ’175, ’582, or ’261 provisional applications supports September 10, 2007, as the priority date.

B. Specification

37. The specification discloses that before the alleged invention, intermediaries would help make a market between real property owners and telecommunications carriers desirous of placing infrastructure on that property.

EX1001, 1:19-2:41. It describes that a variety of information and analytics were used when identifying opportunities and negotiating a deal. *Id.* It also describes the existence of online marketplaces and software tools to facilitate such transactions. *Id*., 2:31-57. After asserting there was no "public clearinghouse" where carriers could explore information about "tower sites or available real estate or land available to their business needs" (3:17-21, 2:58-3:28), the '700 Patent asserts that business and technical trends, including developments in wireless connectivity (3:29-4:22), will contribute to the demand for an online marketplace specific to telecommunications infrastructure, replacing the existing manual markets (4:23-5:56).

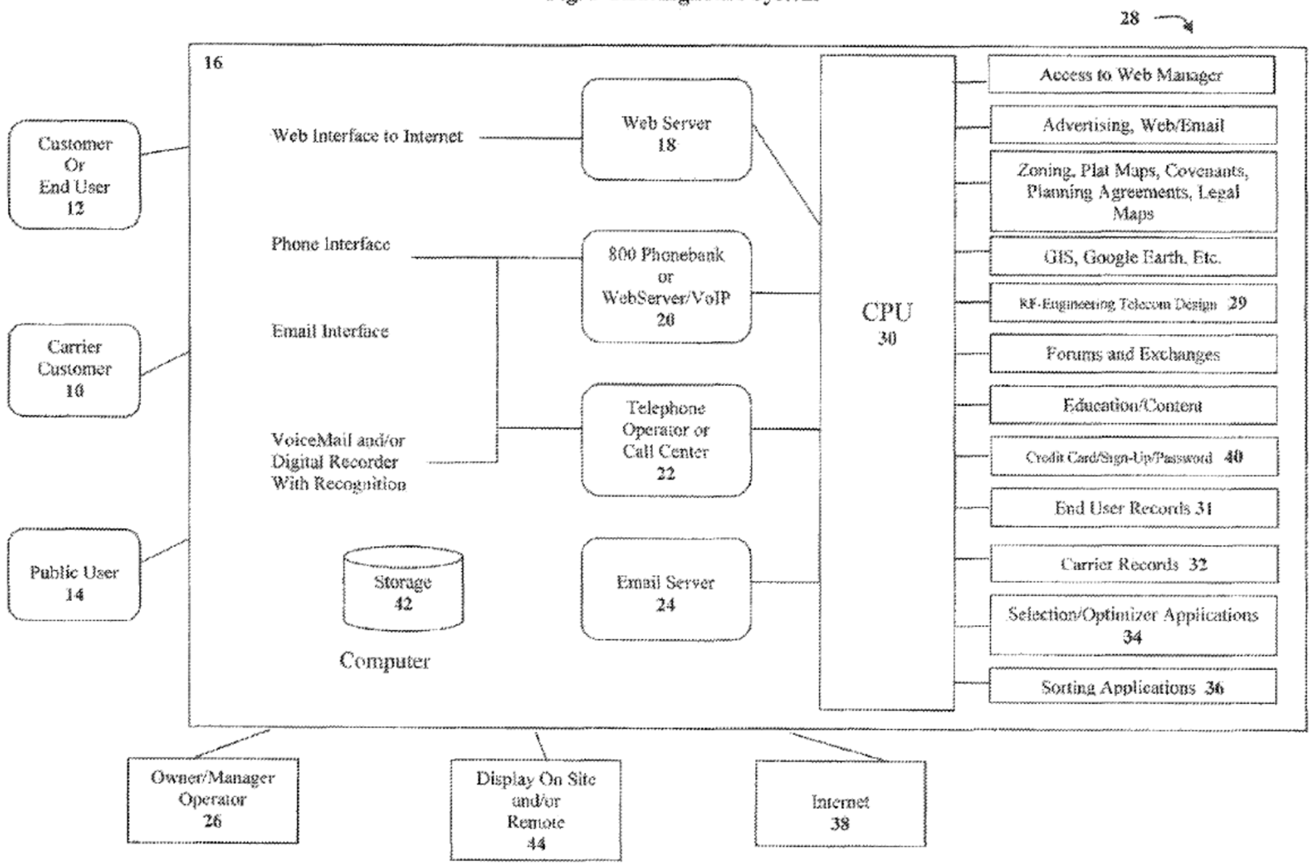
38. The patent identifies both (1) firms and websites that use public information to map or plot wireless signal strength/quality and that allow users to comment on the same wireless signal strength in a particular area and (2) websites that push advertising to users and similarly allow for user reviews of wireless devices and networks. *Id*., 7:8-40. In the Detailed Description, the patent acknowledges additional prior art and specific systems and sites of relevance. *Id*., 13:60-16:11.

39. The specification emphasizes the breadth of the invention: "This invention applies to any carrier-based system … no matter … whether it is wired or wireless … or what the technology, modulation, access method, etc. may be. That is, this patent is not limited to wireless, optical, cellular, WiMax, Mesh, WiFi, RFID,

LMDS, cable, or satellite, and not limited to fixed, mobile, or portable operation by users…" *Id*., 8:64-9:25.

40. The patent's Figure 1 depicts "the clearinghouse computer system" (*id*., 12:6-9) showing a standard database system where information such as advertising, legal data, geographic/mapping data, user account information, carrier records, and end user records, is made accessible via a variety of interfaces such as the web, phone, or email (elements 18, 20, 22, and 24) to different users such as members of the public, carriers, customers/subscribers, and system end users (elements 10, 12, and 14). The Board construes claims per *Phillips v. AWH Corp.* 415 F.3d 1303 (Fed. Cir. 2005) and "only to the extent necessary to resolve a controversy." *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Except for the terms below, or unless otherwise indicated, and for the purposes of this proceeding only, the claim terms should carry their "ordinary and customary" (i.e., plain and ordinary) meaning: "the meaning that the term would have to a person of ordinary skill in the art in question" at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007) (citation omitted).

Fig. 1 Clearinghouse System



C. Prosecution History of the '700 Patent (EX1004)

41. The '700 Patent is a pre-AIA patent whose earliest possible priority date is September 10, 2007, via Provisional Application No. 60/971,175. It also claims priority to Provisional Applications No. 60/977,582 (filed Oct. 4, 2007) and No. 61/028,261 (filed Feb. 13, 2008).

42. The '700 Patent issued from Application No. 12/815,165, filed June 14, 2010, as a continuation of Application No. 12/208,007, filed September 10, 2008. Applicants filed terminal disclaimers over, *inter alia*, 8,224,794, and overcame two rejections through a combination of amendment and argument.

43. None of the references argued in the petition or this declaration were made of record during prosecution.

D. Level of Ordinary Skill in the Art

44. I understand that a person of ordinary skill in the art ("POSITA") is a hypothetical person who is presumed to be aware of all pertinent art, thinks along conventional wisdom in the art, and is a person of ordinary creativity—not an automaton. In deciding the level of ordinary skill, I understand that the following factors may be considered:

- The levels of education and experience of persons working in the field;
- The types of problems encountered in the field; and
- The sophistication of the technology.

45. I understand that the asserted claims of the asserted patents must be evaluated from the perspective of a POSITA. In my opinion, the relevant art for this patent relates to database design or administration, online marketplaces or e-commerce, and wireless network or mobile device management, or equivalents. I understand that the relevant point in time for determining the qualifications of a person of ordinary skill in the state-of-the-art is the time of the alleged invention, which I assume to be the earliest effective filing date for the patent. Here, I understand that the earliest alleged priority date is September 10, 2007.

46. In my opinion, a person of ordinary skill in the art at the time of the ’700 patent (“POSITA”) had at least a bachelor’s degree in computer science, electrical engineering, or a related field, and at least two years (cumulative) of work or research experience in the fields of database design or administration, online marketplaces or e-commerce, and wireless network or mobile device management, or equivalents. Additional work or research experience could substitute for education, and further education could substitute for work or research experience.

47. I meet these criteria now and met them at the time of the alleged invention. I have applied this level of skill in my analysis. My opinions would not change if a slightly higher or lower level of ordinary skill applied.

E. Claim Construction

48. I have been instructed by Petitioner to perform my technical analysis of the disclosures of the prior art by applying the plain and ordinary meaning of all claim terms unless noted otherwise below. I reserve the right to provide additional opinions concerning claim construction or the application of certain claim constructions to the prior art, as appropriate, and to respond to any particular claim construction-related argument advanced by Patent Owner and/or its expert.

F. Challenged Claims

49. I understand that claims 1-16 are at issue in Petitioner’s petition for *inter partes* review. They are reproduced below for reference.

Claim	Limitation
1[pre]	A method of collecting and providing access to quality or service information associated with one or more wireless communications networks, mobile devices, or end users, comprising:
1[a]	using a computer, receiving mobile device location information of a plurality of mobile devices or end users that are associated with one or more wireless communications networks and quality or service information pertaining to wireless access characteristics for one or more mobile devices of said plurality of mobile devices or end users, and said quality or service information comprising coverage, availability or performance information of one or more wireless communications networks or said one or more mobile devices,
1[b]	storing, by action of said computer, said mobile device location information and said quality or service information in a memory or database;
1[c]	updating, by action of said computer, said mobile device location information stored in said memory or database when a mobile device of said plurality of mobile devices travels from one location to another;
1[d]	providing access to said quality or service information stored in said memory or database to one or more end users or one or more end user communication devices or one or more carriers or third parties that provide services to said one or more end users or one or more end user communication devices or one or more carriers, or to said one or more wireless communications networks; and
1[e]	wherein said wireless access characteristics comprise one or more of identified, perceived or measured: radio reception quality, network performance, quality of service, data rate, spectrum availability or suitability, capacity or bandwidth, availability or quality of coverage, availability or quality of capacity, availability or quality of one or more services or carriers, availability or quality of air interfaces, average use profile, average availability profile, statistics on outage or reliability or coverage or capacity carrying capabilities for one or more service providers, frequencies, radio frequency or quality of service or coverage or service map or addresses for one or more

Claim	Limitation
	service providers, radio frequency or end-user application performance, and cost of service.
2	The method of claim 1 wherein said step of providing access provides access to said one or more end users or one or more end user communications devices by reporting quality or service information to said one or more end users or said one or more end user communications devices.
3	The method of claim 1 wherein said quality or service information is location specific.
4	The method of claim 1, further comprising serving data based on mobile device location information and quality or service information stored in said memory or database.
5	The method of claim 4 wherein said data comprises one or more of a recommended operating band, operating mode, communications network and/or carrier for end users or end user communications devices.
6	The method of claim 5 wherein said data is formatted and served to end users or end user communications devices as one or more web pages.
7	The method of claim 1, further comprising serving data based on mobile device location information or quality or service information stored in said memory or database to one or more carriers.
8	The method of claim 1, further comprising providing access to quality or service information stored in said memory or database to a party or parties other than subscribers and carriers of said one or more wireless communications networks.
9[a]	The method of claim 1, wherein said quality or service information further comprises rank ordering or preferred preferences for one or more of ranked or preferred:
9[a][i]	wireless performance, telecommunication services, service providers, carriers, frequencies, spectrum allocations, wireless connection

Claim	Limitation
	options, power levels, data rates, modulation types, air interface specifications, and bandwidths, and
9[b]	wherein said providing step further provides access to one or more of said ranked ordering or preferred preferences to said one or more end users or said one or more end user communication devices or said one or more carriers or said third parties that provide services to said one or more carriers, or to said one or more wireless communications networks.
10[pre]	A system for collecting and providing access to quality or service information associated with one or more wireless communications networks, mobile devices, or end users, comprising:
10[a]	a computer configured to receive mobile device location information of a plurality of mobile devices or end users that are associated with one or more wireless communications networks and quality or service information pertaining to wireless access characteristics for one or more mobile devices of said plurality of mobile devices or end users, and said quality or service information comprising coverage, availability or performance information of one or more wireless communications networks or said one or more mobile devices;
10[b]	a memory or database configured to store the received mobile device location information and quality or service information;
10[c]	an interface through which one or more end users or one or more end user communication devices, or one or more carriers, or one or more third parties that provide services to said one or more end users or one or more end user communication devices or said one or more carriers, or one or more wireless communications networks may access said quality or service information or mobile device location information stored in said memory or database; and
10[d]	wherein said wireless access characteristics comprise one or more of identified perceived or measured: radio reception quality, network performance, quality of service, data rate, spectrum availability or suitability, capacity or bandwidth, availability or quality of coverage, availability or quality of capacity, availability or quality of one or

Claim	Limitation
	more services or carriers, availability or quality of air interfaces, average use profile, average availability profile, statistics on outage or reliability or coverage or capacity carrying capabilities for one or more service providers, frequencies, radio frequency or quality of service or coverage or service map or addresses for one or more service providers, radio frequency or end-user application performance, and cost of service.
11	The system of claim 10, further comprising a server configured to serve quality or service information stored in said memory or database to one or more carriers.
12	The system of claim 10, further comprising a server configured to generate and serve data based on mobile device location information and quality or service information stored in said memory or database to one or more end users or one or more end user communications devices.
13	The system of claim 12 wherein said data comprises one or more of a recommended operating band, operating mode, communications network and/or carrier for said one or more end users or one or more of said end user communications devices.
14	The system of claim 13 wherein said server comprises a web server and said data is formatted as one or more web pages served to said one or more end users or one or more of said end user communications devices.
15	The system of claim 10 wherein said computer is configured to provide access to quality or service information stored in said memory or database to a party or parties other than subscribers and carriers of said one or more wireless communications networks.
16[pre]	The system of claim 10,
16[a]	wherein said quality or service information further comprises rank ordering or preferred preferences for one or more of ranked or preferred:

Claim	Limitation
16[a][i]	wireless performance, telecommunication services, service providers, carriers, frequencies, spectrum allocations, wireless connection options, power levels, data rates, modulation types, air interface specifications, and bandwidths, and
16[b]	wherein said interface is configured to provide access to one or more of said rank ordering or preferred preferences to said one or more end users or said one or more end user communication devices or said one or more carriers or said one or more third parties, or to said one or more wireless communications networks.

IV. Grounds

Ground	Basis	Reference(s)	Claims
1	§103	Daley, Aaron, and Scherzer	1-16
2	§103	Scherzer	1-6, 8-16
3	§103	Scherzer and Chmaytelli	7
4	§103	Scherzer and Sharma	7

A. Prior Art

1. Daley

50. U.S. Patent Application Publication 2007/0207800 ("Daley") is prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and 102(e), having been filed February 20, 2007, and published September 6, 2007, before the earliest possible effective filing date of the '700 Patent (September 10, 2007).

51. Daley describes a system for managing and monitoring mobile devices and the mobile networks to which they connect. EX1009, Abstract, [0031], [0032], [0038], [0047]-[0056]. Daley Figure 1 illustrates the mobile device 107, its client-side software components, and the network operator's server-side components. EX1009, Fig. 1, [0033], [0035].

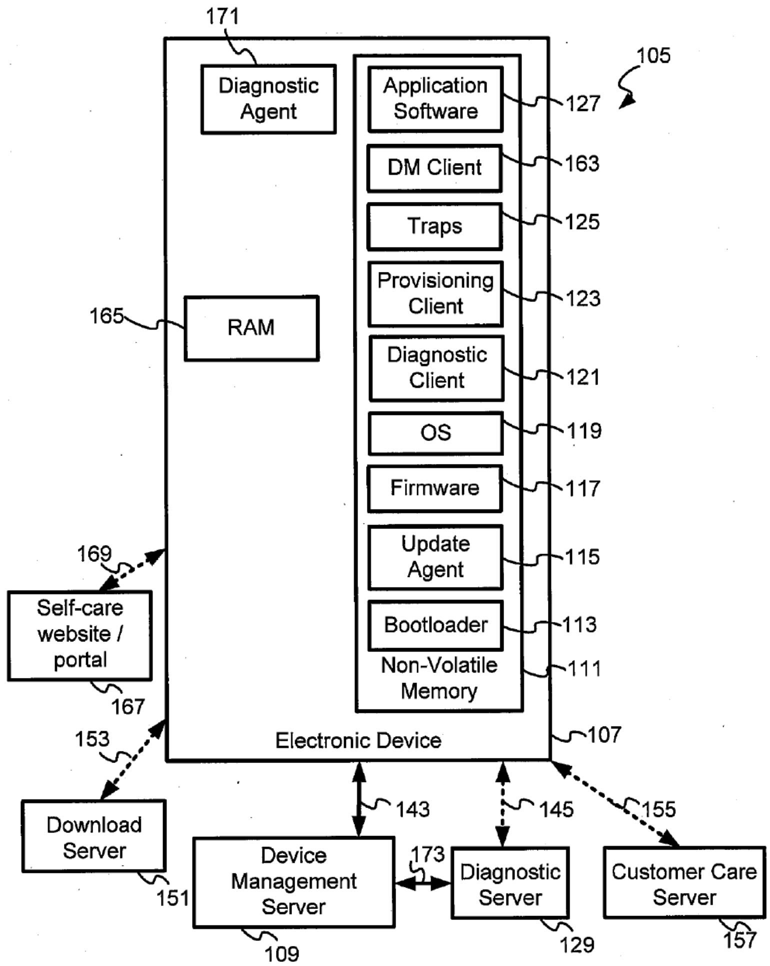
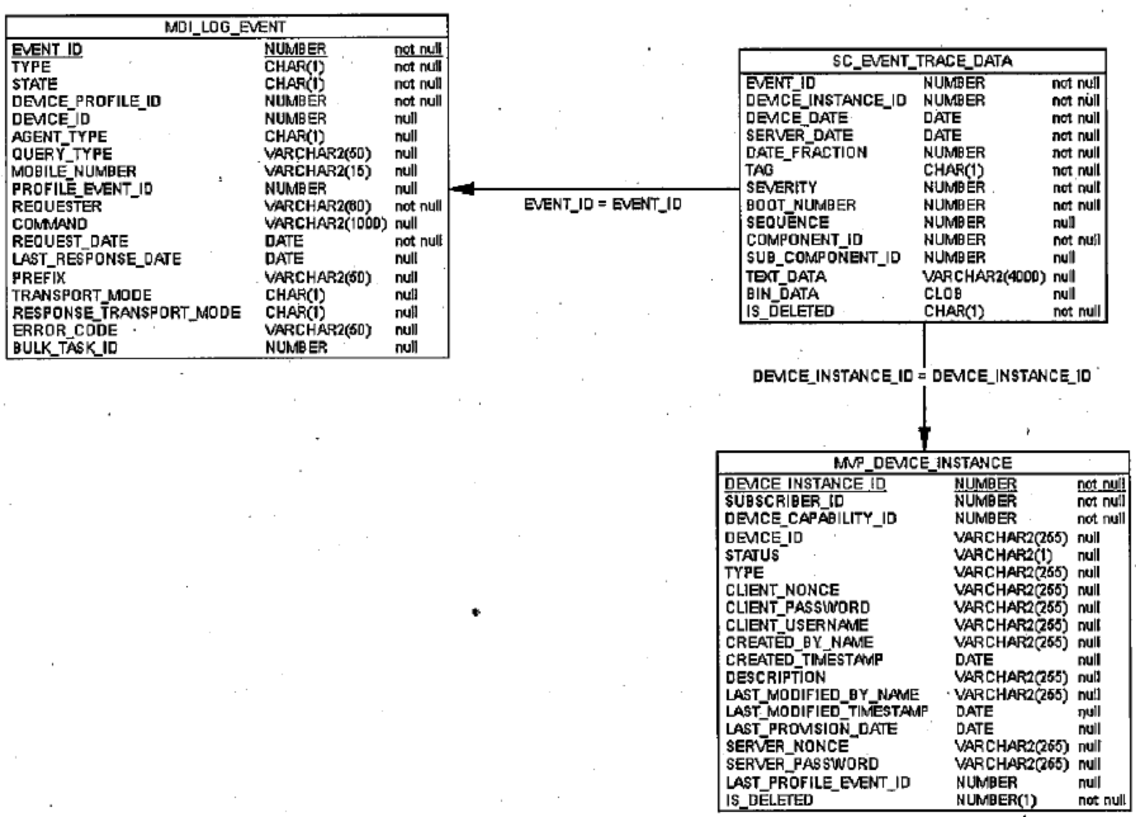


