IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS AMERICA, INC.,

SAMSUNG ELECTRONICS CO., LTD.,

Petitioners,

v.

KONINKLIJKE KPN N.V.,

Patent Owner.

Case No. IPR2025-00533

U.S. Patent No. RE48,089

DECLARATION OF KEVIN C. ALMEROTH, PH.D. IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. RE48,089

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I. INTRODUCTION

1. I, Kevin C. Almeroth, Ph.D., submit this declaration to state my opinions on the matter described below.

2. I have been retained by Petitioners Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. ("Petitioners"), as an independent expert in this proceeding before the United States Patent and Trademark Office. Although I am being compensated at my usual and customary rate of $850 per hour, no part of my compensation depends on the outcome of this proceeding, and I have no other interest in this proceeding.

3. I understand this proceeding involves U.S. Patent No. RE48,089 (the "'089 patent"), and I have been asked to consider the validity of certain claims of the '089 patent based on certain prior art references. I have also been asked to consider the state of the art and prior art available on or before December 21, 2009. Based on the prior art discussed in this declaration, it is my opinion that claims 6-10 and 12 of the '089 patent are unpatentable for the reasons provided below.

II. QUALIFICATIONS AND BACKGROUND

4. I believe that I am well qualified to serve as a technical expert in this matter based upon my educational and work experience, and specifically, in the field of cellular telecommunications and radio-access network architectures and protocols. My curriculum vitae ("CV") is submitted as Exhibit 1014.

5. I am currently a Professor Emeritus in the Department of Computer Science at the University of California, Santa Barbara (UCSB). While 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 also served as 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.

6. 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. During my education, 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.

7. One of the major concentrations of my research over the past 30+ years 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.

8. In 1992, the initial focus of my research was on the provision of interactive functions (e.g., VCR-style functions like pause, rewind, and fastforward) 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. 6. 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. Although the early Internet was used mostly for text-based, non-real time applications, the interest in sharing multimedia content, such as video, quickly developed. Multimedia-based applications ranged from downloading content to a device to streaming multimedia content to be instantly used. One of the challenges was that multimedia content is typically larger than text-only content, but there are also opportunities to use different delivery techniques since multimedia content is more resilient to errors. 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.

9. 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. In the IMJ, the number of channels varied depending on the capabilities of the server including the available bandwidth of its connection to the Internet. If one of the channels was idle, the requesting user would be able to watch their selection immediately. If all channels were streaming previously selected content, the user's selection would be queued on the channel with the shortest wait time. In the meantime, the user would *See* what content was currently playing on other channels, and because of the use of multicast, would be able to join one of the existing channels and watch the content at the point it was currently being transmitted. The IMJ service combined the interactivity of the web with the streaming capabilities of the Internet to create a jukebox-like service. It supported true Video-on-Demand when capacity allowed, but scaled to any number of users based on queuing requested programs. As part of the project, we obtained permission from Turner Broadcasting to transmit cartoons and other short-subject content. We also connected the IMJ into the Georgia Tech campus cable television network so

that students in their dorms could use the web to request content and then view that content on one of the campus's public access channels.

10. As a parallel research theme, starting in 1997, I began researching issues related to wireless devices and sensors. In particular, I was interested in showing how to provide greater communication capability to "lightweight devices," i.e., small form-factor, resource-constrained (e.g., CPU, memory, networking, and power) devices. Starting in 1998, I published several papers on my work to develop a flexible, lightweight, battery-aware network protocol stack. The lightweight protocols we envisioned were similar in nature to protocols like Bluetooth, Universal Plug and Play (UPnP) and Digital Living Network Alliance (DLNA). 12. From this initial work, I have made wireless networking—including ad hoc, mesh networks and wireless devices—one of the major themes of my research. My work in wireless network spans the protocol stack from applications through to the encoding and exchange of data at the data link and physical layers. 13. At the application layer, even before the large-scale "app stores" were available, my research looked at building, installing, and using apps for a variety of purposes, from network monitoring to support for traditional computer-based applications (e.g., content retrieval) to new applications enabled by ubiquitous, mobile devices. For example, my research has looked at developing applications for virally exchanging and tracking "coupons" through "opportunistic contact" (i.e., communication with other

devices coming into communication range with a user). In many of the courses I have taught there is a project component. Through these projects I have supervised numerous efforts to develop new "apps" for download and use across a variety of mobile platforms.

11. Yet another theme of this research was monitoring wireless networks, in particular different variants of IEEE 802.11 compliant networks, to (1) understand the operation of the various protocols used in real-world deployments, (2) use these measurements to characterize use of the networks and identify protocol limitations and weaknesses, and (3) propose and evaluate solutions to these problems. I have successfully used monitoring techniques to study wireless data link layer protocol operation and to improve performance by enhancing the operation of such protocols. For wireless protocols, this research includes functions like network acquisition and channel bonding.

12. My 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 and recommendations for downloadable "apps."

13. 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.

14. 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. Further, I am a

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

15. 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 (CV), attached as Exhibit 2006.

16. In addition, 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.

III. LEGAL STANDARDS

17. In forming my opinions and considering the subject matter of the ’089 patent and its claims in light of the prior art, I am relying on certain legal principles that counsel in this case explained to me. My understanding of these concepts is summarized below.

18. I understand that the claims define the invention. I also understand that an unpatentability analysis is a two-step process. First, the claims of the patent are construed to determine their meaning and scope. Second, after the claims are construed, the content of the prior art is compared to the construed claims.

19. I understand that a claimed invention is unpatentable when it is not new, not useful, or not non-obvious in light of the “prior art.” That is, an invention, as defined by the claims of the patent, must not be anticipated by or rendered obvious over the prior art.

A. Claim Construction

20. I understand that the United States Patent and Trademark Office interprets claim terms in an *inter-partes* review proceeding under the same claim construction standard that is used in a United States Federal Court. I understand that under this standard, the meaning of claim terms is considered from the viewpoint of one of ordinary skill in the art at the time of the alleged invention.

21. I understand that claim terms are generally given their ordinary and customary meaning as understood by one of ordinary skill in the art in light of the specification and the prosecution history pertaining to the patent. I understand, however, that claim terms are generally not limited by the embodiments described in the specification.

22. I understand that in addition to the claims, specification, and prosecution history, other evidence may be considered to ascertain the meaning of claim terms, including textbooks, encyclopedias, articles, and dictionaries. I have been informed that this other evidence is often less significant and less reliable than the claims, specification, and prosecution history.

B. Anticipation Under 35 U.S.C. § 102

23. I understand that under 35 U.S.C. § 102, a patent claim is invalid if its subject matter was patented or described in a printed publication before the effective filing date of the claimed invention. I have been told that this concept is referred to

as invalidity by anticipation. I have been told that a patent claim is anticipated under § 102 if a single prior art reference describes all limitations of the claimed invention.

C. Obviousness Under 35 U.S.C. § 103

24. I understand that a patent claim is invalid as obvious if the claimed invention would have been obvious to a person of ordinary skill in the art ("POSITA") at the time the claimed invention was made. I have been told that this means that even if all of the elements of the claim cannot be found in a single prior art reference that would anticipate the claim, a person of ordinary skill in the field who knew about all the prior art would have come up with the claimed invention. I understand that in an obviousness determination, the person of ordinary skill in the art is presumed to have knowledge of all material prior art. I understand that whether a claim is obvious is based upon the determination of several factual issues.

25. I understand that obviousness is a determination of law based on underlying determinations of fact. I understand that these factual determinations include the scope and content of the prior art, the level of ordinary skill in the art, the differences between the claimed invention and the prior art, and secondary considerations of non-obviousness.

26. In considering obviousness, I understand that one must determine the scope and content of the prior art. I understand that, in order to be considered as prior art to a patent being considered, a prior art reference must be reasonably related to

the claimed invention of that patent. I have been told that a reference is reasonably related if it is in the same field as the claimed invention or is from another field to which a person of ordinary skill in the art would look to solve a known problem.

27. I understand that one must determine what differences, if any, existed between the claimed invention and the prior art.

28. I understand that a patent claim composed of several elements is not proved obvious merely by demonstrating that each of its elements was independently known in the prior art. In evaluating whether such a claim would have been obvious, I understand that one may consider whether a reason has been identified that would have prompted a person of ordinary skill in the art to combine the elements or concepts from the prior art in the same way as in the claimed invention. I have been told that there is no single way to define the line between true inventiveness on the one hand (which is patentable) and the application of common sense and ordinary skill to solve a problem on the other hand (which is not patentable). For example, market forces or other design incentives may be what precipitated a change, rather than true inventiveness.

29. I understand that whether a prior art reference renders a patent claim unpatentable as obvious is determined from the perspective of a person of ordinary skill in the art at the time of the alleged invention. I have been told that there is no requirement that the prior art contain an express suggestion to combine known

elements to achieve the claimed invention, but a suggestion to combine known elements to achieve the claimed invention may come from the prior art, as filtered through the knowledge of one skilled in the art. In addition, I have been told that the inferences and creative steps a person of ordinary skill in the art would employ are also relevant to the determination of obviousness.

30. I understand that there is no rigid rule that a reference or combination of references must contain a "teaching, suggestion, or motivation" to combine references. But I also understand that the "teaching, suggestion, or motivation" test can be a useful guide in establishing a rationale for combining elements of the prior art. I have been told that this test poses the question as to whether there is an express or implied teaching, suggestion, or motivation to combine prior art elements in a way that realizes the claimed invention, and that it seeks to counter impermissible hindsight analysis.

31. I understand that one may consider, e.g., whether (1) the change was merely the predictable result of using prior art elements according to their known functions, or whether it was the result of true inventiveness; (2) there is some teaching or suggestion in the prior art to make the modification or combination of elements claimed in the patent; (3) the claimed innovation applies a known technique that had been used to improve a similar device or method in a similar way; (4) the claimed invention would have been obvious to try, meaning that the claimed

innovation was one of a relatively small number of possible approaches to the problem with a reasonable expectation of success by those skilled in the art; (5) the invention merely substituted one known element for another known element in order to obtain predictable results; (6) the invention merely applies a known technique to a known device, method, or product to yield predictable results; or (7) known work in the field may have prompted variations of use of the same inventions in the same or different fields due to market forces or design incentives that would have been predictable to a person of ordinary skill in the art.

32. I understand that any assertion of secondary considerations of non-obviousness must be accompanied by a nexus between the merits of the invention and the evidence offered.

IV. THE ’089 PATENT

A. Background of Technology

33. I first begin with a summary of the technology disclosed in the ’089 patent.

34. I’ve been asked to assume for purposes of this declaration a priority date of December 21, 2009. I have not been asked to determine what the priority date is. Moreover, if the dates shifts earlier or later, my opinions would not change. Prior to the earliest claimed priority date on the face of the ’089 patent, all the technology at issue in the ’089 patent was broadly applied and well known by

persons of ordinary skill in the art. In my opinion, no individual elements of the ’089 patent claims were novel at the time of the alleged invention, and there was nothing novel or inventive about the manner in which those elements were combined in the claims. Further, there were no technological barriers to combining these elements to form the claimed inventions. Indeed, combining these elements would have yielded predictable results.