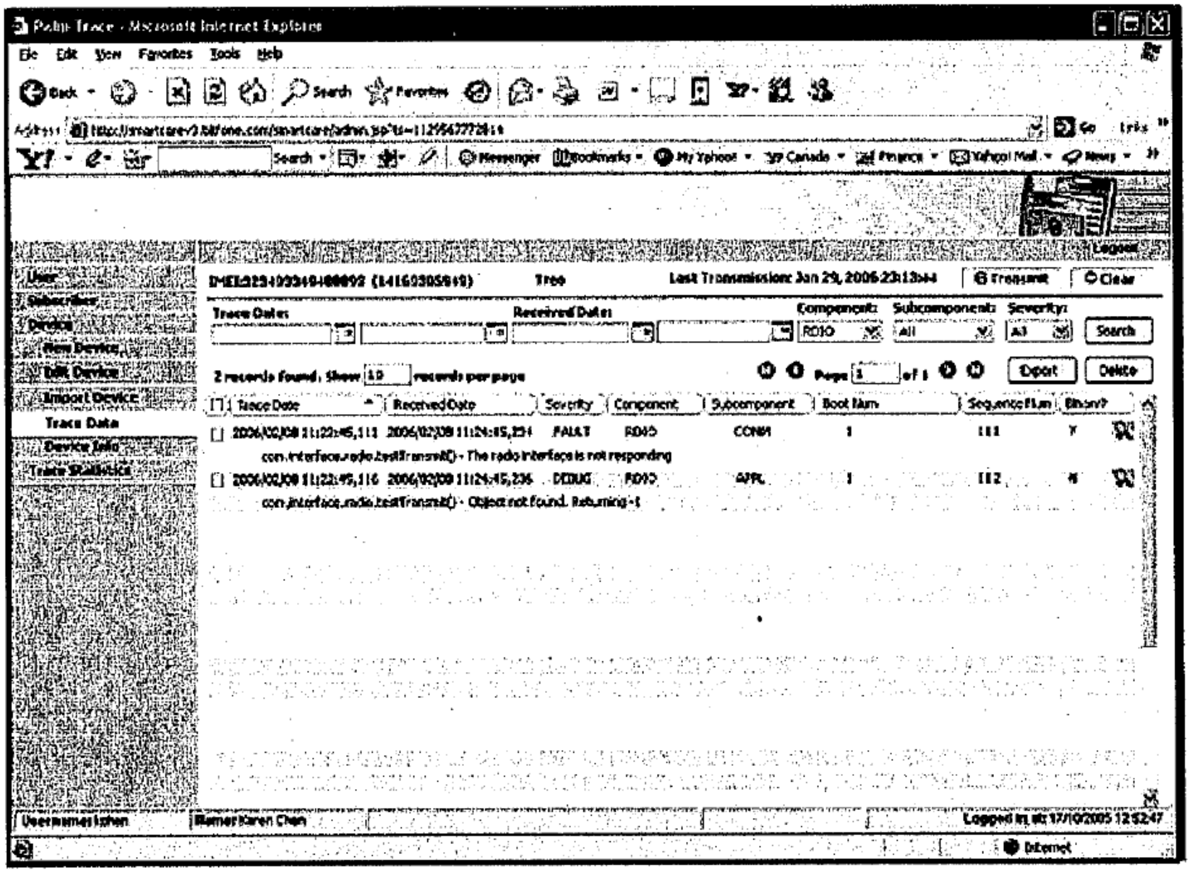
FIG. 1

52. The client software components include the device management client, diagnostic client, provisioning client, update agent, and traps client. EX1009, [0035]. These components configure, update, and monitor the mobile device. EX1009, [0035]-[0041]. Server components include the download server, device management server, diagnostic server, customer care server, and self-care website/portal. EX1009, [0033]. The client components communicate with the

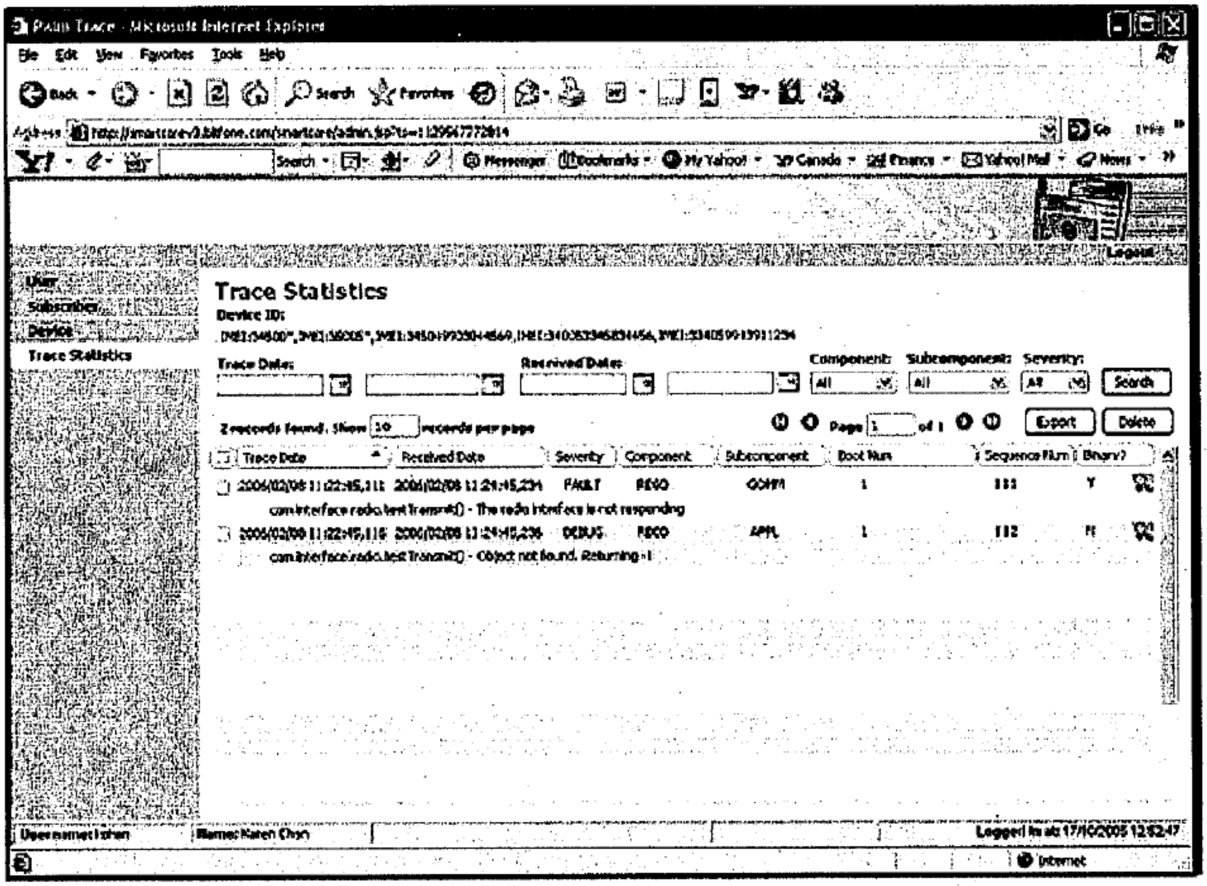
server components, allowing the network operator to remotely diagnose and resolve problems faced by the customer/subscriber. EX1009, [0034], [0038].

53. The client software generates and collects diagnostics, tracing, debugging, and network performance information. EX1009, [0039]-[0042]. This information is uploaded to the server components, where it is stored in a database and made available (e.g., through a web page) to a network operator or mobile device user. EX1009, [0044], [0059], [0072], [0202], [0215], [0242], [0249], [0252], [0273]-[0274], Fig. 14-18.





54. The network operator may analyze the collected information in aggregate to gather statistics across multiple mobile devices. EX1009, [0286]-[0290], Fig. 17.



1. Aaron

55. U.S. Patent Application Publication 2008/0305747 ("Aaron") is prior art under at least pre-AIA 35 U.S.C. § 102(e), having been filed June 7, 2007 (before the earliest effective filing date of the '700 Patent) and published December 11, 2008.

56. Aaron describes methods and systems for measuring the service quality of wireless telecommunications systems through collecting and measuring information from wireless devices. EX1010, Abstract, [0004]-[0005].

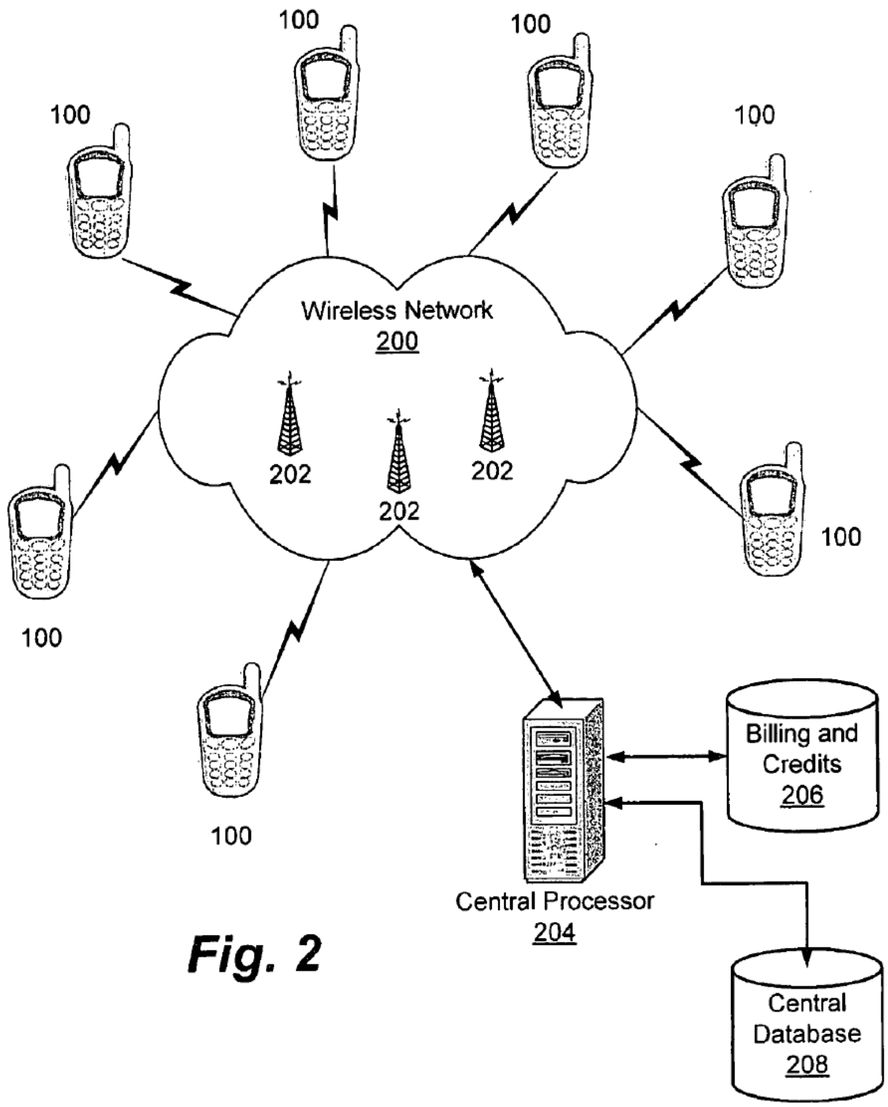


Fig. 2

57. The wireless devices collect service quality information such as "the signal strength of a radio link between the wireless terminal 100 and a base station 202, the signal quality of a radio link between the wireless terminal 100 and a base station 202, and the occurrence of a dropped call. SNR (signal-to-noise ratio) may also be used." EX1010, [0040]. The wireless devices also determine their geographic location based on a GPS receiver or based on the base stations they use. EX1010, [0006], [0042].

58. The information, including the location information, is sent to a server system that stores the received information in a central database. EX1010, [0036], [0037], [0043]. The wireless service provider may use the quality of service and location information to identify problems within the wireless communications system. EX1010, [0009], [0031], [0052], [0054].

2. Scherzer

59. U.S. Patent Application Publication 2008/0186882 ("Scherzer") is prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and (e), having been filed May 3, 2007 and published August 7, 2008, both before the earliest effective filing date of the '700 Patent.

60. Scherzer discloses a system for collecting service quality information for wireless access points into a database that is then shared with devices to facilitate those devices connecting to access points based on the collected measurements. EX1011, Abstract. This system includes client devices such as cellphones communicating with a server to update and query a database containing measurements of quality and the geographic location of wireless access points. EX1011, [0068], Fig. 1.

61. Scherzer's database "stores historical data about radio broadband access resources" including "WiFi hot-spots locations and quality." EX1011, [0067]-[0068]. The server populates the database based on "connectivity reports"

received from client devices. EX1011, [0069], [0071]. Client devices conduct radio surveys of the radio resources available at the client's geographic area, and for each radio resource, the client performs a "measurement trip" to collect "radio resource parameters." EX1011, [0080]-[0082].

62. Scherzer's client devices also receive quality and connection information from the server's database and may use the information when selecting and connecting to a wireless access point. EX1011, [0070]-[0071].

63. Scherzer describes the server using the information in the database to provide geographic maps of access points near a client device. EX1011, [0149]. The server may also provide a ranking of those access points based on the database's measurements of the quality of the access point. EX1011, [0149]-[0151].

B. <u>Ground 1:</u> Daley, Aaron, and Scherzer (1-16)

3. The Combination

64. Daley's mobile device monitoring and diagnostic system is augmented to leverage the mobile device geographic location capabilities and access point quality measurement collection and use, as disclosed by Aaron and Scherzer.

65. Daley, Aaron, and Scherzer are all analogous art because they all incorporate the collection of data, including quality of service information, from mobile devices to a central server for review, analysis, and issue remediation and/or wireless service improvement. A POSITA would have recognized that these

references share fundamental architectural similarities—each employs distributed mobile devices as data collection nodes that report to centralized server infrastructure for processing and storage. The common technical approach across these references demonstrates convergent solutions to the challenge of monitoring wireless network performance. Furthermore, all three references address the same core problem: obtaining real-world performance data from actual user devices operating in diverse conditions rather than relying solely on theoretical models or controlled testing. Daley focuses on diagnostic and troubleshooting capabilities, Aaron emphasizes quality-of-service mapping and visualization, and Scherzer provides access point selection and ranking functionality. A POSITA would have understood that these different applications of the same underlying data collection architecture represent complementary approaches to wireless network management. The technical compatibility of these systems, evidenced by their shared client-server communication patterns and database storage mechanisms, would have suggested to a POSITA that features from each reference could be beneficially combined. Therefore, the analogous nature of these references establishes a strong foundation for their combination in addressing the comprehensive wireless monitoring and management challenges.

4. Motivations to Combine

66. As noted above, Daley is directed to systems and method involving applications running on mobile devices that collect and transmit information about those devices to a server, allowing end-users of the server system (who may access that system via web and other interfaces) such as mobile subscribers to remotely diagnose and resolve problems faced by the subscribers and allowing them to engage in self-care. EX 1009, [0033]-[0034], [0038]-[0042], [0215]-[0216], Figs. 1, 4, 6-18.

67. In my opinion, in the context of Daley's system, a POSITA would have known that, when assessing any wireless networking problem or issue, it can be helpful to know the location of the customer, and this is especially true when attempting to assess and resolve an issue with the network performance of a mobile wireless device. The technical rationale for location awareness stems from the fundamental physics of radio propagation—signal strength, interference patterns, and coverage quality all vary significantly based on geographic position. A POSITA would have known that radio waves attenuate with distance according to predictable propagation models, encounter varying obstacles and terrain features, and experience location-specific interference from other electromagnetic sources. Indeed, a system would benefit from having access to information about the location of the mobile device at the time of the monitored performance and about the

infrastructure (*e.g.*, base stations or towers) with which the device was or could have been in communication. A POSITA would have recognized that correlating diagnostic data with specific cell towers or base stations enables precise identification of infrastructure-related issues versus device-specific problems. This location-aware approach enables operators to distinguish between device-specific problems and location-based network issues, thereby facilitating accurate diagnosis and targeted resolution. Furthermore, location information transforms abstract connectivity problems into concrete geographic patterns that reveal coverage gaps, interference zones, and infrastructure failures. Network operators can identify whether multiple users in the same area experience similar issues, indicating location-specific problems, or whether issues follow individual devices across locations, suggesting device-specific faults. A POSITA would therefore have looked to art that describes collecting and providing that information to be used in the context of a system like Daley.

68. Aaron and Scherzer are such references. As set forth above, Aaron, like Daley, is directed to collecting and measuring service quality information from wireless devices. The technical similarity between these systems would have suggested to a POSITA that Aaron's enhancements could be beneficially applied to Daley's framework. Aaron discloses more detail about the type of network performance data disclosed in Daley, specifically reciting "signal strength," "signal

quality," and "dropped call[s]," and signal-to-noise ratios. EX1010, [0040]. These granular performance metrics provide quantitative characterization of the exact network conditions experienced by mobile devices. A POSITA would have recognized that Aaron's specific quantitative metrics complement Daley's broader diagnostic framework by providing measurable parameters that transform qualitative issues into numerical values suitable for threshold-based triggers and statistical analysis. Similarly, Scherzer is directed to improving the performance of a wireless device based in part on collecting data from that device into a server-side database. EX1011, [0061], [0069], [0074]. The database includes the geographic location of wireless access points and both real-time and historical data about their performance. EX1011, [0067]-[0069], Fig. 1. A POSITA would have understood that Scherzer's dual temporal perspective—capturing both immediate conditions and historical trends—enables predictive analytics and pattern recognition that would have enhanced Daley's reactive diagnostic capabilities. The architectural parallels among these systems, particularly their client-server communication models and centralized database storage, demonstrate compatible technical implementations. A POSITA would have looked to the teachings of Scherzer and Aaron when considering how to add location related features to Daley.