35. For example, by the early 2000s, systems for collecting and mapping signal data were already widely implemented, leveraging standard methods and technologies. These standardized protocols, such as 3GPP Radio Resource Control (“RRC”) protocol for UMTS**,** the GSM Radio Interface Layer 3 protocol, and the LTE RRC protocol, facilitated the collection of signal and location data in cellular networks. For example, 3GPP standards governing GSM, UMTS, and LTE specified how mobile devices should measure and report signal quality and location information to the network. Although originally intended for network optimization, handover decisions, and interference management, these standards were increasingly repurposed for coverage mapping. Standardized parameters—such as signal strength and signal-to-noise ratio—provided essential metrics for evaluating network performance. Leveraging mobile terminals for data collection was a recognized approach for supplementing or substituting drive tests, which are costly and inefficient.

36. It was well-known at the time that wireless operators regularly engage in network planning and optimization. (EX1013, 185). For instance, operators optimize networks to "improve the overall network quality as experienced by the mobile subscribers and to ensure that network resources are used efficiently." (EX1013, 214). Network performance "can be observed by measurements, and the results of those measurements can be used to visualise and optimise network performance." (EX1013, 185). Figure 8.1, shown below, provides an example of a network planning process. This process uses measured network performance as an input for capacity and coverage planning, network performance visualization, and optimization, resulting in outputs such as capacity and coverage analysis:

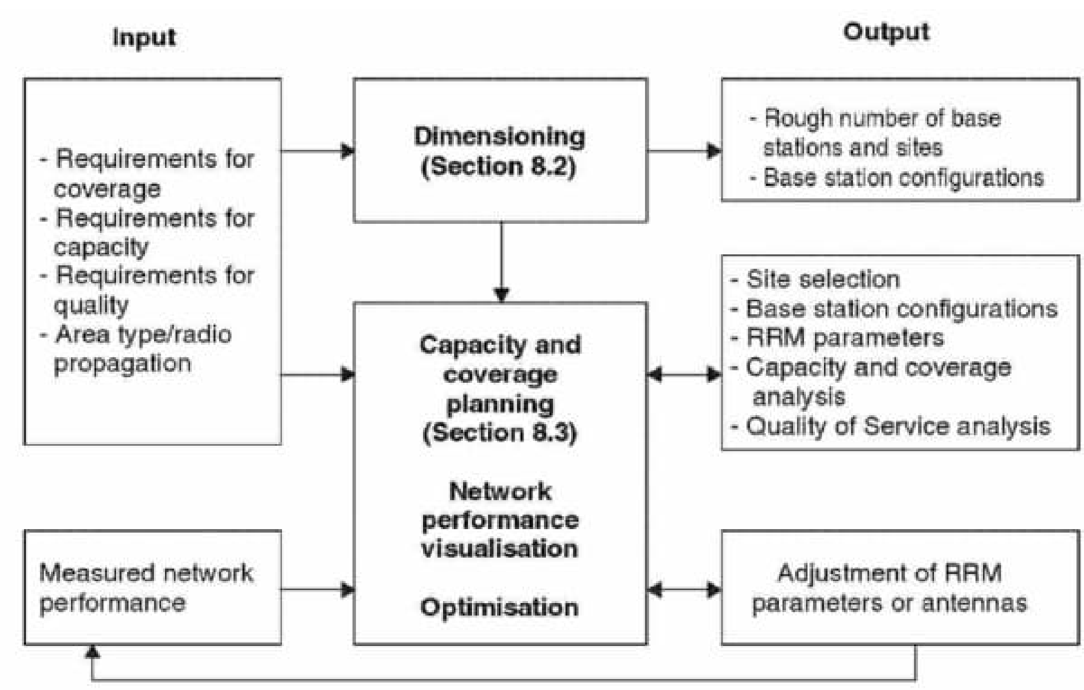


Figure 8.1. WCDMA radio network planning process

(EX1013, 186, Fig. 8.1)

37. Additionally, network optimization may involve: "1. Performance measurements. 2. Analysis of the measurement results. 3. Updates in the network configuration and parameters." (EX1013, 214). Figure 8.19, shown below, depicts an example of a network optimization process. This process uses performance measurements as inputs to conduct analysis and subsequently adjust the network.

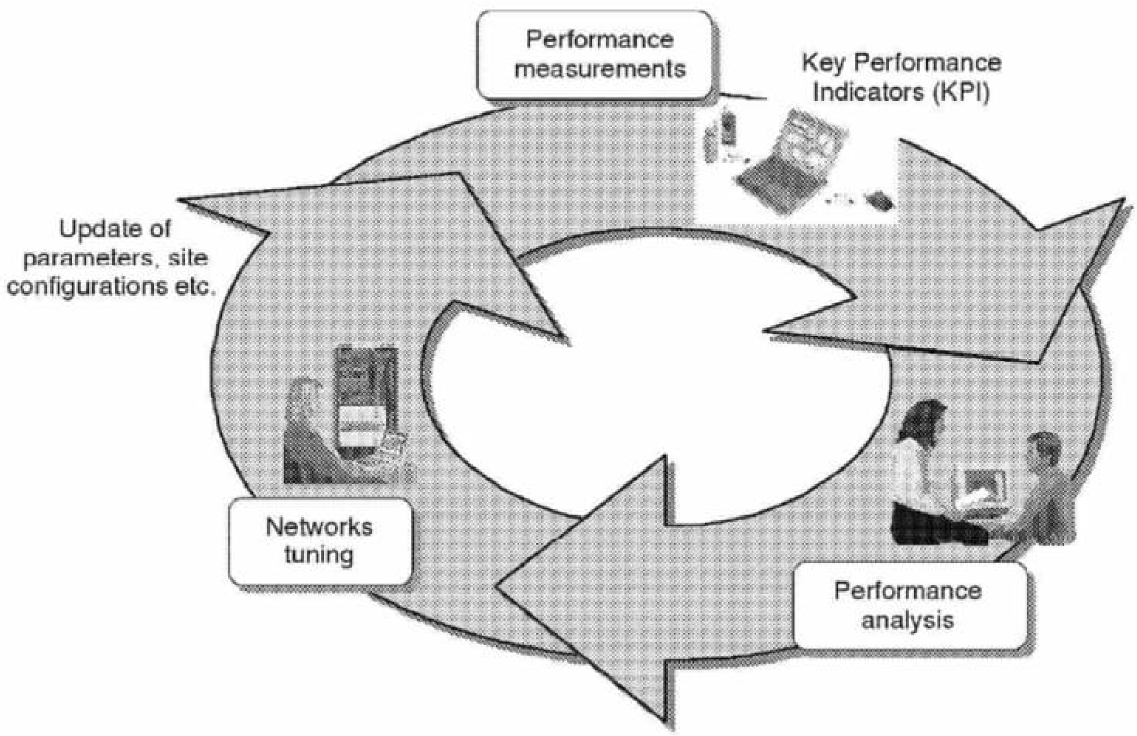


Figure 8.19. Network optimisation process

(EX1013, 215, Fig. 8.19). The "[t]ypical measurement tools" for network performance measurements are also illustrated in Fig. 8.20, reproduced below:

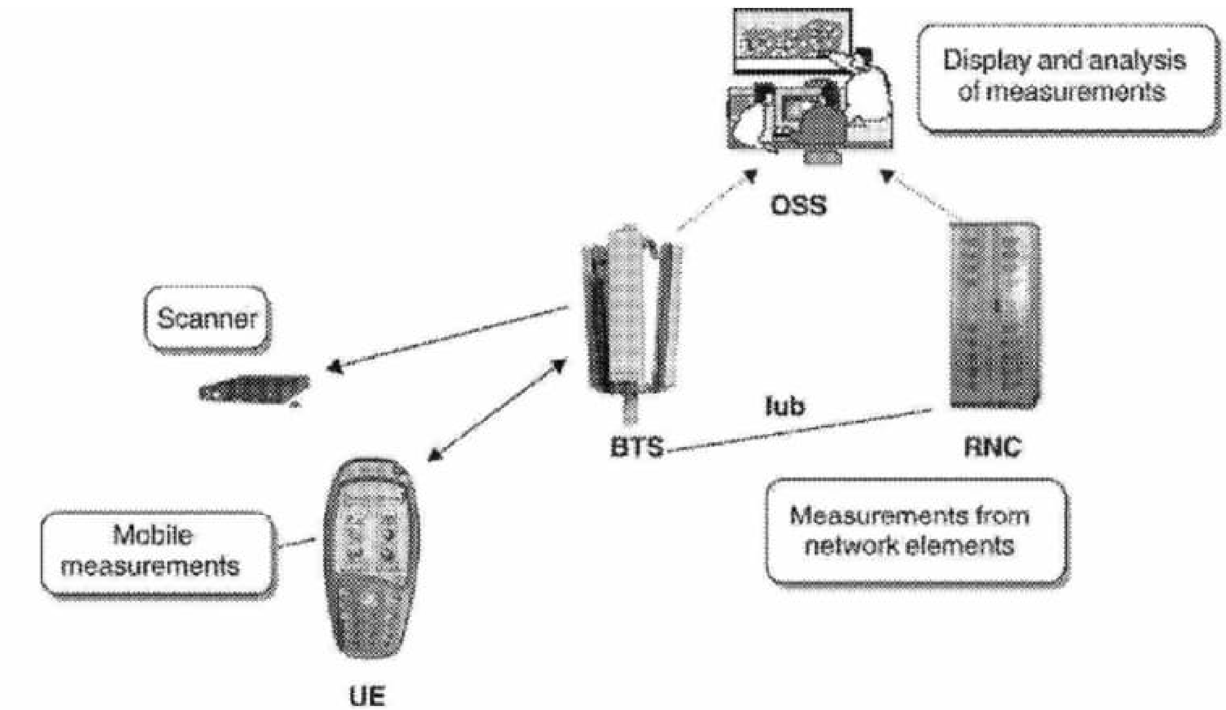


Figure 8.20. Network performance measurements

(EX1013, 215, Fig. 8.20).

38. Conventional methods for assessing network coverage and interference conditions included conducting drive tests by the network operator. EX1011, 1:36-38. To perform drive tests, "operator staff drive throughout the network and conduct and record call quality checks." EX1011, 3:38-40; *see also* EX1010, 1:44-46 ("Drive team testing requires dispatching a mobile unit into the selected zone of coverage to make first[-]hand observation of system conditions."). By 2009, advances in cellular technologies (e.g., mobile devices, cell phone GPS trackers, etc.) and adoption of standardized tools and methods for automated data collection and analysis (as opposed to drive tests), enabled operators to generate signal coverage maps more

efficiently. Indeed, techniques for automatic coverage assessments of networks to replace or complement drive tests have been well-known since at least the 1980s and 1990s. (EX1010, 1:41-2:36, 2:49-62 (describing such tools); EX1011, 1:61-2:39, 3:15-32, 7:51-8:9 (describing another example of such a tool)).