69. Furthermore, as discussed above, a POSITA would have understood that adopting a centralized data collection architecture enables systematic

aggregation and analysis of network-wide performance data. Aaron discloses collecting information about the geographic location of the wireless device when service quality information is collected. EX1010, [0006], [0042]. A POSITA would have recognized that this collection of performance metrics and location data creates location-aware diagnostic information that transforms discrete network issues into concrete localized problems. The combination of detailed performance parameters with precise location coordinates enables network operators to generate coverage maps, identify interference zones, and optimize infrastructure placement based on empirical field data. Therefore, incorporating Aaron's location-aware quality measurement techniques into Daley's management system would have been a straightforward enhancement that significantly improves diagnostic capabilities.

70. Further, collecting base station information would have improved problem assessment and remediation. In my opinion, POSITA also would have been aware that, because mobile devices were oftentimes within range of multiple cell towers or access points (base stations), connecting a mobile device to a different base station was a common handover / handoff exercise, i.e., switching to a new base station to maintain service quality as the mobile device moves, which could be both a useful diagnostic tool (e.g., to help determine if an issue has its root in the device or in the network infrastructure) and a potential remedy (e.g., if the problem remains when connected to another base station) in the context of Daley. EX1015, at 117-

120, 142-156; EX1016, at 336-39; EX1032 at 4-7, 15-30, 31-38, Table 11.4; EX1035; EX1036 at 1:18-4:36. The technical implementation of handover decisions often requires sophisticated evaluation of multiple performance parameters across available base stations to ensure seamless service continuity. EX1015, at 117-120; EX1016, at 338-39; EX1032 at 19-30, 275-302, 327; EX1036 at 1:18-4:36. For example, Daley discloses monitoring "roaming transitions,", which involve base station transitions. EX1009, [0145]. A POSITA would have understood that base-station specific monitoring and configuration capabilities based on service quality measurements, cell load and capacity, mobility patterns (e.g., speed of the mobile device movement) were important considerations for handover decisions. EX1032 at 19-30, 251-273; EX1033 at 1:10-2:67.

71. These technical factors directly influence handover optimization—service quality measurements determine signal adequacy, cell load metrics prevent congestion-induced failures, and mobility patterns enable predictive handover timing. *Id*. Moreover, Daley as augmented with location-related collection and processing (e.g., as disclosed in Aaron) would have invited these additional capabilities with even more vigor, because such a system is already tracking the location of the device, meaning it would have been a missed opportunity to not also provide location-related functionality like base station recommendations or rankings. *Id*. A POSITA would have recognized that location awareness naturally

extends to base station selection optimization, transforming passive monitoring into active network management. *Id*. A POSITA would therefore have looked to art that describes collecting, providing, using information about base stations and access points in the context of a system like Daley or Daley as augmented per Aaron.

72. Notably, both real-time location data and historical performances based on location are important to achieve the goal of Daley—improving user experiences with mobile devices as they are on the move. The real-time and historical data enables both reactive and predictive network optimization strategies. The former provides instantaneous measurements from surrounding base stations that help avoid dropped calls or degraded data sessions. *See, e.g.*, EX1015, at 117-120; EX1032 at 19-30. The latter reveals real-world reliability and allows the system to predictively make adjustments, for example, by incorporating factors such as peak calling time and local interferences, in order to optimize service provision. EX1015 at 117-120; EX1032 at 19-30; EX1035. Thus, the system can address immediate connectivity issues while simultaneously learning patterns that prevent future problems. Furthermore, Daley specifically contemplates "anticipatory tracing" or collection of data "for a problem that is expected to occur at some time in the future." EX1009, [0060]. A POSITA would have understood that this anticipatory capability requires historical pattern analysis to identify recurring issues and predict future network conditions.

73. As described above, Scherzer discloses such a system. Like Daley and Aaron, Scherzer is directed to improving the performance of a wireless device based in part on collecting data from end-user devices into a server-side database. EX1011, [0061], [0069], [0074]. This architectural similarity demonstrates a common technical approach across the art for addressing wireless performance optimization challenges. The database includes the geographic location of wireless access points and both real-time and historical data about their performance. EX1011, [0067]-[0069], Fig. 1.

74. Scherzer's collected data enables sophisticated access point selection algorithms that consider both current conditions and historical reliability trends. A POSITA would have looked to the teachings of Scherzer when considering how to add base-station related features to Daley (or Daley as augmented per Aaron). Therefore, incorporating Scherzer's access point evaluation and ranking capabilities would have been a natural enhancement that leverages existing location and performance data to optimize connection decisions.

75. In addition, collecting both base station information and location information improves problem assessment and remediation in the Daley system in a synergistic fashion. Having both location and base station information can help determine if there is a location-specific issue (e.g., a storm, power outage, or some source of interference), a base station specific issue (e.g., too much demand or

malfunction), or a device or user specific issue. EX1015, at 35-41, 117-120; EX1032 at 19-30, 275-302; EX1035 at 245-247. This multi-dimensional diagnostic capability was a commonsense network troubleshooting methodology. A POSITA would have recognized that correlating performance degradation with both geographic coordinates and base station identifiers enables precise root cause analysis through systematic elimination of potential failure sources. EX1032 at 19-30, 251-274, 275-302; EX1035. The technical implementation of this diagnostic framework transforms ambiguous connectivity problems into categorized issues with targeted resolution strategies.

76. Furthermore, a POSITA would also have understood that it was in the best interests of customers and carriers to expeditiously and accurately remedy, and not just diagnose, a wide range of issues. The economic and operational benefits of rapid problem resolution include reduced support costs, improved customer satisfaction, and decreased network congestion from repeated connection attempts. By augmenting Daley's system with location and base station information, the system would be able to take a wider range of appropriate remedial actions, including configuring a device to avoid interference or otherwise optimize connectivity, to avoid excessive power use if there appears to be a regional power outage, or even to connect to alternative base stations if a base station appears overloaded or unavailable. EX1032 at 19-30, 251-274, 275-302.

77. These remedial capabilities leverage the diagnostic intelligence to implement context-appropriate solutions—interference avoidance through frequency adjustments, power conservation during infrastructure failures, and load balancing through base station redistribution. The latter remedy, in particular, was known to possibly have financial implications for a device user (e.g., because of roaming or off-network fees). A POSITA would have understood that in some circumstances it may be desirable to provide a list of available base stations (ideally ranked according to various metrics such as availability, performance, or cost) and allow the device user to make the final decision. This user-oriented selection mechanism balances technical optimization with economic considerations, empowering users to make informed connectivity choices based on their individual priorities. EX1016, at 340; EX1017, at 216-217. Therefore, the combination of automated remediation and user-guided selection creates a flexible resolution framework that addresses diverse failure scenarios.

78. Additionally, a POSITA would have known that enhancing Daley to provide these features and functionality would be likely to provide a competitive advantage (ultimately improving customer satisfaction and retention) or to at least be necessary to avoid competitive disadvantage as these features became "table stakes." EX1017, at 216-217. The wireless telecommunications industry's competitive landscape drives continuous service improvement, making advanced

diagnostic and remediation capabilities essential for market viability. Customer expectations for reliable connectivity and transparent problem resolution create market pressure for sophisticated management systems. *Id*.

79. Moreover, Scherzer would have provided a POSITA with additional motivations to implement this functionality in a wireless device monitoring and management system.

80. Knowing that these features and functions are desirable to have in a system like Daley's, a POSITA would have recognized that Aaron and Scherzer disclose their implementation in systems that are technically similar to that of Daley. The architectural parallels between these systems—client-server communication, performance data collection, and database storage—demonstrate common technical approaches to wireless network management. A POSITA would have understood that the complementary features disclosed in Aaron and Scherzer could be readily integrated into Daley's framework, leveraging the existing infrastructure while adding location awareness and base station information. Thus, the combination of these references provides a complete technical solution for implementing comprehensive mobile device management with geographic and infrastructure-aware capabilities.

5. Reasonable Expectation of Success

81. In my opinion, a POSITA would have had a reasonable expectation of success in adding location and access point capabilities to Daley, including as disclosed by Aaron and Scherzer. The technical implementation of these enhancements involves well-established mobile device capabilities and standard software engineering practices that were routine in the art. Modifications to Daley's mobile devices to collect geographic location, as disclosed in Aaron, and access point information, as disclosed in Scherzer, would be straightforward and well within the abilities of a POSITA. A POSITA would have recognized that GPS receivers and base station identification modules were already standard components in mobile devices, requiring only software integration to capture and report this additional data through existing collection mechanisms.

82. Furthermore, transmitting the additional data could have been done by, for example, simply adding additional header and content fields consistent with the transmission protocols disclosed by Daley, with only a minimal impact on consumed bandwidth. A POSITA would have understood that these modest data additions are straightforward extensions or modifications and represent only negligible overhead compared to the diagnostic and performance data already being transmitted by Daley's system.

83. On the server side, a POSITA would be capable of extending the databases already disclosed by Daley by (for example, if a relational database is used) adding new columns or tables to account for the additional datatypes and relationships, such as a table for access points or towers with information about them, and a column for collected performance data that includes the location of the device at the time of collection. The technical implementation would leverage existing database management capabilities while preserving the established data model's structure and query patterns.

84. Additionally, adding user interface pages to support this additional content would also have been within the skillset of a POSITA, requiring the same type of work that would have been necessary to create the pages already disclosed in Daley. The user interface modifications would employ standard web development techniques to display location data on maps, present access point lists, and visualize geographic performance patterns. A POSITA would have recognized that these interface enhancements utilize common UI components and visualization libraries that were readily available and widely deployed in similar systems. Therefore, the technical modifications required to incorporate location and access point capabilities into Daley's system represent routine engineering tasks that a POSITA would have successfully implemented with high confidence of success.

85. In my opinion, a POSITA would also have understood that information about the location of a wireless device and information about the location and properties of wireless infrastructure can be sourced or determined in multiple ways from multiple sources and a POSITA would have known how to implement each of the various options. The availability of multiple location determination methods provides system designers with flexibility to select appropriate techniques based on accuracy requirements, power consumption constraints, and infrastructure availability. For example, it was known that a device could determine its location, with varying degrees of accuracy and precision, by: using GPS (integrated into the device or otherwise), measuring the signal delay to an emitter of known location, triangulation with multiple emitters, comparison of observed network performance to devices known to be in roughly similar locations, etc. EX1018, at 330-33; EX1019, at 341-43.

86. A POSITA would have understood that such methods like advanced forward link trilateration (AFLT), round trip delay (RTD), cell/sector centroids, etc., were well known in the art and were embodied in commercial solutions such as Qualcomm's gpsOne®. EX1018, at 330-33; EX1019, at 341-43; EX1020, [0005]-[0007], [0068]-[0095], Figs. 5-9. These commercial implementations demonstrated the technical maturity and reliability of hybrid positioning systems that combine multiple location techniques for optimal accuracy. Furthermore, the location of a

base station could be determined, for example, from commercial databases (e.g., Qualcomm's Base Station Almanac) offering location determination services for mobile devices. EX1020, [0008]-[0016].

87. Also, publicly accessible registries and commercial databases (with paid subscriptions) of wireless infrastructure like cell towers and base stations were well known at the time. These included the FCC's Antenna Structure Registration (ASR) and the TowerSource online site-location tool. EX1021, at 13. Such registries included not just location, but also various communication properties and the identity of the associated carrier. *See, e.g.*, EX1022; EX1023. For example, the FCC ASR offered open access with a variety of search options such as the location, type, or owner of the antenna structures. EX1024. A POSITA would have been familiar with a variety of ways to incorporate data from such registries into a system like Daley, including performing bulk downloads for full local integration, accessing the registries through an API or scripting, or linking these external databases through federated queries "on demand." In other words, the state of the art was such that a POSITA would have found it straightforward and logical to include tower and base station information in a management and monitoring system such as Daley. Indeed, because a database would be a logical and well-known place to store this information, a POSITA would have found it obvious to include this information in the database of the combination. Moreover, storing the public records in the

database would make recurrent use faster (because of the local storage) and improve availability (e.g., if the remote record source were unavailable).

88. In sum, in my opinion, the above-discussed concepts were well-established and compatible, and integrating them into the system of Daley would have been straightforward and predictable. A POSITA would have recognized that the technical architectures of Daley, Aaron, and Scherzer share common foundational elements—client-server communication protocols, database storage mechanisms, and web-based user interfaces—that facilitate seamless integration. The compatibility extends beyond mere architectural similarity to encompass complementary functionality where each reference addresses different aspects of the same core challenge. Furthermore, the integration would leverage existing, proven technologies without requiring novel innovations or untested approaches. A POSITA would have understood that combining location awareness from Aaron, base station information and rankings from Scherzer, and diagnostic capabilities from Daley represents an aggregation of established techniques. Across Daley, Aaron, and Scherzer each component of the system operates independently within its domain while contributing to the overall system functionality through well-defined interfaces. Therefore, implementing this combination would have involved routine engineering tasks of connecting compatible and well-known systems.

6. Analysis

(a) Claim 1

(i) 1[pre] A method of collecting and providing access to quality or service information associated with one or more wireless communications networks, mobile devices, or end users, comprising:

89. Assuming the preamble is limiting, the combination renders obvious ***a method of collecting and providing access to quality or service information associated with one or more wireless communications networks, mobile devices, or end users*** and ***a system for*** the same.

90. In my opinion, Daley comprehensively discloses methods and systems through which wireless communication network operators collect diagnostic tracing and log data, including network performance data, from mobile devices. EX1009, Abstract. The system architecture incorporates a diagnostic server that receives and stores monitoring, tracing, configuration, and diagnostic data from diagnostic client software running on each mobile device (***collecting … quality or service information associated with one or more … mobile devices***). EX1009, [0039]-[0040], [0215]-[0216]. The diagnostic data includes "network performance data." EX1009, [0041]. A POSITA would have recognized that the "network performance data" collected on the mobile devices of Daley provides ***quality or service information*** of the mobile device's wireless network connection and service. Further, Daley discloses the diagnostic client collecting log data that includes ***quality***

or service information by logging "discrete events such as low/high signal or roaming transitions" that reflect the experience of the mobile device. EX1009, [0145]; *see also e.g.* EX1009, [0270] (an exemplary log entry: "2006/01/23 11:23:33 2006/01/23 11:26:121 12 22 DEBUG RADI SGNL Signal 'extremely low', problem").

91. The diagnostic server receives this information from the diagnostic client and stores it in a database. EX1009, [0215]-[0216]. A POSITA would have recognized that this server-side infrastructure establishes the necessary mechanisms for reliable data collection and persistent storage. The system stores this received information in a database, thereby creating a centralized repository that enables systematic organization and subsequent retrieval of the diagnostic data. Therefore, the diagnostic server ensures that the collected information remains accessible for analysis and reporting purposes.

92. Daley's system also includes web pages that provide Internet-based interfaces into the collected data, e.g. "the Device IMEI/ESN, Manufacturer, Model, Platform, Revision, Processor, OS Version, Free Memory, Signal Strength, and Data Connection Settings, for example," to users of the system, including the wireless network provider and the customer (***providing access to quality or service information associated with one or more … mobile devices***). EX1009, [0291], Figs. 15-18. Through this web-based interface architecture, Daley enables

authorized users to access and analyze the collected diagnostic information, thereby facilitating network troubleshooting and customer support functions.

93. In my opinion, Aaron discloses mobile devices measuring the "quality of a wireless communication service" (***quality or service information associated with one or more communications networks, mobile devices, or end users***) and a server ("central processor 204") ***collecting*** the "service quality information and location information" from those mobile devices to store in database ("central database 208"). EX1010, [0031]-[0035], [0036]-[0037]. Aaron discloses using this information to draw or update quality-of-service maps (***providing access to quality or service information***) which technicians use to identify problems with the wireless communications network. EX1010, [0031], [0036], [0037], [0043]. A POSITA would have understood that these dynamically generated and updated quality-of-service maps serve as diagnostic tools that technicians employ to identify problems with the quality or services provided by the wireless communications network.

94. As set forth above, it would have been obvious to a POSITA to combine this aspect of Aaron with Daley.

(ii) 1[a] using a computer, receiving mobile device location information of a plurality of mobile devices or end users that are associated with one or more wireless communications networks and quality or service information pertaining to wireless access characteristics for one or more mobile devices of said plurality of mobile devices or end users, and said quality or service

information comprising coverage, availability or performance information of one or more wireless communications networks or said one or more mobile devices,

95. In my opinion, the combination renders obvious this limitation. In my opinion the technical teachings of Daley and Aaron collectively establish the claimed receiving of location and quality and service information regarding the coverage and performance of the mobile device's wireless access to the wireless communications networks.

96. In my opinion, Daley discloses capturing and storing information about transitions from being connected to a native network to a roaming network which includes ***location information***. EX1009 [0145], [0270]-[0271], [0291]. A POSITA would have recognized that this technical implementation establishes a systematic approach to tracking network handover events and their associated geographical context.

97. Furthermore, a POSITA would have understood that this information includes the identity of the old tower and the identity of the new tower. The identity of the tower constitutes location information because towers are located at fixed geographic locations, thereby providing precise geographical reference points for determining mobile device positioning. Through these tower identifications, the system establishes a framework for tracking device movements across network boundaries. Additionally, a POSITA would have known that the location of a tower

or base station could be determined from public and commercial databases, such as Qualcomm's Base Station Almanac, the FCC's Antenna Structure Registration, and the TowerSource online site-location tool. EX1020, [0008]-[0016]; EX1021, 13; EX1022; EX1023; EX1024. These readily available resources enable the correlation of tower identities with their specific geographical coordinates, facilitating location tracking capabilities across the network infrastructure.

98. Moreover, a POSITA would have found it straightforward to include tower and base station information in a management system like Daley. The technical implementation would involve integrating these tower identification parameters into the existing data collection framework, thereby enhancing the system's ability to track mobile device movements and network transitions. Therefore, Daley discloses a database containing ***location information of a plurality of mobile devices ... and quality or service information*** to correlate with the roaming events, establishing a framework for analyzing network transitions in conjunction with their geographical context.

99. In my opinion, Aaron discloses ***using a computer*** (central processor 204), ***receiving mobile device location information*** ... and ***quality or service information pertaining to wireless access characteristics for one or more mobile devices*** (it receives "service performance information, geographic location information, and user feedback from the various wireless terminals 100"). EX1010,

[0036], [0043]. A POSITA would have recognized that central processor 204 constitutes a ***computer*** that runs software on a processor, implementing the necessary computational infrastructure for data collection and processing. EX1010, [0050] ("The operations of FIG. 4 are implemented via software ... executing on a single processor or multiple processors that perform the various functions of central processor 204.").