39. These techniques were known long before the alleged priority date of the ’089 patent, and include generating a coverage map based on measured signal strength information and location of a UE. (*See, e.g.*, EX1011, 1:62-2:39, 3:15-32, 7:51-8:9; EX1013, 185 (“The planning and optimization process can also be automated with intelligent tools and network elements.”); EX1010 2:52-62 (describing the network “collect[ing] information relevant to the communication system’s actual performance from the mobile unit’s perspective,” and ultimately “provid[ing] a computer generated representation of the characteristics of the electromagnetic coverage within the target geographic area.”), 4:22-40 (describing “monitoring the signal strength and the signal quality of transmissions between the mobile unit and the base station” in order for the “system operator to observe communication system performance during operation and to identify an incidence of degraded service, without waiting for subscribers to call in service complaints.”); *see also* Ex,1010, 3:46-50, 5:17-24 (describing providing location information and signal strength measurements from mobile units “to map the radio coverage

characteristics of a geographic area serviced by a cellular radiotelephone communication system," at a "rate[] rapidly approaching real-time.")).

40. The coverage assessments that are generated allow operators to plan networks, troubleshoot coverage issues, and optimize coverage for subscribers. *See, e.g.,* EX1013, 217 (describing automated network performance monitoring and optimization that can "point out the performance problems, propose corrective actions, and even make some tuning actions automatically."). For example, one 1989 reference describes just that:

> Armed with this view of the electromagnetic coverage, the system operator can quickly and efficiently identify deficiencies and take the necessary corrective actions. Moreover, by continually monitoring the subscriber calls and updating the graphical representations, a system operator can actually observe the effect of system modifications in a pseudo real-time fashion. . .
>
> As a function of these actual measurements, the evaluation tool is capable of providing a computer generated representation of the characteristics of the electromagnetic coverage. . . . Armed with this information, the system operator can easily plan, diagnose, or optimize the electromagnetic coverage of that communication system. . . . .
>
> The disclosed method of coverage evaluation, however, conveniently provides the system operator the capability of observing the coverage in these surrounding cells. Consequently, faulty coverage identification can now be achieved in an extremely reliable fashion which facilitates the selection of corrective actions that provide both adequate coverage and minimal disruption to neighboring cells. Based upon the location

> and the amount of mobile unit traffic within the cells, coverage mapping at rates rapidly approaching real-time is available.

(EX1010, 2:62-68, 5:43-52, 6:18-29; *see also, e.g.*, EX1010, 6:41-7:16 & Figs. 2-6 (disclosing example coverage evaluations)). Another 1998 reference describes, "[t]he visual map can be used for identifying areas of the network that may require remediation to ensure sufficient network coverage." (EX1011, Abstract; *see also* EX1011, 8:28-39; EX1013, Figs. 8.17-8.18).

41. Indeed, the process of applying automatic coverage assessment methods to different or next generation network technologies was also well known. (*See, e.g.*, EX1013, 217-218 (describing use of coverage assessments to help in deployment of next generation technologies like WCDMA and GSM)).

42. Benefits of these automatic coverage assessment include reducing operator time and resources for evaluating coverage, and allowing for real-time or near-real time, efficient, and up-to-date coverage evaluation. (*See, e.g.*, EX1011, 3:36-56 (describing "technique[s] for monitoring a cellular network that minimizes the time required to detect areas of poor network coverage or high interference and which further minimizes the necessity of operator intervention."); EX1011, 8:28-39 ("These techniques are advantageous in that they require minimal loading on current systems (i.e., provision of mobile station location data), and permit reduction in the man-hours that were previously required to manually survey the network.");

EX1010, 1:41-56 (describing disadvantages of conventional drive tests, overcome by automatic coverage assessment tools described)).

43. Now turning to the ’089 patent, the ’089 patent is directed to “a method and system for assessing coverage of a wireless access network within a desired area via cooperating wireless access networks and terminals capable of measurement and reporting across the different wireless access networks.” (EX1001, Abstract). This measurement information is then used to “generate the coverage assessment for the second wireless access network of the telecommunications infrastructure.” (EX1001, 2:61-65). The ’089 patent acknowledges that accurate cell coverage mapping has long been critical for optimizing wireless networks, requiring robust methods to collect and analyze signal quality and location data. (EX1001, 1:34-36) (“In order to provide adequate service to clients, wireless operators constantly evaluate the coverage area of their wireless access networks.”).

44. The patent also describes triggers for initiating the coverage assessment process, such as event-based triggers (*e.g.*, an instruction from the coverage estimator) or periodic triggers. (EX1001, 8:26-33). In my opinion, these mechanisms align with standardized approaches for automated network management, ensuring that coverage maps remain current without manual intervention. For instance, 3GPP standards included event-based and periodic reporting conditions in control messages, allowing mobile terminals to

autonomously collect and report network data under predefined conditions. *See, e.g.,* EX1012, 342-344. This functionality was commonly used to maintain up-to-date network performance metrics across operators.

45. Thus, by 2009, leveraging standardized systems to collect signal and location data and generate coverage maps was well-established in network management. Advances in mobile terminal capabilities and reporting protocols, such as automated event triggers and compatibility with network management platforms, made it increasingly feasible to replace drive tests with dynamic data collection. The ’089 patent describes a system and method that follows this trend and aligns with the old and well-known standardized processes for dynamic network data collection and coverage mapping to enhance efficiency and scalability.

46. The alleged novelty of the claims, particularly the “selecting” and “instructing” functions highlighted during prosecution, reflects nothing more than minor variations on well-understood principles. As explained below, by 2009, leveraging mobile terminals to collect and report signal quality and location data was not merely a theoretical concept but a widely adopted practice. *See, e.g.,* EX1012. Standardized protocols had already paved the way for systems that automated the process of selecting devices, triggering data collection, and integrating the results into comprehensive network maps. *Id.* These technologies and methods were not

only common but also foundational to the industry's transition away from cumbersome and outdated drive tests.

B. Overview of the '089 patent

47. The '089 patent describes "a method and system for assessing coverage of a wireless access network," in which selected terminals, capable of communicating with both a first and second wireless access network, measure signal information of the second network. (EX1001, Abstract). The measured signal information is then used to generate a coverage assessment of the second wireless access network. (*See id*., Abstract). The '089 patent acknowledges prior art methods for generating coverage assessments, such as drive tests, which "consist of measurement routes that are traversed by a measurement terminal often mounted on a vehicle" to gather signal strength data and detect coverage issues. (EX1001, 1:46-62). In my opinion, the patent seeks to generate coverage assessments "in a manner that minimizes or eliminates" reliance on drive tests. (*Id*., 2:10-14, 1:46-62, 6:11-13, Fig. 1).

48. Figure 2 shows the telecommunications infrastructure:

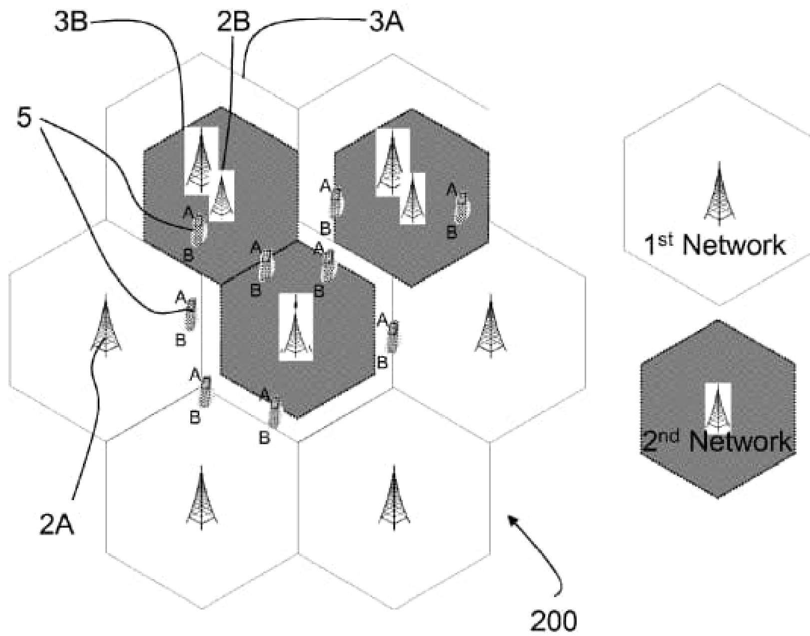


FIG. 2

(*Id.*, Fig. 2, 6:29-31).

49. The first wireless access network 2A and the second wireless access network 2B "may e.g., differ in radio access technology (e.g., GSM and UMTS or UMTS and LTE) or the used frequency spectrum (e.g. the 900 MHz and 1800 MHz frequency bands)." (*Id.*, 6:51-55). For example, the first network could be a 3G UMTS network, while the second network might be an LTE network. (*Id.*, 7:59-61). Mobile terminals 5 "are capable of communicating with both the first and second wireless access networks 2A, 2B" and "support multiple radio access systems." (*Id.*, 6:39-44, 7:65-67). The coverage assessment system 300 "includes

an information collector 7 and a coverage estimator 8." (EX1001, 6:18-20, 7:12-22).

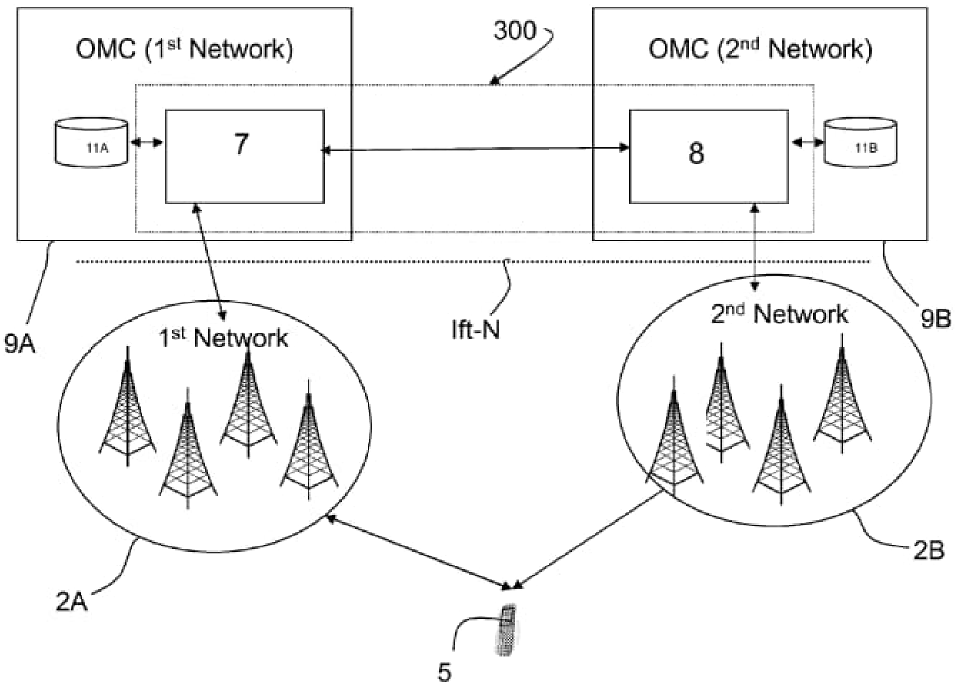


FIG. 3

(*Id.*, FIG. 3). Figure 3 shows an information collector 7 located in the operations and maintenance center (OMC) of the first wireless access network 2A (OMC 9A) and the coverage estimator in the OMC of the second wireless access network 2B (OMC 9B), "[a]lternatively, the first and second wireless access networks 2A, 2B may share the same OMC." (EX1001, 7:22-28).

50. In addition, the coverage assessment system "may also be decentralised by implementing coverage assessment functionality in other network elements (such as base stations) and using connections between these elements." (*Id.*, 6:66-7:7).

"Hybrid implementations are also envisaged." (*Id.*, 7:7-8). The information collector can reside in the first network and the coverage estimator in the second network, or "the information collector and the coverage estimator may be included within the second wireless access network." (*Id.*, Fig. 3, 2:26-34).

51. Both the information collector and the coverage estimator "may be largely implemented as software executed by a processor and making use of memory" or "may be implemented in hardware or a combination of software and hardware." (*Id.*, 7:29-35). In some embodiments, "coverage assessment system 300 may include a trigger for triggering the procedure of generating the coverage assessment." (*Id.*, 8:26-28). "The trigger may be event-based (e.g. the instruction from the coverage estimator 8 to obtain measurement information) or periodical, with period T." (*Id.*, 8:30-33).

C. Prosecution History of the '089 patent

52. I have reviewed the prosecution history of the applications that led to the '089 patent. The examiner allowed the applications that became the '175 and '089 patents without issuing any Office Actions rejecting any claims. (EX1002, 138-148). In the reasons for allowance, the examiner identified the "selecting" and "instructing" limitations as the sole basis for allowance. (EX1002, 143-148).

53. Applicant sought reissue of the '089 patent to "correct errors in the issued patents in claims 11 and 12, both of which are potentially

subject to findings of invalidity under 35 U.S.C. §112." (EX1002, 339-341). Specifically, previous claim 11 contained an indefinite typographical error "[a] mobile user terminal ***configured for use in configured for use*** in the method of claim 6…" (EX1002, 340) And, previous claim 12 of the '175 "recit[ed] both a computer program comprising software portions and method limitations." (EX1002, 340).

D. Person of Ordinary Skill in the Art

54. I am informed that patentability must be analyzed from the perspective of "one of ordinary skill in the art" in the same field as the '089 patent at the time of the invention. As previously discussed, the relevant time of invention is the patent's priority date, which is no earlier than December 21, 2009. Moreover, I understand that whether or not a patent application provides "written description" support for patent claims must also be assessed from the perspective of a person of ordinary skill in the art.

55. I am also informed that several factors are considered in assessing the level of ordinary skill in the art, including (1) the types of problems encountered in the art; (2) the prior art solutions to those problems; (3) the rapidity with which innovations are made; (4) the sophistication of the technology; and (5) the education level of active workers in the field.

56. A person of ordinary skill in the art pertinent to the '089 patent would

have had at least a Bachelor of Science degree in electrical engineering, computer engineering, computer science, physics, or an equivalent field, and at least two years of experience with cellular telecommunications, radio-access network architectures and protocols, and signal propagation in wireless networks. Additional education could substitute for professional experience and vice versa. A person of ordinary skill in the art would also be able to understand and apply the prior art discussed herein.

57. Although I surpass this definition of one of ordinary skill in the art now and at the priority date of the ’089 patent, my analysis regarding the ’089 patent has been based on the perspective of one ordinary skill in the art as of the priority date of the ’089 patent.

58. I am also familiar with the knowledge of the person of ordinary skill in the art as of the priority date of the ’089 patent. I am able to opine on how the person of ordinary skill in the art would have understood the disclosure and claims of the ’089 patent, the disclosures of the prior art, the motivation to combine the prior art, and what combinations would have been obvious to one of ordinary skill in the art.

V. CLAIM CONSTRUCTION OF TERMS OF THE ’089 PATENT

59. In the previous IPR and related district court litigation, several means-plus-function limitations were construed. (EX1009 (FWD), 8-26); (EX1015

(*Markman* Order), 8-60). Those limitations do not appear in the claims challenged in this Petition. Accordingly, for the purposes of this proceeding, I have been asked to assume that the claim terms otherwise have their plain and ordinary meaning to a person skilled in the art in light of the specification and prosecution history.

60. At this time, I am not aware of any term that requires specific construction for my opinions. To the extent Patent Owner suggests a narrow construction for a term, I reserve the right to respond to those opinions.

VI. OVERVIEW OF THE PRIOR ART

61. Below, I discuss the two references on which I rely.

A. Olofsson (EX1004)

62. The PCT application that published as Olofsson was filed on September 26, 2008, and published on April 1, 2010. I understand that therefore Olofsson qualifies as prior art.

63. Olofsson focuses on the same objective as the ’089 patent—i.e., eliminating the inefficiencies associated with performing drive tests to assess signal coverage of geographic areas. (EX1004, 3:13-4:15; 7:9-10 (“[I]t is greatly desirable to reduce the need of drive tests for planning or estimating, e.g., radio coverage or service quality of a wireless communication system.”). Olofsson describes additional aim of the disclosed invention, including “to provide radio coverage or service quality measurements of systems of established interworking or

interoperability," (*Id.*, 6;1-3), and "to perform radio coverage or service quality measurements of a system not yet open for public use while providing services of another system, such as a legacy system," (*Id.*, 5:22-24).

64. Olofsson describes mobile devices (UEs) that communicate with an originating network (i.e., first wireless access network) and a target network (i.e., second wireless access network) that provide telecommunications services. (EX1004, Abstract, 23:22-27). In Olofsson, the UEs, as opposed to drive test vehicles, "measure (13) on signals of [a] new cell and send[] a report (14) . . . on the outcome of the measurement(s)." (*Id.*, 9:21-23). Olofsson provides that "the UE should report the result of the measurement to a network entity being responsible for evaluating the measurements." (*Id.*, 14:19-20). "Measurement reports received are processed in a test evaluation server, TES, (56) comprising storage elements and processing circuitry." (*Id.*, 18:11-13).

B. Kuruvilla (EX1005)

65. Kuruvilla was filed on January 15, 2008, and published on July 16, 2009. I understand that therefore Kuruvilla qualifies as prior art.

66. Kuruvilla describes a system configured for generating a coverage assessment. Kuruvilla describes post processing network element 18 in communication with coverage map printer 20, which is "capable of printing a coverage map 22," corresponding to the coverage assessment. (EX1005, [0034]).

Kuruvilla describes that the map can be used for a variety of purposes, including to "locate areas with poor RF signaling capabilities," "locate geographical locations where there is high traffic density," or "in order to decide where future cell towers should be placed." (*Id.*, [0046]). The report may also be used to "show[] coverage area network problems," and "determine geographic areas where signal strengths are poor." (*Id.*, [0050]).

C. Lee (EX1006)

67. Lee was filed on February 5, 2009, and was published on August 6, 2009. I understand that therefore Lee qualifies as prior art.

68. Lee describes "a system for collecting signal quality information in a broadcasting network." (EX1006, [0026]). In Lee, a "broadcast server 100 generates a control message including a reporting condition for signal quality, and broadcasts it within the mobile broadcasting network 110." (*Id.*, [0027]). "The mobile terminal 120 measures signal quality at the current location referring to the reporting condition, and then transmits a reporting message composed of measurement results and area information corresponding to the current location." (*Id.*, [0028]). Finally, "[t]he management server 150 collects signal quality measurements of each area based on the reporting message transmitted from one or more mobile broadcasting terminals, and manages the collected signal quality measurements of each area." (*Id.*, [0031]).

D. Shrum (EX1007)

69. U.S. Patent No. 8,285,310 (Shrum) was filed on January 3, 2008, and issued on October 12, 2012. I understand that therefore Shrum qualifies as prior art.

70. Shrum describes a system for collecting and analyzing wireless session data to generate coverage maps. (*E.g.*, EX1007, Abstract). Measurement data, including "overall signal strength, signal-to-noise ratio (SNR), and failed versus successful wireless signal session status," is stored in a database (126) and processed by a server/processor (128), which acts as a coverage estimator. (EX1007, 4:1-2, 3:1-2). The coverage estimator analyzes the data to identify areas with poor signal quality, such as those prone to "call dropping," and determines where additional resources may be needed. (EX1007, 4:37-45). Shrum further teaches that the coverage estimator (i.e., server/processor (128)) generates coverage maps showing signal availability and geographic details, including areas of poor coverage, restricted usage zones, and resource locations. (EX1007, 4:33-45, 7:22-42)). When a user requests coverage mapping, the system accesses the database, processes the measurement data, and generates a map reflecting the signal conditions along the requested route. (EX1007, 4:18-25, 5:18-30).

VII. SUMMARY OF OPINIONS ON UNPATENTABILITY

71. In the analysis that follows, I identify the following combinations of prior art that, in my opinion, anticipate and/or render obvious the '089 patent claims:

Ground	Basis	Reference(s)	Claims
1	§103	Olofsson in view of Kuruvilla	6-10, and 12
2	§103	Lee in view of Shrum	6-10, and 12

A. Ground 1: Claims 6-10 and 12 are Rendered Obvious by Olofsson in view of Kuruvilla

72. I provide a summary of this ground as follows. In my opinion, Olofsson describes a telecommunications infrastructure comprising a first and second wireless access network, referred to as an "originating network" and "target network," respectively. Mobile devices within the network are selected and instructed to perform test measurements on the target network "for determining service quality and radio coverage." (EX1004, 12:25-27). Measurement reports are processed in a "test evaluation server, TES," which "estimate[s] the[] service quality and radio coverage provided" in the test network. (EX1004, 5:2-4, 18:11-13, 24:8-9, Abstract). Olofsson's test evaluation server performs a coverage assessment method as recited in claims 6-10 and 12 of the '089 patent.

73. To the extent Patent Owner argues that the challenged claims require generating a coverage map, Kuruvilla describes this step, among other recited limitations as discussed below. Like Olofsson, Kuruvilla teaches an automatic coverage assessment system and implementation details of the coverage assessment process. Kuruvilla further expressly teaches a coverage map printer "capable of

printing a coverage map" corresponding to the coverage assessment. (EX1005, [0034]).

74. As set forth below, a POSITA would have been motivated to combine the teachings of Olofsson and Kuruvilla, rendering the challenged claims obvious.

1. Motivation to Combine

75. In my opinion, a POSITA would have been motivated to combine Olofsson with teachings from Kuruvilla. A POSITA would be motivated to incorporate such teachings for various reasons. Below, I separately discuss each of the teachings in Olofsson that a POSITA would be motivated to combine with Kuruvilla.

76. In my opinion, a POSITA would have been motivated to combine Olofsson with Kuruvilla for the following reasons. In my opinion, Olofsson and Kuruvilla are analogous to the challenged claims and to each other. Specifically, both references are in the same field of endeavor and directed to solving the same problem as the '089 patent. The relevant field of endeavor is utilizing mobile devices to assess signal coverage in wireless telecommunication networks. (EX1001, 2:18-24; EX1004, 9:5-7; EX1005, [0009]). And the pertinent problem is avoiding the cost and time inefficiencies of conventional drive tests. (EX1004 (Olofsson), 4:10-15, 8:25-9:4; EX1005 (Kuruvilla), [0005]-[0006]); EX1001 ('089 patent), 1:32-2:9).

77. Regarding claim limitation 6[f], in my opinion, a POSITA would have been motivated to enhance Olofsson's TES (56) to generate a ***visual*** coverage assessment (e.g., coverage map), as disclosed in Kuruvilla, to enhance the accuracy and granularity of coverage assessments, enabling faster and more precise identification of network deficiencies and areas for improvement. Visual representations of data are often easier to interpret than the data in numerical form. This capability would align with industry goals of efficiently ensuring optimal network performance before deployment, thereby increasing consumer satisfaction and reducing post-deployment troubleshooting efforts.