100. Furthermore, Aaron's Figure 4 discloses the steps taken by central processor 204 including receiving the "service quality information and location information from wireless terminal." EX1010, Fig. 4 (annotated below), [0050]. A POSITA would have understood that this systematic reception of both quality and location data enables the central processor to correlate network performance metrics with geographic positioning, thereby creating a spatially-aware quality assessment framework. Figure 4 reinforces this combination of data through the step of "[u]pdat[ing] quality-of-service map." EX1010, Fig. 4. Through this technical architecture, the system establishes the foundation for network performance analysis based on actual field measurements from distributed mobile devices.

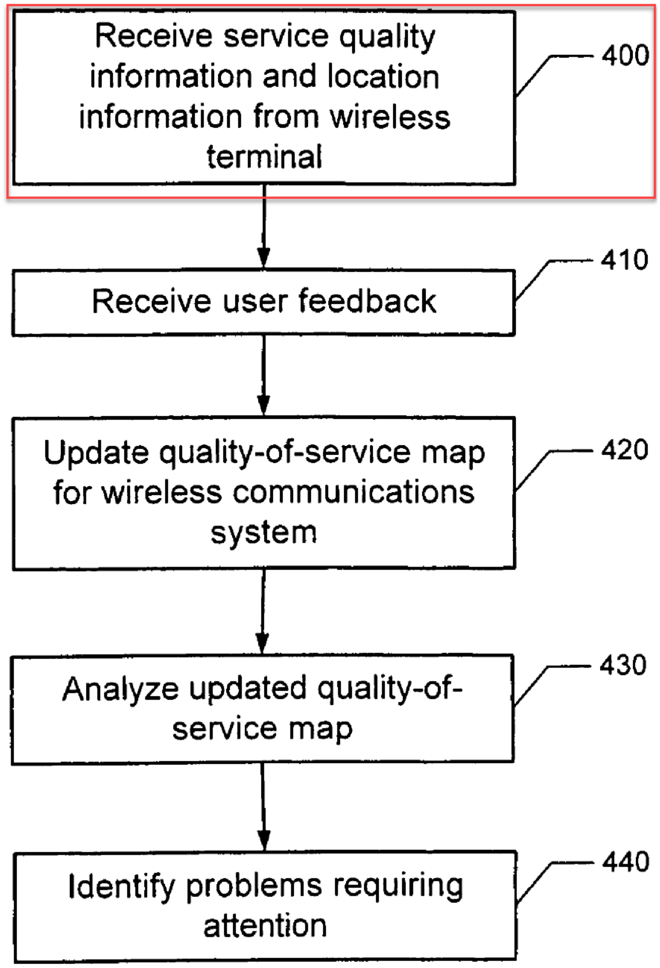


Fig. 4

101. In my opinion, Figure 3 discloses the steps of the mobile device in collecting and sending this information to the central processor 204. EX1010, Fig. 3 (annotated below), [0038]. A POSITA would have recognized that this figure illustrates the systematic data collection and transmission methodology employed by the mobile devices. Each mobile device executes a structured sequence of operations to gather performance metrics and location data before transmitting this

information to the central processor. Through this client-side processing framework, the system ensures that quality and location information are properly captured and formatted for transmission to the server infrastructure. Therefore, Figure 3 establishes the operational workflow that enables mobile devices to function as distributed data collection nodes within the overall network monitoring architecture of Aaron.

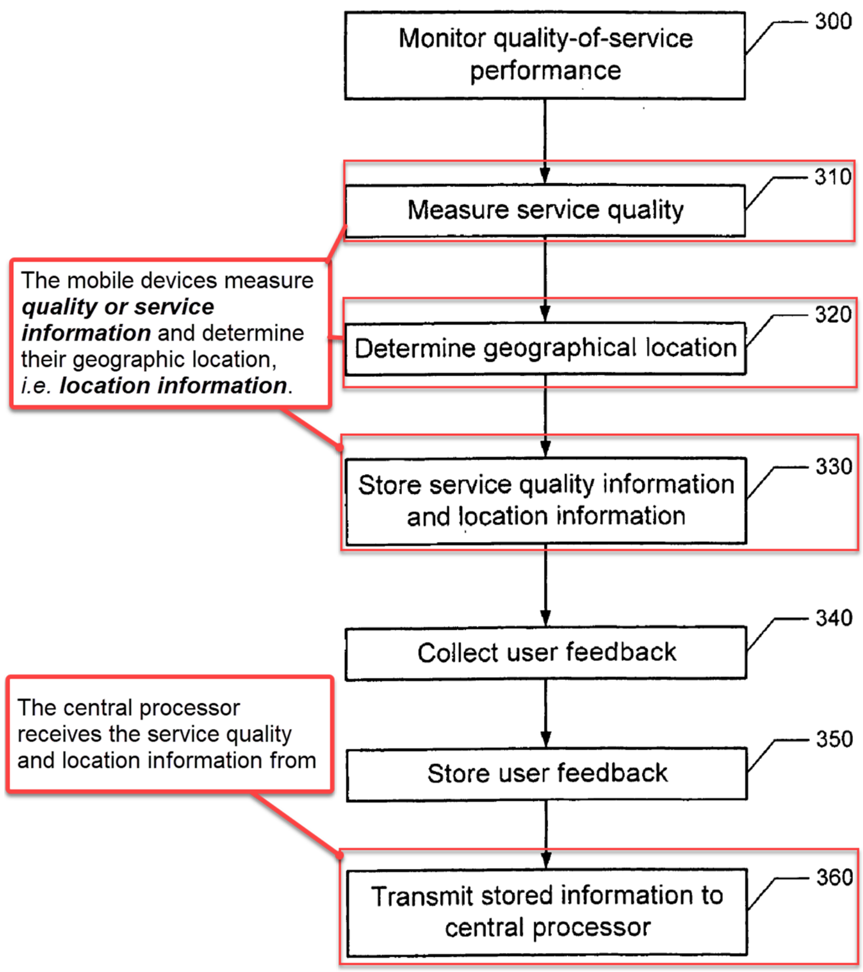


Fig. 3

102. In my opinion, each mobile device measures the quality of its wireless communication service (***quality or service information pertaining to wireless access characteristics for one or more mobile devices***). EX1010, [0031]-[0035], [0041]. A POSITA would have understood that the "service quality" measurements include "performance parameters" such as "the signal strength of a radio link between the wireless terminal 100 and a base station 202, the signal quality of a radio link between the wireless terminal 100 and a base station 202, ... the occurrence of a dropped call ... [and] SNR (Signal-to-Noise Ratio)." EX1010, [0041], Claim 2. These performance metrics provide quantitative characterization of the exact network conditions experienced by mobile devices. A POSITA would have recognized that signal strength measurements indicate the power level of received radio signals, while signal quality metrics assess the integrity and reliability of the communication channel. The occurrence of dropped calls serves as a critical reliability indicator, directly reflecting service continuity issues that affect user experience. Furthermore, SNR measurements enable the system to distinguish between desired signals and background noise, providing insight into the communication link's effectiveness. Through this comprehensive set of performance parameters, the system captures multiple dimensions of wireless service quality that collectively characterize the mobile device's network experience.

103. In my opinion, each mobile device determines its geographic location (***location information***) using, e.g.: a Global Position Systems receiver, triangulation methods based on the mobile device's distance from multiple base stations, methods based on the geographic location of the base station with which the mobile device has a radio link. EX1010, [0042]. A POSITA would have recognized that these diverse location determination methods provide flexibility in achieving position awareness under varying operational conditions. GPS receivers deliver precise coordinates through satellite signal processing, offering high accuracy when satellite visibility permits. Triangulation methods leverage signal timing or strength measurements from multiple base stations to calculate device position through geometric computation. Additionally, base station-based location methods utilize the known fixed positions of cellular infrastructure to approximate device location based on current network connections. A POSITA would have understood that this multi-modal approach to location determination ensures reliable positioning capability across different environments, from open outdoor areas with clear satellite visibility to dense urban settings where base station triangulation proves more effective. Therefore, the system accommodates various deployment scenarios by supporting multiple complementary location technologies.

104. As set forth above, it would have been obvious to a POSITA to combine this aspect of Aaron with Daley's collection of diagnostic and tracing data from

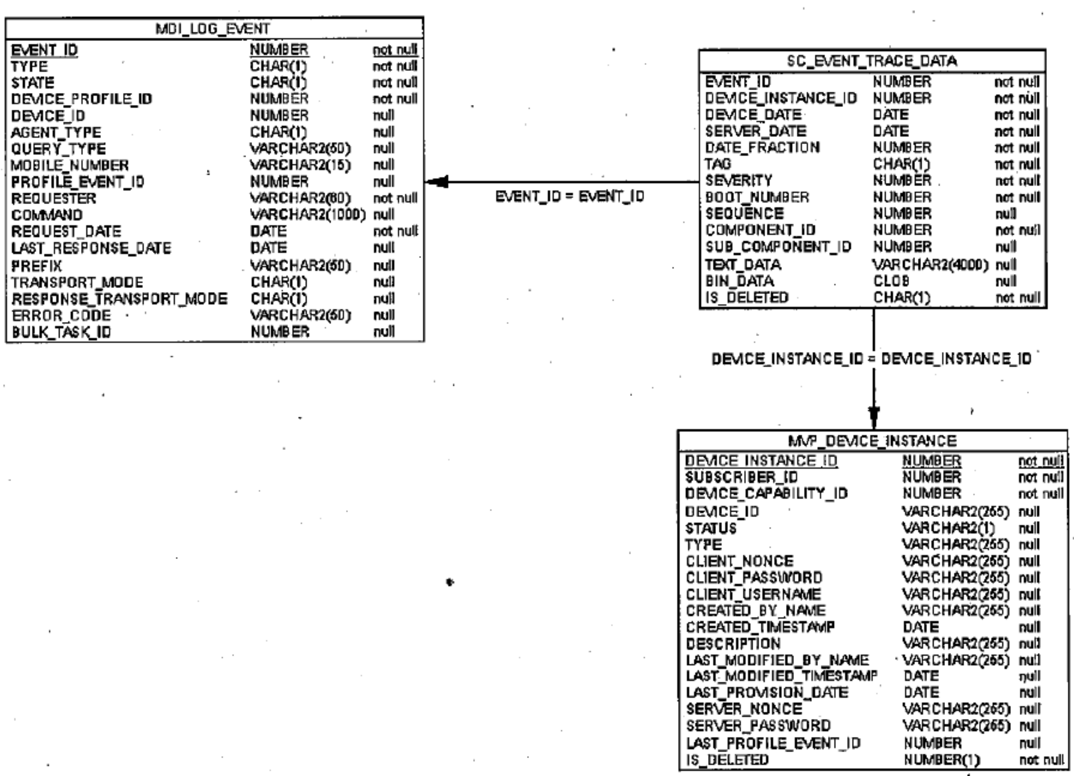
mobile devices. A POSITA would have recognized that Aaron's location determination capabilities directly complement Daley's diagnostic framework, enabling geographic correlation of network performance issues. The combination would allow the system to associate diagnostic events and trace data with specific geographic locations, transforming abstract network problems into concrete, location-specific issues. Furthermore, integrating Aaron's multi-modal positioning methods with Daley's comprehensive diagnostic collection would enable network operators to identify geographic patterns in service quality, distinguish between device-specific and location-specific problems, and implement targeted network optimizations. A POSITA would have understood that this synergy between location awareness and diagnostic capability represents a natural evolution in mobile network management systems. Therefore, combining these complementary technologies would have been a straightforward enhancement that significantly improves the diagnostic and troubleshooting capabilities of the overall system.

(iii) 1[b] storing, by action of said computer, said mobile device location information and said quality or service information in a memory or database;

105. The combination renders obvious this limitation.

106. In my opinion, Daley discloses that the client software on the mobile device generates and collects diagnostics, tracing, debugging, and network performance information. EX1009, [0039]-[0042]. This information is uploaded to

the diagnostic server, where it is stored in a database and made available (e.g., through a web page) to a network operator or mobile device user. EX1009, [0044], [0059], [0072], [0202], [0215], [0242], [249], [252], [0273]-[0274], Fig. 14-18. The server-side database architecture provides persistent storage that enables both real-time monitoring and historical analysis of device performance. A POSITA would have understood that making this data accessible through web interfaces allows authorized users, e.g. customer service representatives, to remotely diagnose issues, track performance trends, and implement corrective measures without requiring physical access to the mobile devices. Therefore, Daley establishes a complete data pipeline from collection through storage to presentation, facilitating comprehensive device and network management.



107. As discussed above regarding 1[pre], in my opinion, Aaron discloses central processor 204 storing the ***location information*** and ***quality or service information*** received from mobile devices into central database 208. EX1010, [0036]-[0037] ("The central database 208 may be utilized to store information received from wireless terminals."). A POSITA would have recognized that central database 208 receives and stores the information ***by action of*** central processor 204 (***said computer***). EX1010, [0036]. This server-driven storage mechanism ensures that collected data undergoes proper processing and validation before database insertion.

108. Furthermore, Aaron discloses this information being included in quality-of-service maps. EX1010, [0037] ("The central database 208, in conjunction with the central processor 204, may be utilized to draw and/or analyze quality-of-service maps"). A POSITA would have understood that these quality-of-service maps represent processed visualizations of the raw data, providing geographic representations of network performance metrics. The dual storage approach—maintaining both raw data in the database and processed data in map form—enables different types of analysis and presentation suited to various operational needs. Therefore, Aaron discloses the information being stored in both central database 208 and updated quality-of-service maps, establishing multiple data persistence mechanisms that support diverse access patterns and use cases.

109. As discussed above, in my opinion, it would have been obvious to combine the diagnostic and tracing database of Daley with database of Aaron including the location information. A POSITA would have recognized that these databases serve complementary functions that naturally integrate to provide enhanced network management capabilities. Daley's diagnostic and tracing database captures detailed operational data about device behavior and network interactions, while Aaron's location-aware database correlates performance metrics with geographic positioning. The combination would create a unified data repository that enables spatial analysis of diagnostic events, allowing operators to identify geographic clusters of similar issues and implement location-specific optimizations. Furthermore, a POSITA would have understood that merging these data sources eliminates the need for separate storage systems while enabling powerful cross-referencing between diagnostic events and their geographic context. Therefore, combining these database architectures represents a logical enhancement that leverages the strengths of both systems to deliver superior network management and troubleshooting capabilities.

(iv) 1[c] updating, by action of said computer, said mobile device location information stored in said memory or database when a mobile device of

said plurality of mobile devices travels from one location to another;

110. The combination renders obvious this limitation. In my opinion, a POSITA would have recognized that the combined teachings of Daley and Aaron establish a comprehensive framework for tracking mobile device movements and updating stored location data accordingly. The system's ability to detect location changes through various positioning methods ensures continuous awareness of device mobility. Furthermore, the database architecture supports dynamic updates that reflect the current position of each mobile device as it moves through the network coverage area. Therefore, the combination fully addresses the requirement for location information updates triggered by device movement.

111. In my opinion, Aaron explicitly discloses collecting information when a quality-of-service threshold is impacted. EX1010, [0005]-[0007], [0033]-[0034], [0041]. A POSITA would have recognized that many of these quality-of-service thresholds are dependent, in whole or in part, on the location of Aaron's wireless terminal. EX1010, [0006] ("signal strength of a radio link with a base station, signal quality of a radio link with a base station, and/or numbers of dropped calls"), [0041]. These location-dependent thresholds naturally fluctuate as the mobile device moves through different coverage areas, with signal strength varying based on distance from base stations and physical obstructions. A POSITA would have understood that when a device travels from one location to another, it experiences different radio

propagation conditions that directly affect these quality metrics. The system's threshold-based triggering mechanism ensures data collection occurs precisely when location changes impact service quality. Therefore, Aaron discloses or makes obvious that the wireless terminal collects data (including the terminal's location) when the terminal changes location, establishing a direct correlation between device movement and data collection events.

112. In my opinion, a POSITA would have found it obvious for the combination of Daley and Aaron to transmit information at or around the time that information is collected, such that the server is ***updating... location information... when a mobile device ... travels from one location to another***. Daley discloses uploading collected information based on a log-related threshold, a specific triggering event, periodically, or upon server request. EX1009, [0153]-[0156]. This is similar to and consistent with Aaron's disclosure that central processor 204 receives information from the wireless terminals periodically, on a scheduled basis, when traffic is low, or "when transmission is otherwise convenient." EX1010, [0005], [0036].

113. Furthermore, a POSITA would understand that especially if the quality-of-service measure indicates a degradation in quality, that would be both an appropriate trigger (e.g., because degrading quality is of relatively high importance) and indicate that transmission is convenient (e.g., because there is still a signal but

if degradation continues there might not be a signal in the near future). The convergence of trigger conditions and transmission opportunities ensures timely updates while optimizing network resource usage. A POSITA would have recognized that this approach balances the need for current location data with practical constraints of wireless communication, such as bandwidth availability and power consumption. Accordingly, a POSITA would find that the above-discussed combination of Daley and Aaron renders this limitation obvious, providing multiple complementary mechanisms for updating location information as devices move through the network coverage area.

(v) 1[d] providing access to said quality or service information stored in said memory or database to one or more end users or one or more end user communication devices or one or more carriers or third parties that provide services to said one or more end users or one or more end user communication devices or one or more carriers, or to said one or more wireless communications networks; and

114. The combination renders obvious this limitation.

115. In my opinion, Daley discloses ***providing access*** to customer service representatives and engineers (***one or more carriers or third parties that provide services to one or more end users***) to diagnose problems with a mobile device encountered by a customer (***access to said quality or service information***). EX1009, [0038], [0060] ("tracing data transferred by the electronic device 107 to the

diagnostic server 129 may be processed and provided as viewable data by the diagnostic server 129, for analysis by a human engineer for subsequent corrective steps"). A POSITA would have recognized that this access mechanism enables technical support personnel to remotely analyze device behavior and network interactions without requiring physical access to the problematic device.

116. Furthermore, Daley discloses that such a user may view and search diagnostic and trace data. EX1009, [0119], [0254]. These search capabilities allow support personnel to efficiently locate relevant information within potentially large datasets, focusing their analysis on specific timeframes, error conditions, or device behaviors. Additionally, Daley's system includes web page interfaces that allow a user to ***access ... quality or service information stored in said ... database***. EX1009, [0273]-[0274], [0290]-[0291], Figs. 15-17. A POSITA would have understood that web-based interfaces provide platform-independent access, enabling authorized users to retrieve diagnostic information from any location with internet connectivity. Through these multiple access mechanisms, the system facilitates efficient troubleshooting and problem resolution across diverse operational scenarios.

117. In addition, Aaron discloses technicians (***one or more carriers or third parties that provide services to said ... one or more carriers, or to one or more wireless communications networks***) ***accessing*** the quality-of-service maps that central processor 204 updates with service quality information received from mobile

devices (***quality or service information***). EX1010, [0036] ("Technicians can then consult the updated quality-of-service map and determine if problems or changes warrant any adjustment to the wireless communications network or its components, and/or to various services or applications."). A POSITA would have recognized that these quality-of-service maps transform raw measurement data into actionable visual representations that facilitate rapid identification of coverage gaps, performance degradation zones, and areas requiring network optimization. The maps enable technicians to make informed decisions about infrastructure adjustments, capacity planning, and service improvements based on empirical field data rather than theoretical models. Furthermore, a POSITA would have understood that providing technicians with map-based visualization tools significantly reduces the time required to diagnose network-wide issues and implement corrective measures. As set forth above, it would have been obvious to a POSITA to combine this aspect of Aaron with Daley, creating a comprehensive system that supports both detailed diagnostic analysis and high-level geographic performance visualization.