78. Further, in my opinion, regarding limitation 7, a POSITA would have been motivated to combine Olofsson's selection step with Kuruvilla's trigger (e.g., dropped call, UE receives weak signals, etc.) such that if a UE experiences a trigger event (e.g., weak test signals), Olofsson's base station (52) or base station controller (53) could select the relevant UE by sending it a parameter over "a dedicated channel." (*See* EX1004, 10:26-11:7, 12:6; EX1005, [0041]-[0042] (discussing Kuruvilla's triggers)). Olofsson explains that only "a subset of available UEs is preferably selected to participate in the measuring to limit the amount of data to communicate and to process" because "[a]n excessive amount of selected UEs would risk causing unnecessary load of the target cell without providing a corresponding improvement as regards to measurement certainty," (EX1004, 10:20-

24). Thus, in view of Olofsson and Kuruvilla, a POSITA would have been motivated to select only UEs that are experiencing an undesirable trigger event (e.g., low signal strength and/or radio coverage) to reduce unnecessary load on the ***second wireless access network*** (i.e. target network of Olofsson) that would occur if the measurements from every UE in the vicinity were collected and analyzed.

79. Regarding claim 9, in my opinion a POSITA would have been motivated to consider the location information for the UE when assessing coverage because recording and mapping the precise location data of the UE when it measures the RF signals is necessary for "identify[ing] geographical areas which distribute poor radio frequency coverage." (EX1004, Abstract). Specifically, a POSITA would have been motivated to enhance Olofsson's base station (52) or base station controller (53) to provide the location information valid upon obtaining the measurement information for at least one of the selected one or more terminals, as taught in Kuruvilla. Indeed, "recording the precise location data for the mobile unit and storing the precise location data in a database," is important to achieving the goals of service providers. For example, "service providers generally want to provide exceptional voice quality, [so] it is important for service providers to identify areas with poor RF coverage." (EX1005, [0003], [0033] ("[a] network administrator may gather this [location] information and use it in order to correct areas with poor coverage"). Further, "[s]ervice providers also want to identify areas

of poor RF coverage areas in order to maximize efficiency when deciding where to place a new cell towner." (EX1005, [0003]).

80. In my opinion, to the extent Patent Owner argues limitation 9 requires a validation step, a POSITA would have been motivated to modify the teachings of Olofsson-Kuruvilla to allow "the step of providing the location information [is] valid," *i.e.*, validating the location information based on the teachings of Kuruvilla and Olofsson. Specifically, Kuruvilla describes "recording the precise location data for the mobile unit and storing the precise location data in a database." (EX1005, [0009]). Similarly, Olofsson teaches recording the location information and the further step of using the location information of the UE in its selection process. A POSITA would have appreciated the importance of periodically verifying the location information for each UE so that the most up to date location information for each UE is being used when generating a coverage map and in the selection process.

81. In my opinion, regarding claim 10, a POSITA would have been motivated to associate a terminal with its corresponding location information to ensure the "recording [of] precise location data for the mobile unit" and "mapping the precise location data of the radio frequency representing the positioning of the mobile unit at a given time." (EX1005, [0009]). As a POSITA would understand, doing so is required to successfully achieve the goals of Olofsson and Kuruvilla—i.e., to "identify geographical areas which distribute poor radio frequency coverage,"

(EX1005, Abstract), and/or "estimate [ ] service quality and radio coverage provided in order not to receive a great number of complaints and for being capable of putting a price on [ ] offered service in relation to perceived value of a customer and expected demand for offered services," (EX1004, 5:2-7).

2. Reasonable Expectation of Success

82. In my opinion, a POSITA would have reasonably expected success when combining Olofsson and Kuruvilla because both references disclose well-established systems for automatic coverage assessment. Applying the additional details from Kuruvilla's teachings in Olofsson's method would have thus represented a straightforward application of known techniques, including generating coverage maps, using event triggers, and using location data, in a predictable way.

83. Further, in my opinion, a POSITA would have understood that complementing Olofsson's teachings with Kuruvilla's teaching of coverage map generation is a straightforward integration of known components and software. Indeed, programming UEs to forward signal measurement data to post-processing system that can generate coverage maps would have been considered by a POSITA to be a routine software implementation that would yield predictable results. Furthermore, because Olofsson's TES (56) "comprise[s] processing equipment" that "operates according to one or more computer program products," (EX1004, 18:23-

27), and Kuruvilla's post processing module (16) is a "software module," (EX1005, [0008]), a skilled artisan would have reasonably expected a successful combination.

84. Further, because Olofsson's TES (56) "comprise[s] processing equipment" that "operates according to one or more computer program products," (EX1004, 18:23-27), and Kuruvilla's post processing module (16) is a "software module," (EX1005, [0008]), a skilled artisan would have reasonably expected a successful combination using known software modifications well within her knowledge and skill level.

85. Further, in my opinion, a POSITA would have reasonably expected success when making the obvious modifications to Kuruvilla and Olofsson to add the step of validating the location information and creating a *visual* coverage assessment, as these additions are nothing more than an application of known techniques, such as data validation and coverage map generation, using conventional components in a predictable way.

3. Claim 6

(a) [6pre]: An automatic coverage assessment method for generating a coverage assessment for a second wireless access network of a telecommunications infrastructure comprising a first wireless access network and the second wireless access network, the first and second

wireless access networks capable of providing services to a plurality of terminals, the method comprising:

86. In my opinion, to the extent the preamble is limiting, Olofsson describes this limitation.

87. With respect to the limitation: "[a]n automatic coverage assessment method for generating a coverage assessment for a second wireless access network." Olofsson describes a method of "perform[ing] radio coverage or service quality measurements," (in other words, a coverage assessment) (EX1004, 5:22-6:3). For example, Olofsson explains that "[p]rior to open[ing] a communications system for public use and commercial services, most providers or operators would like to *estimate* their service quality and radio coverage provided in order not to receive a great number of complaints and for being capable of putting a price on their offered service in relation to perceived value of a customer and expected demand for offered services." (*Id.*, 5:2-7 (emphasis added)). The method involves "triggering of user equipment to perform test or measurement of a target network [i.e., second wireless access network]." (*Id.*, Abstract). In my opinion, the "estimate [of] service quality and radio coverage" ascertained from the measurement information is a ***coverage assessment for the second wireless access network***. Further, in my opinion, Olofsson's coverage assessment method is ***automatic***, at least because it involves automated triggers and processing without human operation. *See* EX1004, 9:8-14.

88. Figure 1 shows the automatic coverage assessment method taught in Olofsson:

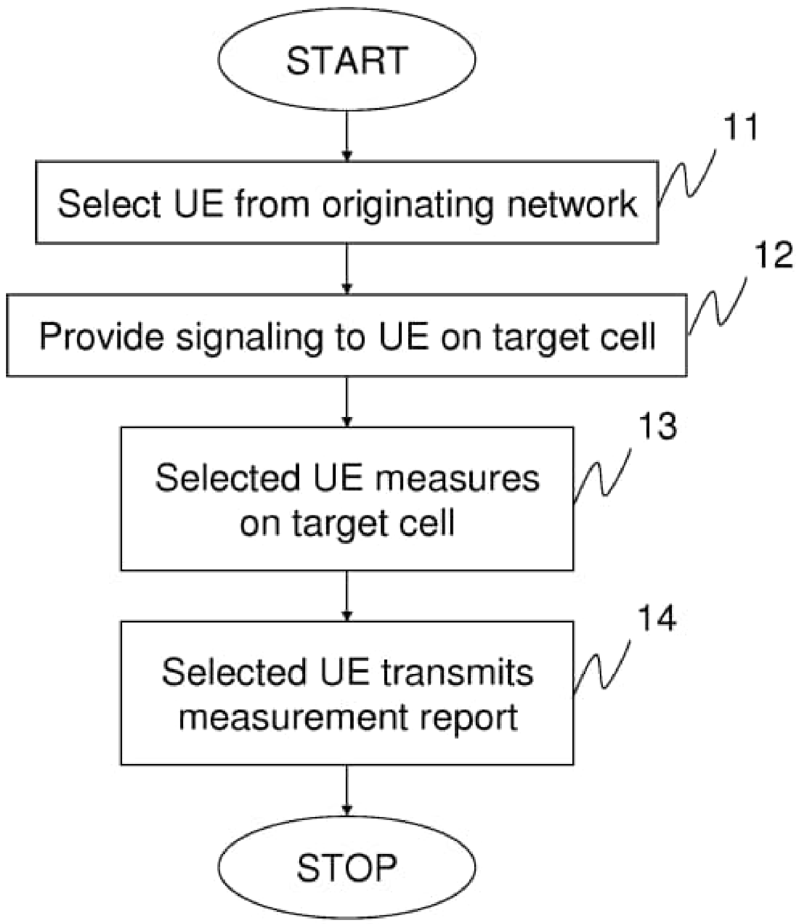


Fig. 1

(EX1004, Fig.1).

89. With respect to the limitation: "of a telecommunications infrastructure comprising a first wireless access network and the second wireless access network, the first and second wireless access networks capable of providing services to a plurality of terminals." Olofsson describes a ***telecommunications infrastructure***

comprising a first wireless access network (i.e., "originating network") ***and a second wireless access network*** (i.e., "target network"), ***the first and second wireless access networks capable of providing services to a plurality of terminals*** (i.e., "user equipment" or "UE"). (EX1004, 20:2-4 ("A method of wireless service provision in a wireless cellular communications system comprising *a first and a second communications network and user equipment equipped for communications in both networks*" (emphases added)); 9:1-4 ("[T]he UEs controlled to assist in the testing must support the one or more radio access technologies required for performing the measurements of the cells of the target network."); 9:12-14 ("One required selection criterion is UEs to support the radio access technology or mode of operation for measurements of the target network/target cell.")). The two networks are part of a ***telecommunications infrastructure***. (*Id.*, 13:11-25 (describing the invention in the context of a "cellular communication system"), 21:11-13 (first and second networks are telecommunication networks such as "WCDMA and LTE networks" or "GSM and WCDMA networks")).

(b) [6a]: collecting, at an information collector, information from terminals by:

90. In my opinion, Olofsson describes this limitation.

91. Olofsson describes ***collecting, at an information collector*** (i.e., receiving base station (52) or base station controller (53)) ***information from***

terminals (i.e., UEs). (EX1004, 14:18-19 ("Measurement reports are preferably transmitted . . . to the base station of the target cell."), claim 2 (The method comprising "in user equipment . . . providing one or more measurement reports comprising the recorded information"), Fig. 1 (step 14: "Selected UE transmits measurement report")). Olofsson explains that the second network comprises one or more antennas (51) connected to the base station (52) for transmitting or receiving signals to or from a UE (40)." (*Id.*, 18:7-9).