(vi) 1[e] wherein said wireless access characteristics comprise one or more of identified, perceived or measured: radio reception quality, network performance, quality of service, data rate, spectrum availability or suitability, capacity or bandwidth, availability or quality of coverage, availability or quality of capacity, availability or quality of one or more services or carriers, availability or quality of air interfaces, average use profile, average

availability profile, statistics on outage or reliability or coverage or capacity carrying capabilities for one or more service providers, frequencies, radio frequency or quality of service or coverage or service map or addresses for one or more service providers, radio frequency or end-user application performance, and cost of service.

118. The combination renders obvious this limitation.

119. In my opinion, Daley's diagnostic server collects diagnostic tracing and log data from mobile devices through the diagnostic client, and that diagnostic data includes "***network performance*** data." EX1009, [0041]. A POSITA would have recognized that Daley's diagnostic client also collects log data that includes ***quality of service*** information by logging "discrete events such as low/high signal or roaming transitions" that reflect the ***perceived or measured*** experience of the mobile device. EX1009, [0145]; *see also e.g.* EX1009, [0270] (an exemplary log entry: "2006/01/23 11:23:33 2006/01/23 11:26:121 12 22 DEBUG RADI SGNL Signal 'extremely low', problem").

120. Furthermore, signal strength is a ***quality of service*** measurement because it measures the wireless service's level of availability and quality of radio frequency coverage. A POSITA would have understood that signal strength directly impacts data transmission rates, connection reliability, and the likelihood of dropped connections. The diagnostic server receives this information and stores it in a database. EX1009, [0215]-[0216]. Additionally, Daley provides web pages that

display device information including: "the Device IMEI/ESN, Manufacturer, Model, Platform, Revision, Processor, OS Version, Free Memory, **Signal Strength**, and Data Connection Settings, for example." EX1009, [0291]. Through this comprehensive data collection and presentation framework, the system captures and displays multiple dimensions of wireless access characteristics that enable thorough network performance assessment.

121. As discussed above, Aaron discloses mobile devices collecting "service quality" measurements including "performance parameters" such as (EX1010, [0041], Claim 2):

- "the signal strength of a radio link between the wireless terminal 100 and a base station 202," (***radio reception quality, network performance, quality of service, quality of coverage***)
- "the signal quality of a radio link between the wireless terminal 100 and a base station 202," (***radio reception quality, network performance, quality of service, quality of coverage***)
- "the occurrence of a dropped call," and (***radio reception quality, network performance, quality of service, availability or quality of coverage***)
- "SNR (Signal-to-Noise Ratio)." (***radio reception quality, network performance, quality of service, quality of coverage***)

122. A POSITA would have recognized that these performance parameters collectively provide a comprehensive assessment of wireless communication quality. Signal strength measurements quantify the received power level, directly affecting communication reliability and data throughput. Signal quality metrics assess the integrity of the received signal beyond mere power levels, capturing distortion and interference effects. The tracking of dropped calls provides critical reliability data that directly impacts user experience and network performance evaluation. Furthermore, SNR measurements enable precise characterization of the communication channel by quantifying the relationship between desired signals and noise floor. Through these diverse metrics, the system captures multiple dimensions of wireless access characteristics necessary for comprehensive network analysis.

123. As set forth above, it would have been obvious to a POSITA to combine these aspects of Aaron with Daley.

(b) Claim 2: The method of claim 1 wherein said step of providing access provides access to said one or more end users or one or more end user communications devices by reporting quality or service information to said one or more end users or said one or more end user communications devices.

124. The combination renders obvious this limitation.

125. In my opinion, Daley discloses a "[s]elf-care website / portal" that communicates with the mobile device. EX1009, Fig. 1, [0033], [0034]. A POSITA would have known that the "self-care website" indicated a web interface through

which a user (***end user***) of the mobile device ***access[ed]*** the ***report[ed] quality or service information*** collected from the user's mobile device. This self-service portal empowers users to independently diagnose and potentially resolve issues without requiring assistance from customer service representatives. A POSITA would have recognized that such self-care capabilities reduce support costs for network operators while providing users with immediate access to diagnostic information about their devices. The web-based interface ensures platform-independent access, allowing users to review their device's performance data from any internet-connected computer or device. Furthermore, by providing direct access to quality and service information, the system enables users to make informed decisions about their device usage patterns and network settings. Therefore, the self-care website establishes a user-centric access mechanism that complements the technical support interfaces available to service personnel.

126. Additionally, Aaron discloses mobile device users providing feedback regarding the wireless communications network service quality including "comments, opinions and/or perceptions, responses, suggestions, selected choices, ratings, etc." EX1010, [0021]. This user feedback is gathered when "a performance parameter falls below a threshold value" or in response to "another problem(s) associated with a wireless communications service." EX1010, [0034]. Then, the user (***end user***) provides feedback "about quality of service and/or about a detected

problem ... via the display of the wireless terminal" (***end user communications devices***). EX1010, [0044], [0045]-[0047].

127. Furthermore, when the mobile device solicits this feedback from the user, the mobile device includes the relevant context of the identified problem, e.g. "Is this problem sufficient to cause you to switch carriers? Select Yes or No." EX1010, Table 1. A POSITA would have recognized that this contextual presentation helps users understand the nature and severity of detected issues while gathering valuable feedback about service impact. Additionally, Aaron discloses configuring mobile devices "to provide user access to a web log ('blog') ... and may automatically provide details to the blog about a detected problem." EX1010, [0045]. Therefore, the user feedback mechanisms ***provide access ... by reporting quality or service information to ... end users or ... end user communications devices***.

128. As set forth above, it would have been obvious to a POSITA to combine these aspects of Aaron with Daley. It would have been obvious to a POSITA to combine Aaron's quality-of-service maps with the diagnostic and "self-care website" capabilities of Daley. A POSITA would have recognized that the quality-of-service maps would have been useful for subscribers to self-diagnose service quality issues, thus reducing demand for customer service representatives. Visual representations of network performance enable users to quickly identify whether

their experienced issues align with broader geographic patterns or represent isolated incidents. The maps transform abstract connectivity problems into concrete geographic visualizations that users can intuitively understand without technical expertise. Furthermore, combining these maps with Daley's self-care portal creates a powerful self-service ecosystem where users can both visualize network conditions and access diagnostic tools to address identified issues. A POSITA would have understood that this dual capability—seeing performance patterns and accessing remediation tools—empowers users to resolve many common issues independently. The reduction in customer service interactions benefits network operators through decreased support costs while improving user satisfaction through immediate access to diagnostic information. The integration of visual performance data with self-service diagnostics creates a comprehensive framework that benefits both subscribers and network operators.

129. Additionally, Scherzer also discloses providing mobile device users with access to the collected service or quality information stored in the database. Scherzer discloses ***providing*** mobile devices (***end user communications devices***) and their users (***end users***) with ***access*** to access point maps that provide rankings of access points nearby the mobile device's current or prospective geographic location based on the quality or service information in the database (***reporting quality or service information***). EX1011, [0078]. A POSITA would have

recognized that these location-aware rankings enable users to make informed connectivity decisions based on empirical performance data from other users. The server communicates such information to the mobile device via the Internet (***provides access***). EX1011, [0068].

130. As set forth above, it would have been obvious to combine Scherzer's location-based access point mapping and ranking functionality with Daley's diagnostic functionality to provide users of mobile devices with information regarding the service quality of their mobile devices. The user-driven, self-service functionality disclosed in both Daley (i.e. "self-care website") and Scherzer (i.e. wireless access point mapping and ranking for user selection) reduces the need for a customer service representative to assist with resolving or improving the wireless service quality. In my opinion, a POSITA would have recognized that these complementary self-service capabilities address different aspects of the same user empowerment benefit—Daley enables users to diagnose existing problems while Scherzer helps them proactively select better connections to avoid problems. The combination would have created a comprehensive self-help ecosystem where users can both understand current issues through diagnostics and take corrective action through informed access point selection. Furthermore, Scherzer's ranking functionality transforms the trial-and-error process of finding reliable connections into a data-driven selection process based on empirical performance measurements.

A POSITA would have understood that providing users with performance data and connection alternatives creates a more efficient support model while improving overall user satisfaction through increased autonomy and control over their wireless connectivity experience. As discussed above, the convergence of diagnostic insight and actionable alternatives would have established a complete self-service framework that reduces support costs for operators while delivering immediate solutions to users, thereby optimizing both operational efficiency and user experience.

(c) Claim 3: The method of claim 1 wherein said quality or service information is location specific.

131. In my opinion, the combination renders obvious this limitation.

132. As discussed above regarding 1[a], in my opinion, Daley discloses capturing and storing information about mobile devices transitioning from a connection with a native network to a roaming network which includes ***quality or service information*** that is ***location specific***. EX1009 [0145], [0270]-[0271], [0291]. Daley discloses that "roaming transitions" are events captured by the client-side logging components of the mobile devices. EX1009, [0145]. A POSITA would have recognized that roaming transition events indicate ***location specific*** information regarding the ***quality or service*** of the mobile device at the geographic location where the transition occurs which would be indicated by at the least the

occurrence of the transition, the networks involved in the transition, and the towers or base stations between which the mobile device transitions.

133. Furthermore, a POSITA would have understood that these roaming transitions serve as critical indicators of network coverage boundaries and service availability zones. The transition itself reveals the geographic limits of the native network's coverage area and identifies locations where alternative network arrangements become necessary. Each roaming event captures essential service quality data including the specific coordinates where native coverage ends, the identity of networks providing substitute coverage, and the infrastructure handoff points represented by tower or base station identifiers. Through this location-specific event logging, the system creates a detailed map of service boundaries and roaming zones that directly correlates geographic position with network availability and quality characteristics.

134. As discussed above regarding 1[a]-[e], in my opinion, Aaron discloses mobile devices measuring service quality performance parameters (***quality or service information***) continuously, including as the mobile device moves across geographic locations. EX1010, [0040]-[0041]. A POSITA would have recognized that when a mobile device measures the service quality, it then determines its geographic location. EX1010, [0042]. This synchronized collection of performance metrics and position data ensures that each quality measurement maintains its

geographic context. This information is then stored and transmitted together to central processor 204. EX1010, [0043].

135. Furthermore, the service quality measurements are ***location specific*** because they are measured by the mobile device at a particular location, propagated to central processor 204 with that associated location information, and then analyzed for quality-of-service maps based on that associated location information. A POSITA would have understood that this tight coupling between quality measurements and geographic coordinates enables precise spatial analysis of network performance. The system preserves the location context throughout the entire data pipeline—from initial measurement through transmission, storage, and ultimately visualization in quality-of-service maps. Through this location-aware architecture, the system transforms discrete point measurements into comprehensive geographic performance profiles that reveal spatial patterns in network quality and coverage.

136. As set forth above, it would have been obvious to a POSITA to combine these ***location specific*** aspects of Aaron with the diagnostic and tracing capabilities of Daley. A POSITA would have recognized that integrating Aaron's location-specific quality measurements with Daley's comprehensive diagnostic framework creates a powerful synergy for network analysis. The combination enables correlation of diagnostic events with precise geographic coordinates, transforming

abstract network issues into concrete, location-based problems that can be systematically addressed. Furthermore, the merged capabilities allow network operators to identify geographic patterns in service degradation, distinguish between widespread coverage issues and localized interference, and implement targeted infrastructure improvements. A POSITA would have understood that this location-aware diagnostic system represents a natural aspect of mobile network management, providing the spatial context necessary for effective troubleshooting and optimization. Therefore, combining these complementary location-specific technologies would have been a straightforward enhancement that significantly improves the precision and effectiveness of network diagnostic capabilities.

(d) Claim 4: The method of claim 1, further comprising serving data based on mobile device location information and quality or service information stored in said memory or database.

137. In my opinion, the combination renders obvious this limitation.

138. As discussed above regarding 1[d], in my opinion, Daley discloses web page interfaces that ***serv[e] data based on mobile device location information and quality or service information store in said ... database***. EX1009, [0273]-[0274], [0290]-[0291], Figs. 15-17. In particular, Daley's web pages include a "user interface screen for displaying trace statistics from trace data." EX1009, [0029], Fig. 17; [0277]-[0290]. A POSITA would have recognized that these statistical

displays transform raw trace data into meaningful performance insights that support diagnostic analysis and network optimization decisions.

139. As discussed above regarding 1[pre] and 1[a], Daley discloses the diagnostic and tracing data collected from mobile devices includes "roaming transitions," i.e. ***location information***. EX1009, [0145]. Therefore, Daley's web interfaces include both ***location information*** and ***quality or service information***. A POSITA would have understood that presenting location and quality data together through web interfaces enables comprehensive analysis of network behavior patterns. The combination of spatial and performance data in a unified interface allows operators to correlate geographic factors with service quality issues, identify location-specific problems, and track the movement patterns of devices experiencing performance degradation. Through this integrated data presentation, the system provides actionable intelligence that supports both reactive troubleshooting and proactive network planning.

140. Additionally, as discussed above regarding 1[d], Aaron discloses ***serving*** quality-of-service maps to technicians. EX1010, [0036]. The quality-of-service maps are updated based central database 208's (***database***) location and quality-of-service measurements collected from mobile devices (***mobile device location information and quality or service information***). EX1010, [0035]-[0037], [0040]-[0043]. A POSITA would have recognized that these dynamically updated

maps provide real-time visualization of network performance across geographic areas, enabling rapid identification of coverage gaps and performance degradation zones.

141. It would have been obvious to combine Aaron's quality-of-service map functionality with Daley's diagnostic and tracing features. A POSITA would have recognized that Aaron's location information and quality-of-service information would be beneficial for diagnosing problems or improving the performance of a subscriber's wireless service. The visual representation of performance data overlaid on geographic maps would have transformed complex datasets into intuitive displays that reveal spatial patterns in network behavior. Furthermore, integrating map-based visualization with Daley's detailed diagnostic capabilities would have created a multi-layered analytical framework where technicians can drill down from high-level geographic patterns to specific device-level diagnostics. Through this combination, the system would have enabled both strategic network planning based on geographic performance trends and tactical troubleshooting of individual subscriber issues.

142. Additionally, Scherzer also discloses providing mobile device users with geographic maps of wireless access points based on the collected ***location*** and ***service or quality information*** stored in the database. Scherzer discloses providing mobile devices with access point maps that include rankings of the access points

nearby a mobile device's current or prospective geographic location ***based on*** the ***quality or service information*** in the database for that mobile device's geographic ***location***. EX1011, [0078], [0149]-[0151]. A POSITA would have recognized that these location-aware rankings leverage crowdsourced performance data to guide users toward optimal connectivity choices. The server communicates such information to the mobile device via the Internet (***serving data***). EX1011, [0068].

143. As set forth above, it would have been obvious to combine Scherzer's location-based wireless access point mapping and ranking functionality with Daley's diagnostic functionality. A POSITA would have recognized that this combination would have allowed users to configure their mobile devices for wireless access points based on the service quality information collected into the database from other mobile devices. The integration would have created a collaborative network optimization system where each user benefits from the collective experience of all participants. Furthermore, providing users with empirical performance rankings would have enabled informed decision-making about connectivity options, reducing trial-and-error connection attempts while improving overall user satisfaction. Through this combination, the system would have transformed isolated diagnostic data into actionable intelligence that guides users toward optimal network configurations based on proven performance metrics.

(e) Claim 5: The method of claim 4 wherein said data comprises one or more of a recommended operating band, operating mode, communications network and/or carrier for end users or end user communications devices.

144. In my opinion, the combination renders obvious this limitation.

145. In my opinion, the rankings of access points disclosed by Scherzer and discussed above regarding Claim 4, are a ***recommended... communications network and/or carrier for end users or end user communications devices***. EX1011, [0078], [0149]-[0151]. Scherzer describes a database of "broadband wireless connectivity (WiFi)" resources (***communications network***) available to users of mobile devices. EX1011, [0010]-[0023]. A POSITA would have recognized that this database serves as a comprehensive repository of available connectivity options, cataloging wireless resources across geographic areas.

146. Based on the service quality information reported into the database by mobile devices, the server provides a ranking of these wireless networks to mobile device users nearby particular wireless networks. EX1011, [0149]-[0151]. A POSITA would have understood that these rankings transform raw performance data into actionable recommendations that guide users toward optimal connectivity choices. The ranking algorithm considers multiple quality factors derived from empirical measurements, ensuring that recommendations reflect actual network performance rather than theoretical capabilities. Furthermore, by providing

location-specific rankings, the system accounts for the fact that network performance varies significantly across different geographic areas. Through this recommendation framework, the system enables users to make informed connectivity decisions based on the collective experience of previous users in the same location.

(f) Claim 6: The method of claim 5 wherein said data is formatted and served to end users or end user communications devices as one or more web pages.

147. In my opinion, the combination renders obvious this limitation.

148. As discussed above regarding claims 4 and 5, in my opinion, Daley discloses web page interfaces that a POSITA would have found obvious to combine with Aaron's quality-of-service maps for serving to user (***end users or end user communications devices***). A POSITA would have recognized that web-based delivery provides universal access to quality-of-service information across diverse device platforms and operating systems. The combination of Daley's web interface infrastructure with Aaron's geographic visualization capabilities creates a comprehensive information delivery system. Furthermore, serving quality-of-service maps through web pages enables users to access performance data from any internet-connected device without requiring specialized software installation. Through this web-based approach, the system ensures broad accessibility while maintaining the rich visualization capabilities necessary for effective geographic

performance analysis. Therefore, the combination establishes a practical and efficient mechanism for delivering location-based quality information to end users.

149. As discussed above regarding claims 4 and 5, Scherzer discloses providing mobile devices (***end users or end user communications devices***) the quality or service information and location information as access point maps that include rankings of the access points nearby a mobile device's current or prospective geographic location. Scherzer discloses that it was well-known in the art to provide ***data*** regarding wireless service information at particular geographic locations ***formatted and served to end users ... as ... web pages***. EX1011, [0023] ("WiFi resources (hot-spots) maps are available through various websites (JiWire, Microsoft, etc.) to enable users to locate AP's."). A POSITA would have recognized that web-based delivery had already become the industry standard for distributing location-based wireless connectivity information.

150. Additionally, Daley discloses web pages that provide Internet-based interfaces into the collected data to users of the system, including the wireless network provider and the customer. EX1009, Figs. 15-18, [0033]-[0034]. Therefore, it would have been obvious to a POSITA implementing this combination of Daley, Aaron, and Scherzer, to provide the access point maps of Scherzer to mobile devices through web pages. A POSITA would have understood that leveraging existing web interface infrastructure from Daley while incorporating the

mapping capabilities from Scherzer creates an efficient, unified system. The web-based approach ensures compatibility across diverse platforms while providing the rich interactive features necessary for effective map-based navigation and access point selection. Through this combination, the system delivers comprehensive location-based quality information using proven web technologies that were well-known and widely supported at the time.