(c) [6b]: selecting one or more terminals from at least part of the plurality of the terminals, the at least part of the plurality of the terminals capable of communicating with both the first wireless access network and the second wireless access network,

92. In my opinion, Olofsson describes this limitation.

93. Olofsson teaches ***selecting one or more terminals*** (40) ***from at least part of the plurality of the terminals*** (40). For example, Olofsson describes a selection process (11) wherein "a subset of available UEs [*i.e.*, ***one or more terminals from at least part of the plurality of terminals***] is preferably selected to participate in the measuring." (EX1004, 10:20-22). Specifically, the "at least part of the plurality of terminals" are the UEs that "support the radio access technology or mode of operation for measurements of the target network/target cell," *i.e.*, the UEs that can perform the claimed measurements. (*Id.*, 9:12-14). Out of the "at least part of the plurality of terminals," one or more terminals is selected based a "network

originated parameter" as described in Olofsson. (*Id.*, 10:26-11:7). For example, Olofsson explains that "a network originated parameter is transmitted (12) on a common channel" and "[a] UE receiving one or more such parameters and being enabled for participating in the (test) measurements comprises circuitry arranged for determining from inclusion of the one or more parameters whether the UE should participate and perform the test/measurements from a selection criterion." (*Id.*, 10:26-11:7). "[T]he signaling is transmitted from the target network," (*Id.*, 12:6), which a POSITA would have understood as a signal transmission from the base station (52) of the target network.

94. Olofsson's "selection process (11) preferably includes, UE capabilities for performing and reporting measurements [and] UE location, i.e. the geographical position for which measurement data is desired." (*Id.*, 10:3-6). In addition, Olofsson notes that "[o]ne required selection criterion is UEs to support the radio access technology or mode of operation for measurements of the target network/target cell. (*Id.*, 9:12-14). Figure 1 shows the coverage assessment method, including the first step of selecting **(11)** a UE from the originating network.

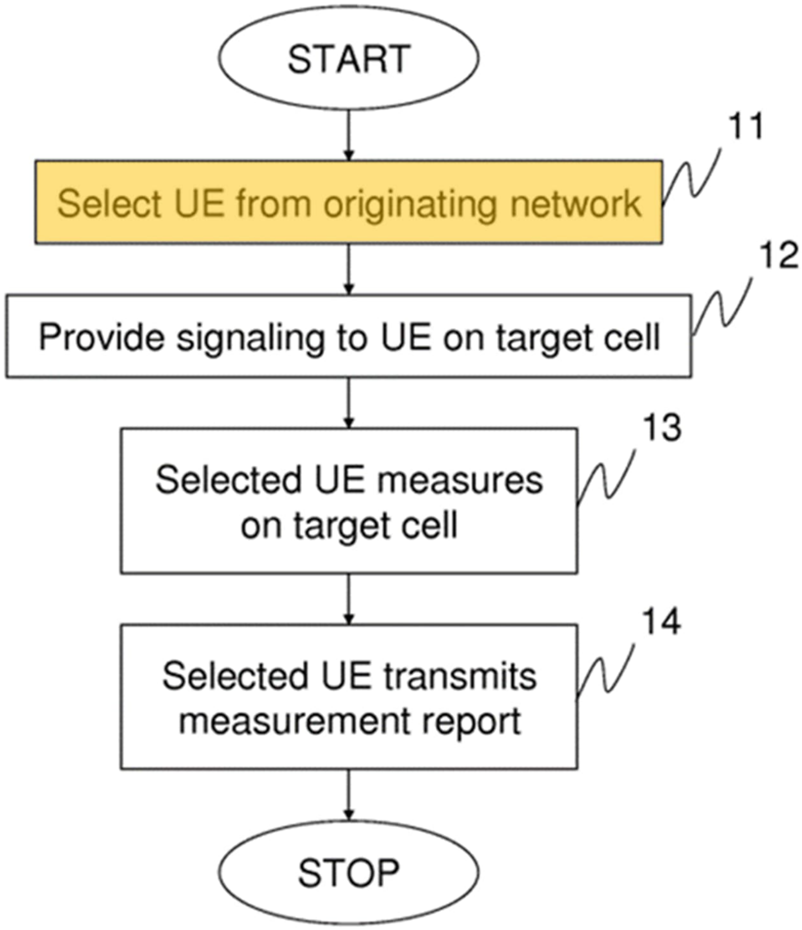


Fig. 1

(EX1004, Fig.1 (color annotations added)).

(d) [6c]: instructing the selected one or more terminals to measure signals from the second wireless access network,

95. In my opinion, Olofsson describes this limitation.

96. Olofsson describes ***instructing the selected one or more terminals*** (40) ***to measure signals from the second wireless access network*** (i.e., target network). Specifically, Olofsson explains that the selected "UE [(40)] should measure (13)

signals and parameters of the target cell *according to signaled instructions* from originating network." (EX1004, 14:1-3 (emphasis added)). Alternatively, "the signaling is transmitted from the target network" instead of the originating network. (*Id.*, 12:6-7). In Olofsson, the "signaling (12) to UE includes *instructions* for UE to perform one or more access attempts to the target cell to verify operations." (*Id.*, 3:26-28 (emphasis added)). For example, "the target cell transmits such example signaling by transmitting a single bit indicating that test measurements should be performed for that cell." (*Id.*, 12: 15-18)

97. "The signaling (12) to UE preferably includes [s]ignals or parameters to measure on or to determine from measured data [and] [r]eporting format comprising e.g. what to report and preferably also when and in what format to report." (EX1004, 10:7-10).

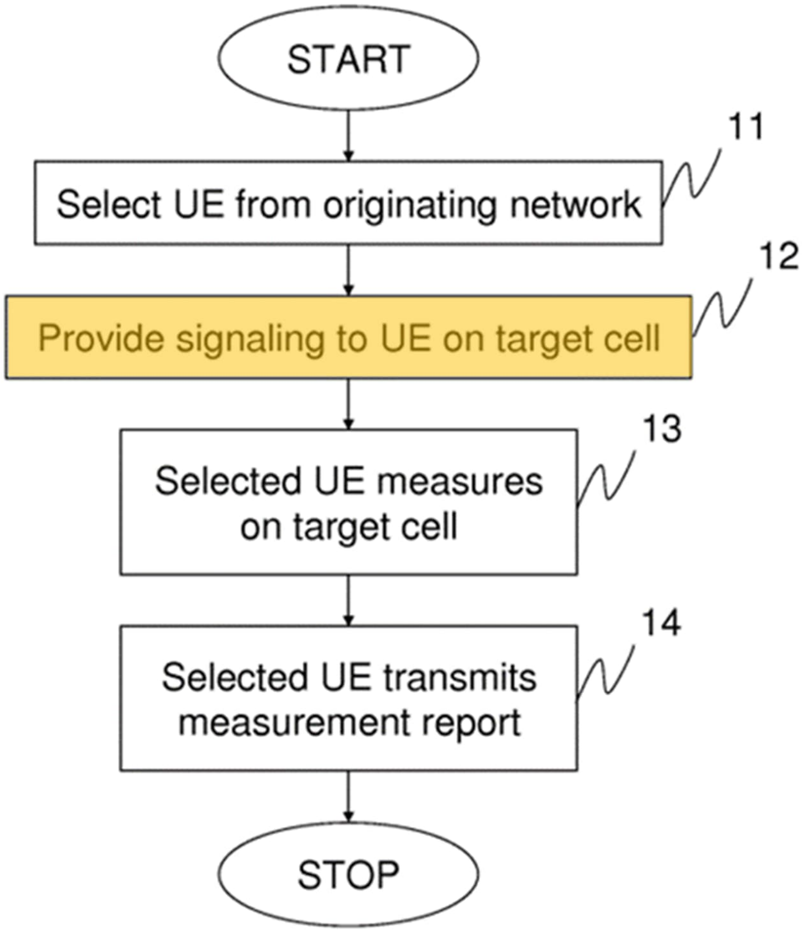


Fig. 1

(EX1004, Fig. 1 (color annotations added)).

(e) [6d]: obtaining measurement information indicative of the signals measured from the second wireless access network by the selected one or more terminals, and

98. In my opinion, Olofsson describes this limitation.

99. Olofsson describes ***obtaining measurement information indicative of the signals measured from the second wireless access network*** (i.e., target network) ***by the selected one or more terminals*** (40). (EX1004, 10:11-19 (explaining that "a

UE performs measurements of the one or more target cells")). Specifically, Olofsson explains that the selected "UE [(40)] should measure (13) signals and parameters of the target cell according to signaled instructions from originating network." (EX1004, 14:1-3). "[T]he predefined measurements according to the system specification are satisfactory for determining service quality and radio coverage." (*Id.*, 12:25-27).

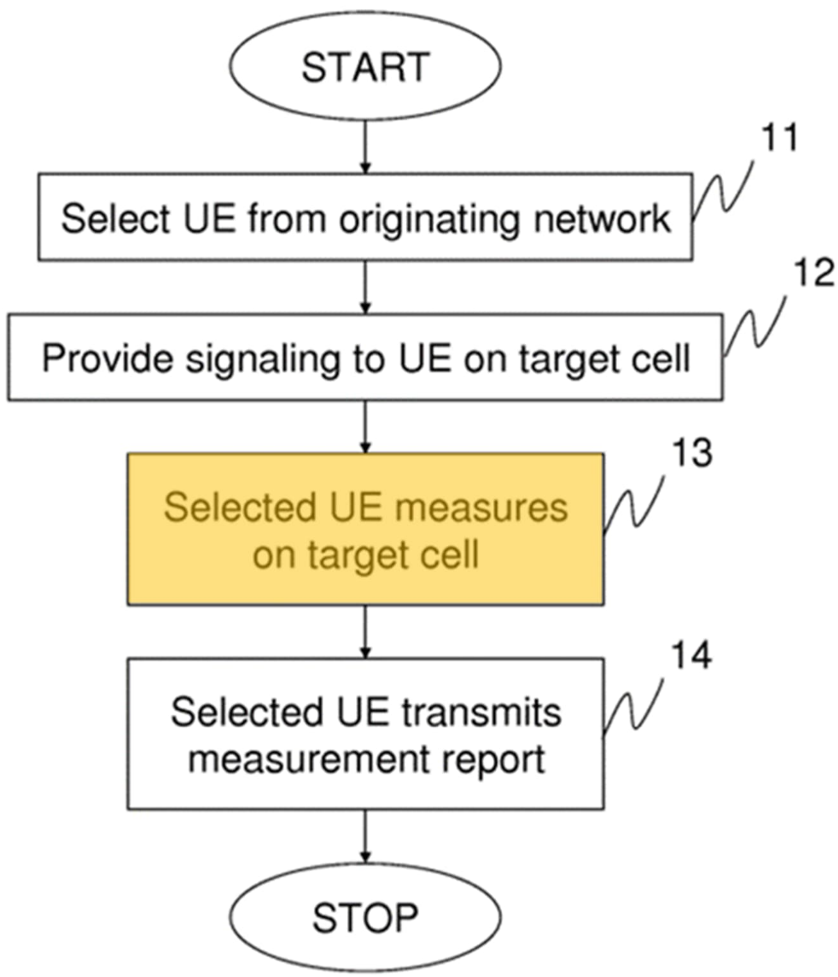


Fig. 1

(EX1004, Fig. 1 (color annotations added)).

(f) [6e]: providing the measurement information to a coverage estimator

100. In my opinion, Olofsson describes this limitation.

101. Olofsson describes ***providing the measurement information*** (i.e., "measurement report" (22)) ***to a coverage estimator*** (i.e., "test evaluation server" or "TES" (56)). As shown in Figure 1 of Olofsson, "UEs participating in the test/measurement measure (13) on signals of the new cell and sends a *report* (14), preferably over the radio interface of the target cell, on the outcome of the measurement(s)." (EX1004, 9:21 (emphasis added)).