(g) Claim 7: The method of claim 1, further comprising serving data based on mobile device location information or quality or service information stored in said memory or database to one or more carriers.

151. In my opinion, the combination renders obvious this limitation.

152. In my opinion, Daley discloses customer service representatives and engineers (***one or more carriers***) to diagnose problems with a mobile device encountered by a customer through web pages containing the ***quality or service information***. EX1009, [0038], [0060] ("tracing data transferred by the electronic device 107 to the diagnostic server 129 may be processed and provided as viewable data by the diagnostic server 129, for analysis by a human engineer for subsequent corrective steps"). A POSITA would have recognized that this server-side processing transforms raw trace data into human-readable formats that facilitate efficient problem diagnosis.

153. Furthermore, Daley discloses that such a user may view and search diagnostic and trace data. EX1009, [0119], [0254]. These search capabilities enable

support personnel to efficiently navigate large datasets, focusing their analysis on specific timeframes, error types, or device behaviors relevant to the reported problem. Additionally, Daley's system includes web page interfaces that allow a user. EX1009, [0273]-[0274], [0290]-[0291], Figs. 15-17. A POSITA would have understood that providing carriers with web-based access to quality and service information enables remote diagnostics without requiring physical access to customer devices. Through these interfaces, carrier personnel can identify patterns across multiple devices, track the progression of issues over time, and implement targeted solutions based on empirical diagnostic data. Therefore, the system establishes comprehensive diagnostic capabilities that empower carriers to efficiently resolve customer issues.

(h) Claim 8: The method of claim 1, further comprising providing access to quality or service information stored in said memory or database to a party or parties other than subscribers and carriers of said one or more wireless communications networks.

154. The combination renders obvious this limitation.

155. As discussed above regarding claim 7, in my opinion, Daley discloses both customer service representatives and engineers using the diagnostic and tracing data collected into the database to diagnose problems encountered by subscribers. EX1009, [0038], [0060]. A POSITA would have recognized that providing multiple user categories with database access enables comprehensive support coverage across

different expertise levels. Customer service representatives can handle routine inquiries and basic troubleshooting using the diagnostic data, while engineers can perform deeper technical analysis for complex issues. This tiered support structure optimizes resource allocation by directing problems to appropriate personnel based on complexity. Furthermore, having both support levels access the same database ensures consistency in problem resolution and enables seamless escalation when issues require advanced technical expertise. Through this multi-level access framework, the system provides efficient and effective support services that address the full spectrum of subscriber issues.

156. Daley discloses that "a trace/diagnostic server functionality may comprise a new service built upon an existing customer care system such as the SmartCare/FusionDM server architecture of Bitfone Corporation ... to support the management of, and data collection from, diagnostic/trace-enabled devices." EX1009, [0112]. Further, Daley specifically discloses implementing the disclosed methods and system in systems like "SmartCare or FusionDM system available from Bitfone Corporation." EX1009, [0090], [0112], [0129], [0275], [0276], [0300]. A POSITA would have recognized that these commercial systems were designed to support diverse deployment scenarios beyond traditional carrier networks.

157. Indeed, Bitfone's FusionDM was sold to enterprise, corporate customers to enable management of employee mobile devices. EX1039

("FusionDM provides peace-of-mind to corporate users and IT managers by enabling the OTA locking and wiping of devices to prevent unauthorized access."). A POSITA would thus have known that such a system would have been operable by ***parties other than subscribers and carriers of said one or more wireless communications networks***. The enterprise deployment model enables IT departments to monitor and manage company-owned devices, tracking performance issues and ensuring proper functionality across their mobile device fleet. Therefore, Daley discloses or renders obvious employers (***parties other than subscribers and carriers***) accessing the ***quality or service information stored in said memory or database***. Through this enterprise access model, organizations can maintain visibility into their mobile device infrastructure independent of carrier relationships.

158. Additionally, Daley's provisional application, U.S. Provisional Application No. 60/774,406, filed on Feb. 17, 2006, incorporated by reference into Daley (EX1009, [0001]), discloses the diagnostic and tracing data collection system of Daley specifically for use by Palm for the Palm Treo mobile device. EX1042, 26:

> **1.1 Purpose, Intended Audience, and Use of This Document**
>
> The purpose of this document is to describe the requirements, architecture and design details for Phase 1, Stage 1 of the Treo Trace project. This document covers the design of the Treo Trace Client and the Treo Trace Server.
>
> The intended audience for this document includes the engineers, professional services engineers, and the quality assurance team who will be working on the project. This document will also be presented to Palm for discussion, validation and acceptance. Upon acceptance by Palm, this document will serve as the basis for mutual understanding of the core design requirements. Subsequent changes and additions will be managed through the Engineering Change Request process (ECR), according to the Bitfone Product Development SOP.

159. A POSITA would have recognized that this specific implementation demonstrates the system's applicability to device manufacturer use cases. The Palm deployment illustrates how device manufacturers can leverage diagnostic and tracing capabilities to monitor their products' performance in the field, identify common failure modes, and improve future device designs based on real-world usage patterns. Furthermore, providing device manufacturers with direct access to diagnostic data enables them to distinguish between hardware-related issues and network-related problems, facilitating more accurate warranty support and product improvements. Through this manufacturer-oriented deployment, the system extends beyond traditional carrier-subscriber relationships to encompass the entire mobile device ecosystem.

160. Palm was a device manufacturer, i.e. ***a party ... other than subscribers and carriers of said one or more wireless communications networks***. EX1043, EX1044. Therefore, Daley discloses ***providing access*** to the "engineers, professional services engineers, and the quality assurance team" of device

manufacturers. A POSITA would have recognized that device manufacturer access enables comprehensive product lifecycle management, from initial deployment through field performance monitoring. Engineers can analyze diagnostic data to identify hardware design issues, professional services engineers can develop targeted solutions for recurring problems, and quality assurance teams can validate that devices meet performance specifications under real-world conditions. Furthermore, providing manufacturers with direct access to field diagnostic data accelerates the feedback loop between customer experiences and product improvements. Through this manufacturer access model, the system enables continuous product refinement based on empirical performance data rather than laboratory testing alone.

161. In addition, a POSITA would have known that mobile virtual network operators (MVNOs) served as intermediaries between telecommunication carriers of ***wireless communications networks*** and ***subscribers***. EX1045, [0008]-[0009], EX1046, 5:18-24. MVNOs support their subscribers and want to provide similar support to more traditional carriers. EX1045, [0009] ("Carriers can devolve marketing, sales, billing, customer relations, and related front and back office functions to MVNOs who may provide these functions more efficiently for their target markets than can the carriers themselves."), EX1046, 5:26-31.

162. However, MVNO's do not own or operate the underlying telecommunications network, and instead use networks provided by one or more other carriers. EX1045, [0009] ("MVNO is a [service provider] that does not maintain its own wireless network (i.e., radio equipment)."), EX1046, 5:18-24. A POSITA would have understood that in the context of an MVNO, there are considerable benefits from the underlying carrier or network operator, the subscriber, and the MVNO all having access to the ***quality or service information stored in said ... database***. For example, it would allow the MVNO to directly support its subscribers while the carrier or network operator could assess and improve the performance of its network. EX1045, [0046]-[0048], [0092], EX1046, 14:24-15:13. This shared access model enables MVNOs to provide first-tier customer support without requiring constant escalation to the underlying carrier, while simultaneously allowing carriers to maintain visibility into network performance across all users regardless of their service provider relationship. Furthermore, the access arrangement ensures that quality issues can be addressed at the appropriate level, whether they stem from network infrastructure, MVNO service configuration, or individual device problems. Through this framework, the system optimizes support efficiency while maintaining service quality across the complex MVNO ecosystem.

(i) Claim 9

(i) 9[a] The method of claim 1, wherein said quality or service information further comprises rank ordering or preferred preferences for one or more of ranked or preferred: wireless performance, telecommunication services, service providers, carriers, frequencies, spectrum allocations, wireless connection options, power levels, data rates, modulation types, air interface specifications, and bandwidths, and

163. In my opinion, the combination renders obvious this limitation. A POSITA would have recognized that Scherzer explicitly teaches ranking and preference mechanisms for wireless access points based on quality metrics. The combination incorporates these ranking capabilities into the broader diagnostic and monitoring framework established by Daley and Aaron. Furthermore, the ability to rank and prioritize connection options based on empirical performance data represents a natural extension of collecting and analyzing quality information. Therefore, the combination provides the necessary elements for implementing rank ordering and preferred preferences across various wireless performance parameters.

164. In my opinion, Scherzer's radio resource database includes information related to a mobile device's wireless connection to an access point, e.g., "[b]ackhaul quality (estimated bandwidth connection to Internet)," "success rate," "average execution periods," and "[p]ercentage allowable shared bandwidth." EX1011, [0109]-[0117], [0148]. A POSITA would have recognized that these parameters

collectively characterize multiple dimensions of access point performance, from connection reliability to bandwidth availability. Scherzer encodes access point connection quality data, into quality and accessibility vectors, which include connection quality, ease of accessibility, and location coordinates, in the database. EX1011, [0131]-[0140].

165. Furthermore, Scherzer discloses that these vectors are used to determine rankings of access point connections (***quality or service information further comprises rank ordering or preferred preferences***). A POSITA would have understood that this vector-based ranking system enables multi-criteria optimization, balancing various performance factors to identify the most suitable access points for each user's specific needs. The encoding of quality metrics into vectors facilitates mathematical comparison and sorting operations that produce objective rankings based on empirical measurements. Through this ranking framework, the system transforms raw performance data into actionable recommendations that guide users toward optimal connectivity choices based on their location and quality requirements.

(ii) 9[b] wherein said providing step further provides access to one or more of said ranked ordering or preferred preferences to said one or more end users or said one or more end user communication devices or said one or more carriers or said third parties that provide services to said one or more carriers, or to said one or more wireless communications networks.

166. In my opinion, the combination renders obvious this limitation. A POSITA would have recognized that Scherzer explicitly discloses providing ranked access point information to multiple stakeholder categories. The combination ensures that these rankings reach the appropriate users through various distribution channels established by Daley and Aaron. Furthermore, making rankings available to different user categories—from end users seeking optimal connections to carriers analyzing network utilization patterns—maximizes the value of the collected performance data. Therefore, the combination satisfies the requirement for providing ranked ordering access to the specified parties.

167. As discussed above regarding claims 4 and 5, in my opinion, Scherzer discloses providing mobile devices (***end users or ... end user communication devices***) with access point maps that include rankings of the access points (i.e. ***telecommunication services, service providers, carriers, frequencies, ... wireless connection options, ... bandwidths***) nearby a mobile device's current or prospective geographic location based on the quality or service information in the database for that mobile device's geographic location. EX1011, [0078], [0149]-[0151]. A

POSITA would have recognized that these location-specific rankings deliver personalized recommendations tailored to each user's current position and connectivity needs. The system evaluates available access points within the user's vicinity, applying ranking algorithms to the collected quality metrics to identify optimal connection options. Furthermore, by providing these rankings directly to end user devices, the system empowers users with data-driven insights that improve their connectivity decisions. Through this direct delivery of ranked preferences, users can quickly identify and connect to the highest-performing access points in their immediate area, enhancing their overall wireless experience while reducing time spent searching for suitable connections.

(j) Claim 10

(i) 10[pre] A system for collecting and providing access to quality or service information associated with one or more wireless communications networks, mobile devices, or end users, comprising:

168. See 1[pre], *supra*. Daley, Aaron, and Scherzer each disclose ***system[s]*** that perform the ***collecting and providing access to quality or service information associated with … mobile devices*** described in claims 1-9.

169. A POSITA would have recognized that these references collectively establish comprehensive system architectures for wireless network monitoring and management. Each reference contributes complementary system components—

Daley provides the diagnostic infrastructure, Aaron adds location-aware quality measurement capabilities, and Scherzer contributes access point ranking and selection mechanisms. Furthermore, these systems share common architectural patterns including client-server communication, database storage, and web-based interfaces that facilitate their integration. Therefore, the combination establishes all system elements necessary to satisfy the collecting and providing functions specified in the claim.

(ii) 10[a] a computer configured to receive mobile device location information of a plurality of mobile devices or end users that are associated with one or more wireless communications networks and quality or service information pertaining to wireless access characteristics for one or more mobile devices of said plurality of mobile devices or end users, and said quality or service information comprising coverage, availability or performance information of one or more wireless communications networks or said one or more mobile devices;

170. See 1[a], *supra*.

(iii) 10[b] a memory or database configured to store the received mobile device location information and quality or service information;

171. See 1[b], *supra*.

(iv) 10[c] an interface through which one or more end users or one or more end user communication devices, or one or more carriers, or one or more third parties that provide services to said one or more end users or one or more end

user communication devices or said one or more carriers, or one or more wireless communications networks may access said quality or service information or mobile device location information stored in said memory or database; and

172. See 1[d], *supra*.

(v) **10[d] wherein said wireless access characteristics comprise one or more of identified perceived or measured: radio reception quality, network performance, quality of service, data rate, spectrum availability or suitability, capacity or bandwidth, availability or quality of coverage, availability or quality of capacity, availability or quality of one or more services or carriers, availability or quality of air interfaces, average use profile, average availability profile, statistics on outage or reliability or coverage or capacity carrying capabilities for one or more service providers, frequencies, radio frequency or quality of service or coverage or service map or addresses for one or more service providers, radio frequency or end-user application performance, and cost of service.**

173. See 1[e], *supra*.

(k) **Claim 11: The system of claim 10, further comprising a server configured to serve quality or service information stored in said memory or database to one or more carriers.**

174. See claim 7, *supra*.

(l) Claim 12: The system of claim 10, further comprising a server configured to generate and serve data based on mobile device location information and quality or service information stored in said memory or database to one or more end users or one or more end user communications devices.

175. See claim 4, *supra*.

(m) Claim 13: The system of claim 12 wherein said data comprises one or more of a recommended operating band, operating mode, communications network and/or carrier for said one or more end users or one or more of said end user communications devices.

176. See claim 5, *supra*.

(n) Claim 14: The system of claim 13 wherein said server comprises a web server and said data is formatted as one or more web pages served to said one or more end users or one or more of said end user communications devices.

177. See claim 6, *supra*.

(o) Claim 15: The system of claim 10 wherein said computer is configured to provide access to quality or service information stored in said memory or database to a party or parties other than subscribers and carriers of said one or more wireless communications networks.

178. See claim 8, *supra*.

(p) Claim 16

(i) 16[a] The system of claim 10, wherein said quality or service information further comprises

rank ordering or preferred preferences for one or more of ranked or preferred:

179. See 9[a], *supra*.

(ii) 16[a][i] wireless performance, telecommunication services, service providers, carriers, frequencies, spectrum allocations, wireless connection options, power levels, data rates, modulation types, air interface specifications, and bandwidths, and

180. See 9[a][i], *supra*.

(iii) 16[b] wherein said interface is configured to provide access to one or more of said rank ordering or preferred preferences to said one or more end users or said one or more end user communication devices or said one or more carriers or said one or more third parties, or to said one or more wireless communications networks.

181. See 9[b], *supra*.

C. Ground 2: Scherzer

1. Prior Art

182. A POSITA would have understood Scherzer as disclosing or rendering obvious each element of the challenged claims, and it therefore invalidates under 35 U.S.C. Section 103.

2. Analysis

(a) Claim 1

(i) 1[pre] A method of collecting and providing access to quality or service information associated with one or more wireless

communications networks, mobile devices, or end users, comprising:

183. To the extent the preamble is limiting, in my opinion, Scherzer discloses a system and methods that include a server that receives, stores, and updates "access point connection cache data from the network access point" and the access point connection quality data from mobile device for access points across geographic locations (***collecting ... quality or service information associated with one or more wireless communications networks, mobile devices, or end users***). EX1011, [0058], [0059]. A POSITA would have recognized that this dual-source data collection approach—gathering information from both access points and mobile devices—provides comprehensive coverage of network performance characteristics. The system uses the database records pertaining to access points to provide a geographic map of access points to mobile devices to assist the user in selecting a nearby access point (***providing access to...***). EX1011, [0149].

184. Furthermore, a POSITA would have understood that transforming collected data into geographic visualizations enables intuitive user interaction with complex performance information. The mapping interface allows users to quickly assess available connectivity options within their vicinity and make informed selection decisions based on empirical quality data. Through this collection and provision framework, the system establishes a complete pipeline from data gathering

through storage to user-accessible presentation, satisfying the fundamental requirements of the claimed method.

185. Owners of access points register their access point with the system to allow other third-party users to connect to their access point for wireless Internet access. EX1011, [0147]. A POSITA would have recognized that this registration mechanism creates a network where access point owners voluntarily share their resources with the broader user community. The registration process establishes the necessary authorization framework for third-party access while maintaining owner control over their infrastructure. It also allows the owner to share the connection information for the access point. This shared ***service information*** is then ***provide[d]*** to others through Scherzer's system. Furthermore, this opt-in model incentivizes participation by enabling access point owners to contribute to and benefit from the collective network resources. Through this registration system, Scherzer's platform transforms isolated access points into a unified network of shared connectivity resources that benefits all participants.

(ii) 1[a] using a computer, receiving mobile device location information of a plurality of mobile devices or end users that are associated with one or more wireless communications networks and quality or service information pertaining to wireless access characteristics for one or more mobile devices of said plurality of mobile devices or end users, and said quality or service information comprising coverage, availability or performance information of one or more

wireless communications networks or said one or more mobile devices,

186. In my opinion, Scherzer renders obvious this limitation.

187. ***using a computer, receiving mobile device location information of a plurality of mobile devices or end users that are associated with one or more wireless communications networks***: Scherzer discloses a server that receives "radio access point" connection quality measurements from mobile devices and stores it in a "radio resource database." EX1011, [0057]-[0059], [0073], [0106], [0109]. Scherzer's server includes an "evaluation module" "which evaluates accessibility and bandwidth of various AP's, and store[s] the information as an update in database 110, as shown by arrow 131." EX1011, [0068], Fig. 1. In my opinion, a POSITA would have recognized that this evaluation module performs critical processing functions, analyzing raw measurements to derive meaningful quality metrics for storage and subsequent use.

188. Furthermore, Scherzer discloses that access point connection quality measurements are associated with access points at particular geographic locations and the measurements are gathered by mobile devices within range of that geographic location. Scherzer's mobile devices determine their own geographic ***location information*** which is included in the data sent to the database. EX1011, [0082]-[0087], [0131]. A POSITA would have understood that this self-positioning capability enables autonomous data collection without requiring external location

services. Additionally, Scherzer's database maintains geographic location information for wireless access points. The access points are organized by "wireless regions" such as "cities, parks, groups of cities, states and other geographical areas of interest." EX1011, [0131], [0149]. Through this hierarchical geographic organization, the system efficiently manages location data across multiple spatial scales, from local neighborhoods to entire metropolitan areas.