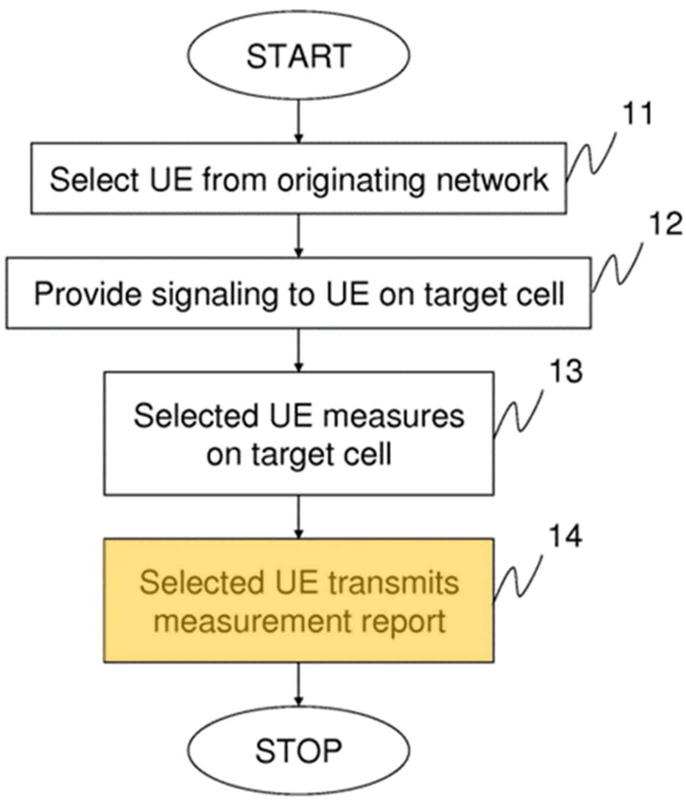


Fig. 1

(EX1004, Fig. 1 (color annotations added)).

102. Per Olofsson, "[m]easurement *reports* are preferably transmitted (14), (22) to the base station [(52)] of the target cell." (EX1004, 14:18-20 (emphasis added); *see* Ground I [6b])). Figure 2 of Olofsson "shows a simplified flow chart for measurement report transmission to a target base station." (*Id.*, 15:4-5).

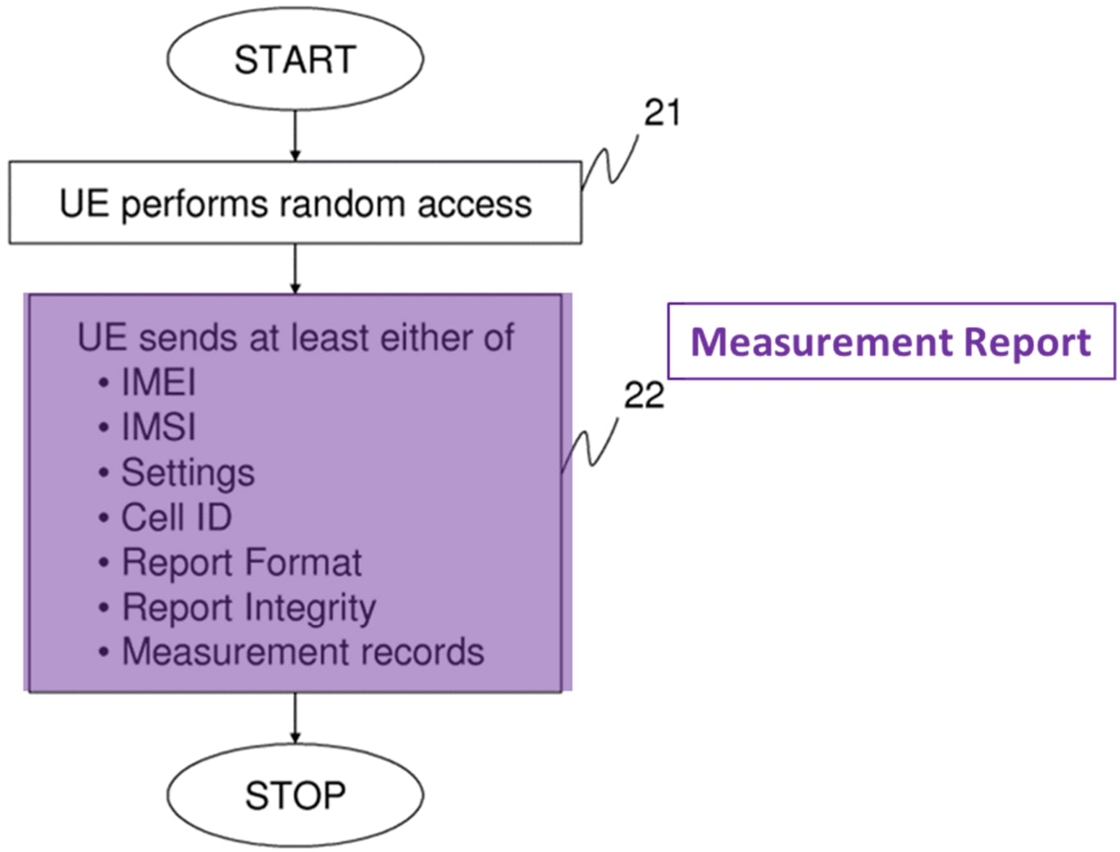


Fig. 2

(EX1004, Fig. 2 (color annotations added)). As illustrated in Figure 2, "[t]he transmitted (22) measurement report preferably comprises at least one of International Mobile Equipment Identity, IMEI, International Mobile Subscriber Identity, IMSI, [s]ettings comprising measurement and equipment data, such as test conditions and UE capabilities, [m]easurement record, [r]eport [t]ype including information on various one or more measurement records, and [r]eport [i]ntegrity, such as cyclic redundancy checking for error detection." (*Id.*, 15:19-27). According to Olofsson, these measurements are "satisfactory for determining service quality and radio coverage." (*Id.*, 12:25-27).

103. "[T]he receiving base station [(52)] or base station controller [(53)] will forward received information to the relevant TES [(56)]." (*Id.*, 14:26-15:1; *see supra* § IX.A.3(b)). According to Olofsson, "[m]easurement reports received are processed in a test evaluation server, TES, (56) comprising storage elements and processing circuitry." (*Id.*, 18:11-13; 24:8-9 ("the second communications network comprises a test evaluation server for storing and evaluating measurement reports")). Figure 5 shows "a simplified block diagram of a sub-network of an example target network," including the coverage estimator (i.e. TES (56)).

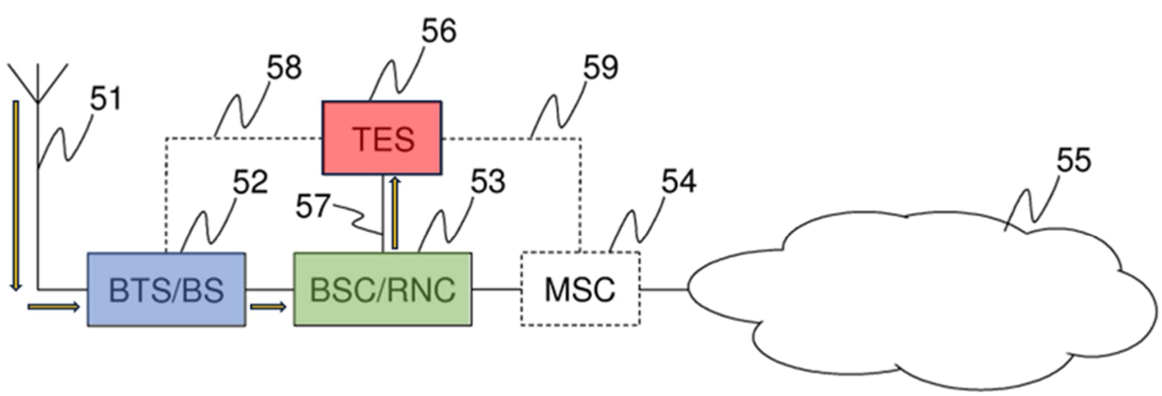


Fig. 5

(EX1004, Fig. 5 (color annotations added)).

(g) [6f]: generating, at the coverage estimator, the coverage assessment for the second wireless access network by:

104. In my opinion, Olofsson describes this limitation.

105. Olofsson describes ***generating, at the coverage estimator*** (i.e., TES (56)) ***the coverage assessment for the second wireless access network*** (i.e., target network). Specifically, Olofsson explains that "the second communications network [i.e., target network] comprises a test evaluation server [TES] for storing and *evaluating* measurement reports." (EX1004, 24:8-9 (emphasis added)). According to Olofsson, "the predefined measurements according to the system specification are satisfactory for determining *service quality and radio coverage*." (*Id.*, 12:25-27 (emphasis added)).

106. Olofsson explains that "[p]rior to open[ing] a communications system for public use and commercial services, most providers or operators would like to *estimate* their service quality and radio coverage provided." (*Id.*, 5:2-7 (emphasis added)). "Thereby, e.g., coverage and service quality can be ensured prior to the new technology is made available for public services." (*Id.*, 5:17-18). A POSITA would interpret the "estimate" of service quality and radio coverage of a target network to be a ***coverage assessment***.

107. To the extent Patent Owner argues that Olofsson's estimates are not a "coverage assessment," Kuruvilla describes a coverage map, which is a "coverage

assessment." In Kuruvilla, a data collection module 14 collects data, (EX1005, [0037] ("the data collection module 14 collects data"), which "is forwarded to a post processing network element 18 which includes a post processing module 16." (*Id.*, [0040]). And the post processing module 16 "creat[es] a map based on the location information" (i.e., ***generates a coverage assessment***). (*Id.*, [0046]).

108. Kuruvilla describes the map (22) as a "coverage map" *(Id.,* [0032]) and teaches that the "post processing module *plots the RF coverage information on a map* using data uploaded from the data collection module (14)," (EX1005, [0008] (emphasis added)). The map may also be used "in order to determine geographic areas where signal strengths are poor." (EX1005, [0050]). Kuruvilla's coverage assessment corresponds directly to the '089 patent's description of the coverage assessment as "a representation of locations/pixels and e.g. associated signal strengths of the second wireless access network." (EX1001, 5:20-22).