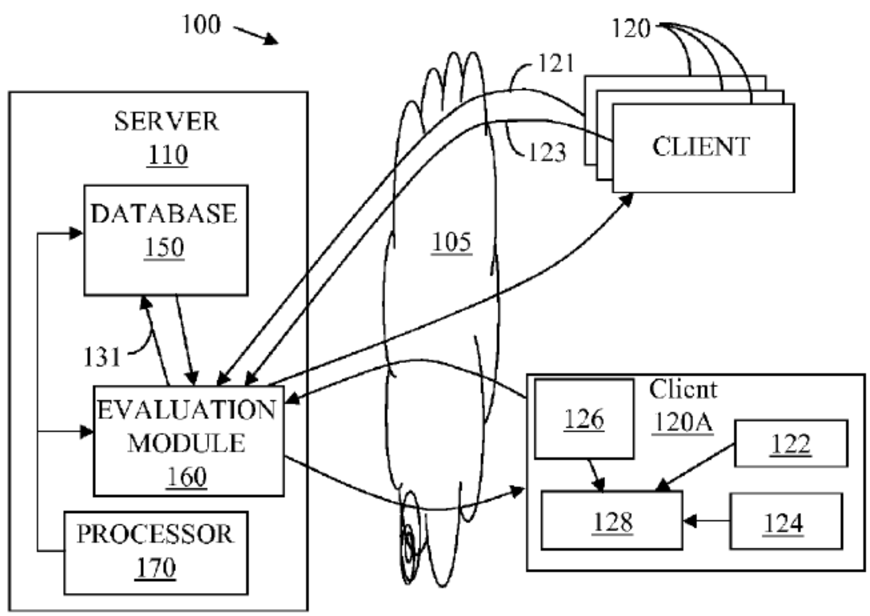


Figure 1

189. ***quality or service information pertaining to wireless access characteristics for one or more mobile devices of said plurality of mobile devices or end users, and said quality or service information comprising coverage, availability or performance information of one or more wireless communications networks or said one or more mobile devices***: In my opinion, Scherzer's radio resource database includes ***quality or service information*** related to a mobile

device's wireless connection to an access point, e.g., "[b]ackhaul quality (estimated bandwidth connection to Internet)," "success rate," "average execution periods," and "[p]ercentage allowable shared bandwidth." EX1011, [0109]-[0117], [0148]. A POSITA would have recognized that these metrics comprehensively characterize connection quality from multiple perspectives—bandwidth capacity, reliability, timing characteristics, and resource sharing policies.

190. Scherzer discloses collecting access point connection quality data from mobile devices which includes "[r]eceived signal strength" and "[a]vailable bandwidth." EX1011, [0028]-[0049]. These measurements directly reflect the ***coverage, availability or performance information*** experienced by mobile devices in real-world deployment scenarios. Furthermore, Scherzer encodes access point connection quality data, into quality and accessibility vectors (***performance information of one or more wireless communications networks or ... one or more mobile devices***), which include connection quality, ease of accessibility, and location coordinates, in the database. EX1011, [0131]-[0140]. Through this comprehensive data collection framework, the system captures all dimensions of wireless access characteristics necessary for evaluating and optimizing connectivity options.

191. Scherzer's ***mobile devices*** include "laptops, handheld devices (PDA's), cell phones, or any other devices that incorporate radio facility." EX1011, [0080]. A POSITA would have recognized that this broad device category encompasses the

full spectrum of wireless-enabled computing platforms available at the time. Each wireless mobile device executes a client program "that besides connecting to the radio network, executes radio measurements and report to the network server that shares this information with other user's clients." EX1011, [0067], [0071], [0073], [0082]-[0087], [0149]. The client software transforms these diverse devices into active participants in the quality measurement ecosystem.

192. Furthermore, the mobile devices communicate with the server and populate the database with access point connection quality data associated with these ***mobile devices of said plurality of mobile devices or end users*** by sending "connectivity reports" and results from radio surveys and "measurements trips" performed by the devices (***coverage, availability or performance information of one or more wireless communications networks or said one or more mobile devices***). EX1011, [0080]. A POSITA would have understood that this distributed measurement approach leverages the collective experience of multiple users to build comprehensive coverage maps and performance profiles. Through this crowdsourced data collection model, the system aggregates real-world performance measurements from diverse device types operating under varying conditions, creating a robust dataset that accurately reflects actual network behavior.

(iii) 1[b] storing, by action of said computer, said mobile device location information and said

quality or service information in a memory or database;

193. Scherzer renders obvious this limitation. A POSITA would have recognized that Scherzer explicitly teaches database storage mechanisms for preserving both location and quality information collected from mobile devices. The system's server-driven storage architecture ensures that all received data undergoes proper processing before database insertion. Furthermore, the persistent storage enables both real-time access for immediate use and historical analysis for trend identification.

194. Scherzer discloses a server that receives "radio access point" connection quality measurements from mobile devices and stores it in a "radio resource database," i.e. ***storing … mobile device location information and said quality or service information in a … database***. EX1011, [0057]-[0059], [0073], [0106], [0109]. Further, Scherzer's server includes an "evaluation module" "which evaluates accessibility and bandwidth of various AP's, and store[s] the information as an update in database 110, as shown by arrow 131" (***by action of said computer***). EX1011, [0068], Fig. 1. This evaluation and storage process demonstrates the server's active role in processing received data before database insertion. The database architecture provides persistent storage that maintains both current measurements and historical performance data. Furthermore, organizing this information in a structured database enables efficient retrieval, analysis, and

comparison of quality metrics across different geographic locations and time periods. Through this storage mechanism, the system preserves the collected intelligence for both immediate operational use and long-term network optimization strategies.

(iv) 1[c] updating, by action of said computer, said mobile device location information stored in said memory or database when a mobile device of said plurality of mobile devices travels from one location to another;

195. In my opinion, Scherzer renders obvious this limitation.

196. In my opinion, Scherzer discloses that access point connection quality measurements are associated with access points at particular geographic locations and the measurements are gathered by mobile devices within range of that geographic location, i.e. ***for one or more geographic locations of said one or more mobile or fixed devices***. EX1011, [0080]-[0087]. Scherzer's mobile devices determine their own ***geographic location[]*** which is included in the data sent to the database. EX1011, [0087], [0114], [0121], [0131]-[0132]. This location determination occurs continuously as devices move through different coverage areas, capturing the dynamic nature of mobile connectivity.

197. Furthermore, the system's architecture inherently supports location updates as mobile devices travel, with each new measurement reflecting the device's current position. A POSITA would have understood that when devices move from

one location to another, they encounter different access points and network conditions, triggering new measurements and corresponding database updates. The continuous measurement and reporting cycle ensures that the database maintains current location information for active mobile devices. Through this dynamic update mechanism, the system tracks device movements and correlates them with changing network conditions across geographic areas.

(v) 1[d] providing access to said quality or service information stored in said memory or database to one or more end users or one or more end user communication devices or one or more carriers or third parties that provide services to said one or more end users or one or more end user communication devices or one or more carriers, or to said one or more wireless communications networks; and

198. In my opinion, Scherzer renders obvious this limitation. A POSITA would have recognized that Scherzer establishes multiple access mechanisms for various stakeholders to retrieve and utilize the stored quality information. The system provides interfaces tailored to end users seeking optimal connectivity, enabling them to access performance data relevant to their location and needs. Furthermore, the access provision extends beyond individual users to encompass broader stakeholder categories, such as access point owners, who benefit from the aggregated performance intelligence.

199. In my opinion, Scherzer discloses ***providing*** mobile devices (***end user communications devices***) and their users (***end users***) with ***access*** to access point maps that provide rankings of access points nearby the mobile device's current or prospective geographic location based on the quality or service information in the database. EX1011, [0078]. A POSITA would have recognized that these location-aware maps transform raw quality data into actionable visualizations that guide connectivity decisions. The server communicates such information to the mobile device via the Internet (***providing access***). EX1011, [0068].

200. Furthermore, the system's map-based interface enables intuitive navigation of available connectivity options, presenting complex performance data in an easily understood geographic context. A POSITA would have understood that providing ranked access point information empowers users to make informed decisions based on empirical performance measurements rather than trial-and-error connection attempts. EX1011, [0152]. The delivery of this information directly to end user devices ensures that quality data reaches those who most benefit from it—the actual users seeking reliable wireless connectivity. Through this access provision framework, the system democratizes network performance intelligence, making it available to guide real-world connectivity choices.

(vi) 1[e] wherein said wireless access characteristics comprise one or more of identified, perceived or measured:

1[e][i]-[xvii] radio reception quality, network performance, quality of service, data rate, spectrum availability or suitability, capacity or bandwidth, availability or quality of coverage, availability or quality of capacity, availability or quality of one or more services or carriers, availability or quality of air interfaces, average use profile, average availability profile, statistics on outage or reliability or coverage or capacity carrying capabilities for one or more service providers, frequencies, radio frequency or quality of service or coverage or service map or addresses for one or more service providers, radio frequency or end-user application performance, and cost of service.

201. Scherzer renders obvious this limitation. Scherzer's disclosed metrics encompass multiple categories of the enumerated wireless access characteristics. The system captures fundamental radio parameters, performance indicators, and availability metrics that collectively characterize wireless network quality. Furthermore, these measurements provide the comprehensive data necessary for evaluating and optimizing wireless connectivity across diverse operational scenarios.

202. As discussed above regarding 1[a], in my opinion, Scherzer's radio resource database includes ***wireless access characteristics*** related to a mobile device's wireless connection to an access point, e.g., "[b]ackhaul quality (estimated bandwidth connection to Internet)," "success rate," "average execution periods," and "[p]ercentage allowable shared bandwidth" (***network performance, quality of***

service, ... capacity or bandwidth). EX1011, [0109]-[0117], [0148]. A POSITA would have recognized that Scherzer discloses collecting access point connection quality data from mobile devices which includes "[r]eceived signal strength" and "[a]vailable bandwidth" (***radio reception quality, network performance, quality of service, ... capacity or bandwidth***). EX1011, [0028]-[0049].

203. These measurements directly characterize the communication channel's physical and logical properties, from signal propagation characteristics to data throughput capabilities. Furthermore, Scherzer encodes access point connection quality data, into quality and accessibility vectors, which include connection quality, ease of accessibility, and location coordinates, in the database. EX1011, [0131]-[0140]. A POSITA would have understood that these vectors provide multi-dimensional characterization of wireless access points, capturing both technical performance metrics and practical usability factors. Through this comprehensive measurement framework, the system documents the full spectrum of wireless access characteristics necessary for informed connectivity decisions.

(b) Claim 2: The method of claim 1 wherein said step of providing access provides access to said one or more end users or one or more end user communications devices by reporting quality or service information to said one or more end users or said one or more end user communications devices.

204. In my opinion, Scherzer renders obvious this limitation.

205. In my opinion, Scherzer discloses ***providing*** mobile devices (***end user communications devices***) and their users (***end users***) with ***access*** to access point maps that provide rankings of access points nearby the mobile device's current or prospective geographic location based on the quality or service information in the database (***reporting quality or service information***). EX1011, [0078]. A POSITA would have recognized that these location-specific rankings deliver personalized connectivity recommendations tailored to each user's geographic context. The server communicates such information to the mobile device via the Internet (***provides access***). EX1011, [0068].

206. Furthermore, the map-based presentation transforms complex performance metrics into intuitive visual displays that users can quickly interpret and act upon. A POSITA would have understood that providing rankings based on empirical quality measurements enables users to bypass unreliable connections and directly select high-performing access points. The system's ability to report quality information through geographic visualizations ensures that users receive relevant data in an actionable format. Through this access provision mechanism, the system empowers end users with performance intelligence that directly improves their connectivity experience.

(c) Claim 3: The method of claim 1 wherein said quality or service information is location specific.

207. Scherzer renders obvious this limitation. Scherzer's disclosure of location-specific quality measurements establishes location-specific information. The system's ability to correlate quality metrics with geographic coordinates ensures that all service information maintains its spatial context. Furthermore, the database organization by geographic regions reinforces the location-specific nature of the stored quality data.

208. As discussed above regarding 1[a], in my opinion, Scherzer discloses that access point connection quality measurements are associated with access points at particular geographic locations and the measurements are gathered by mobile devices within range of that geographic location (***quality or service information is location specific***). A POSITA would have recognized that Scherzer's mobile devices determine their own geographic location information which is included in the data sent to the database. EX1011, [0082]-[0087], [0131]. This tight coupling between quality measurements and geographic coordinates ensures that each data point maintains its spatial context throughout the system.

209. Furthermore, Scherzer's database maintains geographic location information for wireless access points. The access points are organized by "wireless regions" such as "cities, parks, groups of cities, states and other geographical areas of interest." EX1011, [0131], [0149]. A POSITA would have understood that this

geographic organization enables efficient retrieval of location-relevant quality information based on a user's current or intended position. The system's fundamental architecture revolves around the principle that wireless quality varies by location, making location-specific measurement and storage essential for accurate performance assessment. Through this location-centric design, the system provides quality information that directly reflects the geographic reality of wireless network performance.

(d) Claim 4: The method of claim 1, further comprising serving data based on mobile device location information and quality or service information stored in said memory or database.

210. Scherzer renders obvious this limitation. Scherzer discloses providing ranked access point maps based on stored quality and location data. The system generates maps of access points that deliver visualizations combining geographic information with performance metrics from the database.

211. In my opinion, Scherzer discloses providing mobile devices with access point maps that include rankings of the access points nearby a mobile device's current or prospective geographic location ***based on*** the ***quality or service information*** in the database for that mobile device's geographic ***location***. EX1011, [0078], [0149]-[0151]. A POSITA would have recognized that these maps represent dynamic data products generated from the stored quality and location information.

The server communicates such information to the mobile device via the Internet (***serving data***). EX1011, [0068].

212. Furthermore, the ranking algorithms process the database's quality metrics to identify optimal access points for each geographic area, transforming raw measurements into actionable recommendations. A POSITA would have understood that serving data based on both location and quality information enables context-aware connectivity guidance that accounts for the user's specific position and the empirical performance characteristics of nearby access points. The system's ability to generate location-specific rankings from stored data demonstrates sophisticated data processing that goes beyond simple retrieval. Through this location-aware data serving mechanism, the system delivers personalized connectivity intelligence that directly addresses each user's immediate networking needs.

(e) Claim 5: The method of claim 4 wherein said data comprises one or more of a recommended operating band, operating mode, communications network and/or carrier for end users or end user communications devices.

213. In my opinion, Scherzer renders obvious this limitation.

214. As discussed above regarding Claim 4, in my opinion, Scherzer discloses rankings (***recommended***) of the access points (***communications network and/or carrier***) nearby a particular mobile device (***for end users or end user***

communications devices). EX1011, [0078], [0149]-[0151]. A POSITA would have recognized that these rankings function as recommendations by ordering connectivity options from most to least desirable based on empirical performance data. The ranking system considers multiple quality factors to identify optimal access points for each user's specific location and requirements. Furthermore, by presenting access points in ranked order, the system guides users toward connections most likely to provide satisfactory performance. Through this recommendation framework, the system transforms complex quality metrics into simple, actionable guidance that helps users make informed connectivity decisions.

(f) Claim 6: The method of claim 5 wherein said data is formatted and served to end users or end user communications devices as one or more web pages.

215. In my opinion, Scherzer renders obvious this limitation.

216. As discussed above regarding claims 4 and 5, in my opinion, Scherzer discloses providing mobile devices (***end users or end user communications devices***) the quality or service information and location information as access point maps that include rankings of the access points nearby a mobile device's current or prospective geographic location. Scherzer discloses that it was well-known in the art to provide ***data*** regarding wireless service information at particular geographic locations ***formatted and served to end users ... as ... web pages***. EX1011, [0023] ("WiFi resources (hot-spots) maps are available through various websites (JiWire,

Microsoft, etc.) to enable users to locate AP's."). A POSITA would have recognized that this reference to existing commercial implementations demonstrates that web-based delivery had already become the industry standard.

217. Furthermore, a POSITA would have understood that web page formatting provides universal accessibility across diverse platforms while maintaining rich interactive features. The combination of map visualization with web delivery creates an intuitive interface that users can access from any internet-connected device. Therefore, it would have been obvious to a POSITA to provide the access point maps in Scherzer to mobile devices through web pages, leveraging established web technologies to deliver location-based quality information in a familiar and accessible format.

(g) Claim 8: The method of claim 1, further comprising providing access to quality or service information stored in said memory or database to a party or parties other than subscribers and carriers of said one or more wireless communications networks.

218. In my opinion, Scherzer renders obvious this limitation. A POSITA would have recognized that Scherzer's disclosure of operating as a social network establishes access provision to parties beyond traditional subscribers and carriers. The social network model inherently involves diverse participants who share and access information outside conventional telecommunications relationships.

Furthermore, the collaborative nature of the system enables various stakeholder categories to benefit from the aggregated quality data.

219. Scherzer discloses operating the database system "as a social network." EX1011, [0147]. In my opinion, a POSITA would have recognized that a social network amongst the owners of wireless access points would include ***parties other than subscribers and carriers of one or more wireless communications networks.*** The social network model enables peer-to-peer sharing of connectivity resources among diverse participants including individual access point owners, businesses, and community organizations.

220. Furthermore, Scherzer contemplates that the social network users would be users of "access device 320, such as a laptop, a PDA, etc," and not necessarily ***subscribers*** of ***wireless communications networks***. EX1011, [0147]. In my opinion, a POSITA would have understood that this inclusive participation model allows anyone with compatible devices to join the network and access quality information, regardless of their carrier relationships or their device's compatibility with telecommunication carrier networks. The social network framework transforms the traditional carrier-subscriber paradigm into a collaborative ecosystem where various parties contribute to and benefit from shared connectivity intelligence. Through this expanded access model, the system democratizes wireless quality

information beyond the constraints of conventional telecommunications relationships.

(h) Claim 9: The method of claim 1, wherein said quality or service information further comprises rank ordering or preferred preferences for one or more of ranked or preferred:

221. Scherzer renders obvious this limitation. A POSITA would have recognized that Scherzer's disclosure of quality and accessibility vectors establishes the foundation for ranking and preference mechanisms. The system's ability to evaluate and rank access points based on multiple performance criteria demonstrates the required preference ordering capability. Furthermore, the vector-based approach enables sophisticated multi-factor rankings that consider diverse quality parameters.

222. In my opinion, Scherzer's radio resource database includes information related to a mobile device's wireless connection to an access point, e.g., "[b]ackhaul quality (estimated bandwidth connection to Internet)," "success rate," "average execution periods," and "[p]ercentage allowable shared bandwidth." EX1011, [0109]-[0117], [0148]. A POSITA would have recognized that Scherzer encodes access point connection quality data, into quality and accessibility vectors, which include connection quality, ease of accessibility, and location coordinates, in the database. EX1011, [0131]-[0140]. These vectors enable mathematical comparison and sorting of access points based on multiple weighted criteria.

223. Furthermore, Scherzer discloses that these vectors are used to determine rankings of access point connections (***quality or service information further comprises rank ordering or preferred preferences***). A POSITA would have understood that the ranking algorithm processes these diverse quality metrics to generate ordered lists that reflect relative performance across different dimensions. Through this vector-based ranking system, the platform transforms multidimensional quality data into clear preferences that guide user selection decisions.

(i) 9[a][i] wireless performance, telecommunication services, service providers, carriers, frequencies, spectrum allocations, wireless connection options, power levels, data rates, modulation types, air interface specifications, and bandwidths, and

9[b] wherein said providing step further provides access to one or more of said ranked ordering or preferred preferences to said one or more end users or said one or more end user communication devices or said one or more carriers or said third parties that provide services to said one or more carriers, or to said one or more wireless communications networks.

224. In my opinion, Scherzer renders obvious this limitation.

225. As discussed above regarding claims 4 and 5, in my opinion, Scherzer discloses providing mobile devices (***end users or ... end user communication devices***) with access point maps that include rankings of the access points (i.e. ***telecommunication services, service providers, carriers, frequencies, ... wireless***

connection options, ... bandwidths) nearby a mobile device's current or prospective geographic location based on the quality or service information in the database for that mobile device's geographic location. EX1011, [0078], [0149]-[0151]. In my opinion, a POSITA would have recognized that these location-aware rankings provide personalized recommendations that account for both the user's position and the empirical performance of available connectivity options. The system evaluates multiple access points within range, applying quality-based ranking algorithms to identify optimal connections.

226. Furthermore, delivering these rankings directly to end user devices empowers users with data-driven insights for connectivity decisions. In my opinion, a POSITA would have understood that providing access to ranked preferences enables users to quickly identify high-performing connections without trial-and-error attempts. EX1011, [0141]-[0146]. Through this direct provision of ranking information, the system ensures that quality-based preferences reach those who most benefit from them—the actual users seeking reliable wireless connectivity.

(j) Claim 10

(i) 10[pre] A system for collecting and providing access to quality or service information associated with one or more wireless communications networks, mobile devices, or end users, comprising:

227. See 1[pre], *supra*. Scherzer discloses ***system[s]*** that perform the ***collecting and providing access to quality or service information associated with … mobile devices*** described in claims 1-9.

(iv) 10[a] a computer configured to receive mobile device location information of a plurality of mobile devices or end users that are associated with one or more wireless communications networks and quality or service information pertaining to wireless access characteristics for one or more mobile devices of said plurality of mobile devices or end users, and said quality or service information comprising coverage, availability or performance information of one or more wireless communications networks or said one or more mobile devices;

228. See 1[a], *supra*.

(v) 10[b] a memory or database configured to store the received mobile device location information and quality or service information;

229. See 1[b], *supra*.

(vi) 10[c] an interface through which one or more end users or one or more end user communication devices, or one or more carriers, or one or more third parties that provide services to said one or more end users or one or more end user communication devices or said one or more

carriers, or one or more wireless communications networks may access said quality or service information or mobile device location information stored in said memory or database; and

230. See 1[d], *supra*.

(vii) 10[d] wherein said wireless access characteristics comprise one or more of identified perceived or measured: radio reception quality, network performance, quality of service, data rate, spectrum availability or suitability, capacity or bandwidth, availability or quality of coverage, availability or quality of capacity, availability or quality of one or more services or carriers, availability or quality of air interfaces, average use profile, average availability profile, statistics on outage or reliability or coverage or capacity carrying capabilities for one or more service providers, frequencies, radio frequency or quality of service or coverage or service map or addresses for one or more service providers, radio frequency or end-user application performance, and cost of service.

231. See 1[e], *supra*.

(q) Claim 11: The system of claim 10, further comprising a server configured to serve quality or service information stored in said memory or database to one or more carriers.

232. See claim 7, *supra*.

(r) Claim 12: The system of claim 10, further comprising a server configured to generate and serve data based on mobile device location information and quality or service information stored in said memory or database to one or more end users or one or more end user communications devices.

233. See claim 4, *supra*.

(s) Claim 13: The system of claim 12 wherein said data comprises one or more of a recommended operating band, operating mode, communications network and/or carrier for said one or more end users or one or more of said end user communications devices.

234. See claim 5, *supra*.

(t) Claim 14: The system of claim 13 wherein said server comprises a web server and said data is formatted as one or more web pages served to said one or more end users or one or more of said end user communications devices.

235. See claim 6, *supra*.

(u) Claim 15: The system of claim 10 wherein said computer is configured to provide access to quality or service information stored in said memory or database to a party or parties other than subscribers and carriers of said one or more wireless communications networks.

236. See claim 8, *supra*.

(v) Claim 16

(i) 16[a] The system of claim 10, wherein said quality or service information further comprises

rank ordering or preferred preferences for one or more of ranked or preferred:

237. See 9[a], *supra*.

(ii) 16[a][i] wireless performance, telecommunication services, service providers, carriers, frequencies, spectrum allocations, wireless connection options, power levels, data rates, modulation types, air interface specifications, and bandwidths, and

238. See 9[a][i], *supra*.

(iii) 16[b] wherein said interface is configured to provide access to one or more of said rank ordering or preferred preferences to said one or more end users or said one or more end user communication devices or said one or more carriers or said one or more third parties, or to said one or more wireless communications networks.

239. See 9[b], *supra*.

D. Ground 3: Scherzer and Chmaytelli

1. Chmaytelli

240. U.S. Patent Application Publication 2006/0253453 ("Chmaytelli") was filed on May 31, 2005 and published on November 9, 2006, and is prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and (e).

241. Chmaytelli describes methods and systems for delivering ads to a mobile device with content tailored to the device's geographic location. EX1012,

Abstract, [0010]-[0016]. Chmaytelli discloses an ad server for distributing ads that are associated with geographic areas of interest. EX1012, [0011]-[0016], [0075], [0080]. The location of the mobile device is determined (via, e.g., GPS or a recently-used tower). EX1012, [0070], [0078]-[0079], [0082]. When the mobile device is within the targeted geographic area of an ad, the server triggers delivery of the ad to the device. EX1012, [0080]-[0084]. Ad views and usage are monitored to enhance targeted content generation and delivery, conversion rates, and user experiences. EX1012, [0043], [0049], [0051].

2. The Combination, Motivation, and Reasonable Expectation of Success

242. Scherzer's mobile access point quality measurement collection with geographic location and use for ranking of wireless access points is augmented with certain ad-related features as taught by Chmaytelli.

243. In my opinion, a POSITA would have been motivated to combine Chmaytelli with Scherzer. For example, a POSITA would have known, from Chmaytelli and from other references, of industry interest in location-based content, including advertising. EX1028; EX1029; EX1030; EX1031. Advertising was widely recognized as an attractive additional revenue stream or a way to offer network services at less cost.

244. Scherzer describes the system operating as a "social network," and a POSITA would have known that social networking systems at the time were

commonly monetized through integrating advertising into the system. EX1011, [0147]; EX1047 ("Social networking sites in general rely mainly on a simple advertising model — selling banner and text ads"). And location-specific advertising was understood to be more likely be viewed and to result in conversions. A POSITA would therefore have recognized the potential value of adding localized ad serving capabilities to Scherzer, which already collected location information from devices and already transmitted data (e.g., access point quality and connection details) to them. In my opinion, a POSITA would have recognized that Scherzer's existing user base of mobile device users actively seeking connectivity represented an attractive demographic for local businesses and service providers. EX1012, [0072] ("For example, all active clients within a two mile radius of a restaurant could receive a discount coupon ad that can be redeemed at the restaurant."). The system's ability to determine user location and movement patterns would enable highly relevant ad delivery at moments when users are most receptive—such as when searching for nearby access points.

245. The addition of location-based advertising would provide essential revenue to offset operational costs while enabling the service to minimize the cost to end users. The existing bidirectional communication infrastructure and location awareness in Scherzer provided an ideal foundation for incorporating Chmaytelli's targeted advertising mechanisms.

246. In my opinion, a POSITA would have had a reasonable expectation of success in implementing the combination. Especially since Scherzer already disclosed providing location-specific information to mobile devices, including by querying a database to find and rank access points nearby a particular mobile device (EX1011, [0149]-[0151]), it would have been straightforward to serve another type of content (ads) in the same fashion, as disclosed in Chmaytelli. A POSITA would have known that ranking systems are core to many advertising and map-based information systems. EX1048, 6:12-20, Fig. 5, 6, 7, EX1049, 2:19-47, Fig. 6.

247. A POSITA would have recognized that the technical infrastructure required for location-based advertising closely parallels that already present in Scherzer—both systems require location determination, database queries based on geographic criteria, and content delivery to mobile devices. The addition of advertising content to Scherzer's existing data flows would require minimal architectural changes while leveraging the established database systems and communication channels. Furthermore, the database structures could readily accommodate advertising data alongside quality metrics, using similar geographic indexing and retrieval mechanisms. Through these technical similarities and a POSITA's knowledge of underlying technologies that enable Scherzer and Chmaytelli, e.g. database systems, web servers, and web interfaces, a POSITA

would have high confidence in successfully integrating Chmaytelli's advertising features into Scherzer's framework.

3. Analysis

(a) Claim 7: The method of claim 1, further comprising serving data based on mobile device location information or quality or service information stored in said memory or database to one or more carriers.

248. In my opinion, the combination renders obvious this limitation.

249. In my opinion, Chmaytelli discloses a "wireless advertisement (ad) system" that comprises "a server configured to generate and transmit an ad containing location data that defines a geographic area" and provides ads "based on a location of the client device and the geographic area defined in the ad" (***serving data based on mobile device location information***). EX1012, [0010]. A POSITA would have recognized that Chmaytelli further discloses that the ad server receives the location information from a server of the carrier: "[c]lient devices within the targeted area (i.e., the defined geographic area) can be identified from the location information stored on a server in the carrier network" (***location information ... stored in said ... database***). EX1012, [0080].

250. This architecture demonstrates how carriers maintain databases of device location information that can be leveraged for targeted content delivery. Furthermore, the system's ability to match device locations with geographically-defined advertising zones enables precise targeting that benefits both advertisers and

users through increased relevance. A POSITA would have understood that this location-based matching process transforms generic advertising into contextually appropriate content delivery based on user proximity to relevant businesses or services. EX1049, 1:45-2:15.

251. In my opinion, Chmaytelli discloses that the ads may be sent from the ad server to the carrier network and then relayed to the mobile device (***to one or more carriers***). EX1012, [0077] ("client devices 752 in communication with a first carrier 750 and client devices 762 in communication with a second carrier 760 may be within the targeted geographic area. Accordingly, generating a targeted ad at CAM console 740 and sending it to the first carrier network 750 and the second carrier network 760 can greatly increase the number of client devices that receive the ad.").

252. A POSITA would have recognized that this multi-carrier distribution strategy maximizes the reach of location-based advertisements by leveraging multiple network infrastructures simultaneously. The system's ability to coordinate with multiple carriers ensures comprehensive coverage of targeted geographic areas regardless of subscribers' specific carrier affiliations. Furthermore, serving data to carriers enables them to optimize delivery based on their network conditions and subscriber preferences. Through this carrier-mediated distribution model, the

advertising system achieves efficient, wide-scale dissemination while maintaining compatibility with diverse network architectures and protocols.

B. Ground 4: Scherzer and Sharma

1. Sharma

253. U.S. Patent Application Publication 2007/0213925 ("Sharma") was filed on March 13, 2006 and published on September 13, 2007, and is prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and (e).

254. Sharma describes methods and systems for delivering location-based wireless coverage information to users of wireless communications devices. EX1050, Abstract, [0015]-[0022]. Sharma describes a system with a database of granular wireless coverage information identified by latitude and longitude coordinates. EX1050, [0029]. Users of mobile devices send requests to a wireless availability server for coverage information at the user's particular location, as determined by specifying a street address or using PGS receiver. EX1050, [0027]. The wireless availability server returns results that indicate the wireless coverage at the location provided by carriers such as in a map format. EX1050, [0030], Fig. 4. Through this request-response architecture, the system provides on-demand access to location-specific coverage intelligence that helps users make informed decisions about their wireless connectivity options.

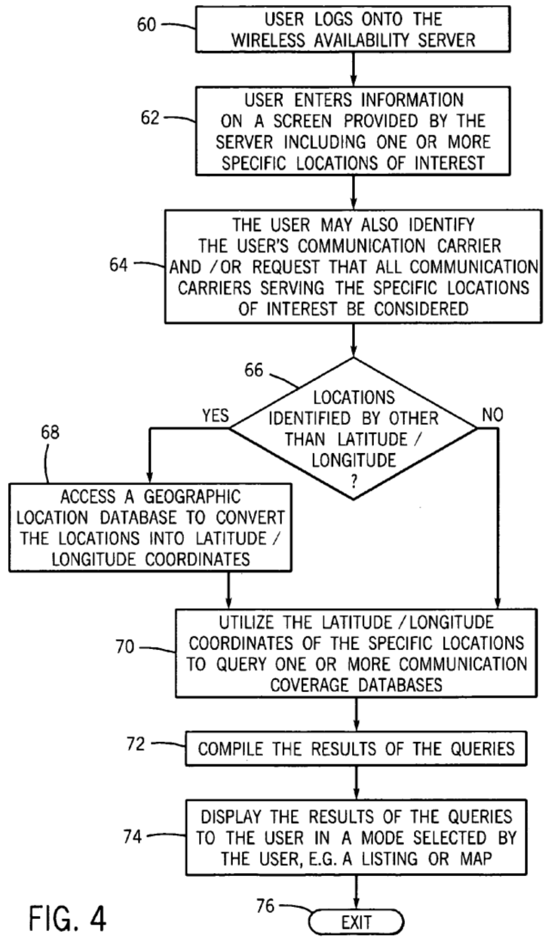


FIG. 4

2. The Combination, Motivation, and Reasonable Expectation of Success

255. Scherzer's mobile access point quality measurement collection with geographic location is augmented with certain wireless availability server features as taught by Sharma.

256. In my opinion, a POSITA would have been motivated to combine Sharma with Scherzer. For example, a POSITA would have known, from Sharma and from other references, of industry interest in location-based measurements of wireless connectivity quality. EX1050, [0003]-[0005], [0016], EX1010. Wireless

connectivity quality and coverage was widely recognized as a competitive feature for wireless service providers to attract subscribers. EX1050, [0003]-[0005].

257. A POSITA would therefore have recognized the potential value of selling reports or data based on the quality of service and location information collected into the database of Scherzer to wireless service providers, Scherzer granular data would have been supplemental to the wireless communications data already collected by wireless service providers. EX1050, [0005] ("Many cellular service providers and Wi-Fi carriers provide information concerning service coverage areas. However, the specificity of this information is normally not sufficiently granular to allow subscribers or potential subscribers to accurately predict whether specific locations of importance to them, e.g. a house, hotel, work location, waypoint, etc., are adequately served within the coverage area.").

258. Furthermore, the Scherzer data would seamlessly fit into the data pipeline of Sharma by providing an alternative flow of wireless quality data and providing a revenue stream to the operator of Scherzer's database. EX1050, [0029] ("Such information can be compiled by empirical testing such as by determining signal strengths available at specific latitude and longitude coordinates for wireless carriers either by professional engineering signal strength studies or by obtaining such information from reports provided by users of the various wireless carriers indicating signal strength readings/communication quality at specific locations.").

Through this combination, carriers would gain access to real-world performance data that complements their theoretical coverage models, while the database operator would establish a sustainable business model through data licensing to interested carriers.

259. In my opinion, a POSITA would have had a reasonable expectation of success in implementing the combination. Scherzer already disclosed providing location-specific information to mobile devices, including by querying a database to find and rank access points nearby a particular mobile device (EX1011, [0149]-[0151]), it would have been straightforward to create similar reports or share the same data with wireless service providers for integration into their own databases and coverage maps.

260. A POSITA would have recognized that the technical requirements for serving data to carriers closely parallel those for serving data to end users—both involve database queries, data formatting, and network transmission. The primary distinction lies in the recipient and potentially the data aggregation level, with carriers likely receiving broader datasets for network planning purposes. Furthermore, Scherzer's existing database architecture could readily support additional query types and output formats tailored to carrier requirements without fundamental structural changes. Through these technical similarities, a POSITA

would have high confidence in successfully implementing carrier-oriented data delivery using Scherzer's established infrastructure.

3. Analysis

(a) Claim 7: The method of claim 1, further comprising serving data based on mobile device location information or quality or service information stored in said memory or database to one or more carriers.

261. In my opinion, the combination renders obvious this limitation.

262. Scherzer discloses various types of parties operating wireless access points including public businesses, municipalities, business offices, and private residences. EX1011, [0010]-[0015]. In my opinion, a POSITA would have known that telecommunications carriers also operated wireless access points. EX1050, [0019], EX1040, [0018], EX1026. The convergence of cellular and WiFi technologies had led many carriers to deploy hybrid networks incorporating both cellular towers and WiFi hotspots.

263. Further, it was well-known that mobile devices incorporated both connectivity to cellular telecommunications networks and wireless local-area-networks. EX1040, [0023], EX1041, 2. Therefore, a POSITA would have known that a carrier operating wireless access points would have used ***data based on mobile device location information or quality or service information*** to understand, track, and improve their wireless access points and related telecommunication services. The operational benefits of accessing empirical performance data would be

particularly valuable for carriers managing diverse network infrastructure. It would have been obvious to a POSITA to ***serv[e] data based*** on the information in the ***database to one or more carriers*** as part of reports on telecommunication carriers services and coverages. Through such data provision, carriers could leverage real-world measurements to validate coverage models, identify problem areas, and optimize their hybrid network deployments.

V. Secondary Considerations of Non-Obviousness

264. I understand that so-called "secondary considerations" are legally relevant to an obviousness analysis. It is my opinion that the secondary considerations I consider here further weigh in favor of obviousness.

265. In my opinion, there is a lack of commercial success for any product practicing the challenged claims because I understand that the Patent Owner has not practiced the claimed invention (at any point in time) and because I am not aware of any other successful commercial deployments in the United States that are proven to embody the asserted claims.

266. Even if evidence of commercial success existed, it would not undermine the strong showing of invalidity. Moreover, the difference between the challenged claims and the prior art is minimal, and any secondary considerations would have minimal impact on the invalidity analysis.

267. In my opinion, there was no long-felt, unresolved need met by the ’700 Patent. For example, the systems disclosed by the references comprising the grounds and by the references I cite to corroborate the state of the art show that the claimed systems and method were already well understood, that many within the market observed their desirability and were at least concurrently working towards implementing them, and that some were even in use.

268. In sum, I am not aware of any of the factors for secondary considerations being present, but even if they existed, it would not impact the invalidity analysis.

VI. Conclusion

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

* * *

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on the 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 Section 1001 of Title 18 of the United States Code.

Respectfully submitted,

Date: October 24, 2025

Kevin C Almeroth

Kevin C. Almeroth, Ph.D.