109. Figure 1 of Kuruvilla shows the above-described process:

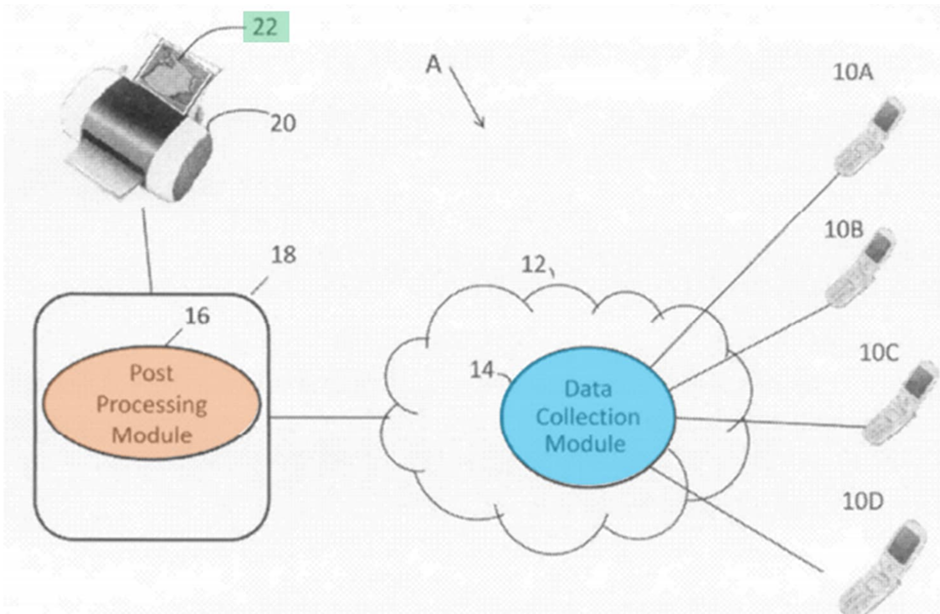


Figure 1

(EX1005, Figure 1 (color annotations added)).

110. In my opinion, a POSITA would have been motivated to modify Olofsson's TES (56) to generate a visual coverage assessment (e.g., coverage map), as disclosed in Kuruvilla, and would have reasonably expected the combination to succeed, for the reasons provided in the Motivation to Combine and Reasonable Expectation of Success Sections.

(h) [6g]: obtaining the measurement information from the information collector, and

111. In my opinion, Olofsson describes this limitation.

112. Olofsson describes ***obtaining the measurement information from the information collector*** (i.e., receiving base station (52) or base station controller (53))

at the coverage estimator (i.e., TES (56)). As Olofsson explains, "the TES is connected (57) to a control unit (53) of the target radio communications system, such as a base station controller, BSC, . . . for access and data retrieval." (EX1004, 18:13-16, 21-3 ("In an alternative realization, . . . TES (56) is connected (58) directly to the base station unit (52).")). "When measurement reports are transmitted to the target network, the receiving base station or base station controller will forward received information to the relevant TES [(56)]." (EX1004, 14:26-15:1). "Measurement reports received are processed in a test evaluation server, TES, (56) comprising storage elements and processing circuitry." (EX1004, 18:11-13).

(i) [6h]: based on the obtained measurement information, generating the coverage assessment for the second wireless access network of the telecommunications infrastructure.

113. In my opinion, Olofsson describes this limitation because based on the obtained measurement information (i.e., measurement reports), Olofsson's TES (56) generates a coverage assessment (i.e., estimate of service quality and radio coverage) for the second wireless network of the telecommunications infrastructure (i.e., the target network). As discussed in Limitation [6f] *supra*, Olofsson teaches a method and system for "perform[ing] radio coverage or service quality measurements" and "provid[ing] measurement reports" on a target network. (EX1004, 5:22-24, 6:4-6). "Measurement reports received are processed in a test evaluation server, TES, (56),"

(EX1004, 18:11-13), and are used to determine estimates of "service quality and radio coverage" (i.e., a ***coverage assessment***). (*Id.*, 5:2-7, 12:25-27).

114. To the extent Patent Owner argues that Olofsson's estimates of service quality and radio coverage are not a ***coverage assessment***, this limitation is obvious in view of Kuruvilla. As discussed in Limitation [6f] *supra*, Kuruvilla describes a post processing module 16 that generates a coverage map, which is a ***coverage assessment based on obtained measurement information***. (EX1005, [0008], [0032], [0037], [0040], [0046], [0050]). A POSITA would have been motivated to modify Olofsson's TES (56) to generate a visual coverage assessment (e.g., coverage map), as disclosed in Kuruvilla, and would have reasonably expected the combination to succeed, for the reasons provided in the Motivation to Combine and Reasonable Expectation of Success Sections.

4. Claim 7: The automatic coverage assessment method of claim 6, further comprising the step of triggering the information collector to select the one or more terminals.

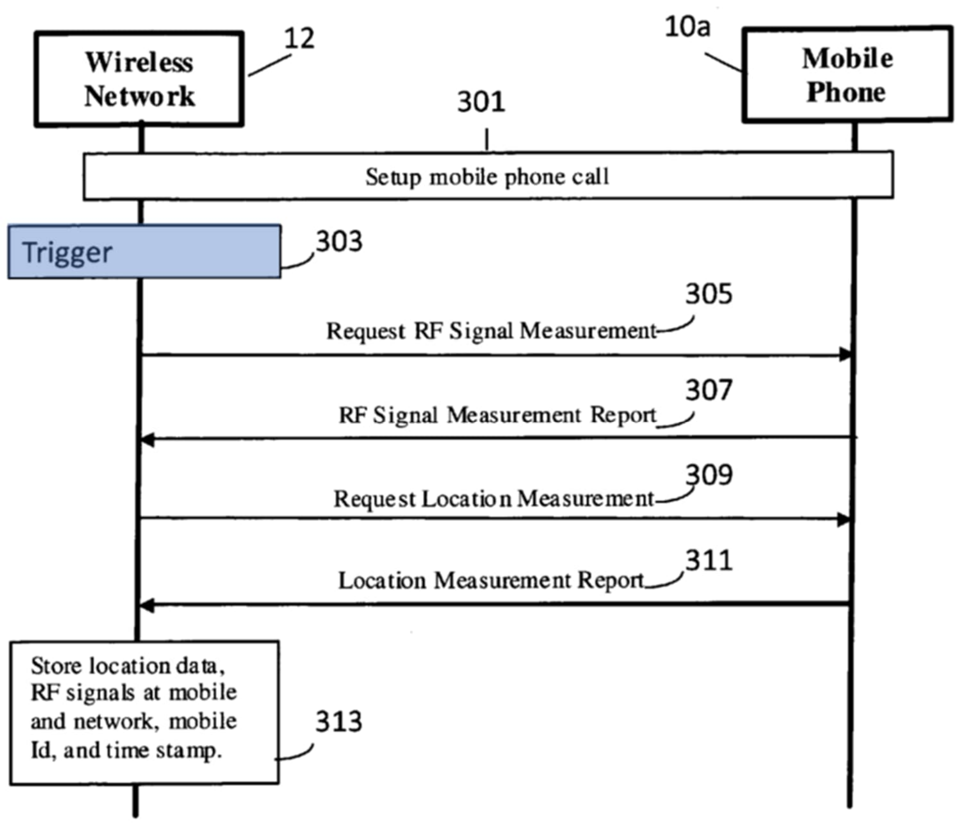
115. In my opinion, Olofsson describes this limitation.

116. Olofsson describes ***triggering the information collector*** (i.e., base station (52) or base station controller (53)) ***to select one or more terminals*** to perform measurements of the target network. As discussed above, *see supra* § VIII.D.1[6b], the base station of the target network ***selects*** UEs (i.e., ***terminals***) to perform measurements by signaling parameters to the UE so that the UE can

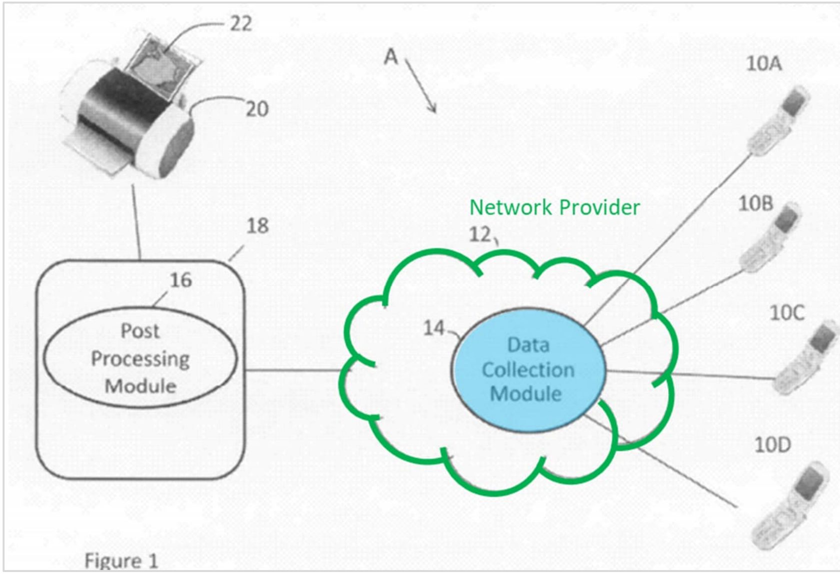
"determin[e] from inclusion of the one or more parameters whether the UE should participate," (EX1004, 11:3-7, 12:6 ("[T]he signaling is transmitted from the target network.")). A POSITA would have understood that because the selection step occurred, something must have caused (i.e., triggered) it to do so.

117. To the extent that Patent Owner argues that Olofsson fails to teach a trigger step, Kuruvilla expressly describes this limitation. Specifically, Kuruvilla describes that its "method begins with the ***trigger***," which "may be a variety of events," including "a timer expiring," "a mobile power increase signaling a reduction in signal strength," "a dropped call, " etc. (EX1005, [0041]; Figs. 2-4). According to Kuruvilla, this "[v]ariety of events may constitute a trigger which *prompts the data collection module 14* [i.e., an ***information collector***] collects [sic] data." (*Id.*, [0037] (emphasis added)). Based on these disclosures, in my opinion, in the combined system, the trigger would initiate the measurement process, which in Olofsson's system begins with the selection of terminals to perform measurements in order to reduce unnecessary load on the target cell, as described above.

118. Figure 3 of Kuruvilla shows the trigger occurring at step 303. (EX1005, Fig 3, [0048]):



(EX1005, Fig. 3 (color annotations added)). Note, as shown in Figure 1, "[t]he network provider 12 includes [the] data collection module." (*Id.*, [0034], [0036], Fig, 1):



(EX1005, Figure 1 (color annotations added)).

119. A POSITA would have been motivated to apply Kuruvilla's trigger events to Olofsson's system, and would have reasonably expected the combination to succeed, for the reasons provided in the Motivation to Combine and Reasonable Expectation of Success Sections.

5. Claim 8*:* The automatic coverage assessment method of claim 6, further comprising the step of obtaining location information for at least one of the at least part of the plurality of terminals prior to selecting the one or more terminals.

120. In my opinion, Olofsson describes this limitation because Olofsson describes the selection process includes ***obtaining location information for at least one of the at least part of the of the plurality of terminals*** (UEs) ***prior to selecting the one or more terminals***. Specifically, Olofsson expressly describes that "[t]he selection process (11) preferably includes . . . UE ***location***, i.e. the geographical

position for which measurement data is desired." (EX1005, 10:3-6). As discussed above, the information collector (i.e., base station (52) or base station controller (53)) selects one or more terminals (40) by transmitting one or more parameters to the UE. (*See supra* IX.A.3(c); EX1005, 10:26-11:7, 12:6). Olofsson's information collector therefore is the component that obtains the UE location information for at least one of the at least part of the plurality of terminals prior to selecting the one or more terminals, since UE location is taken into account as part of the selection process.

121. Consistent with this opinion, in IPR2022-00079, the Board found that a POSITA would have understood from this disclosure of Olofsson that "the system obtains the UE location information for the terminal(s) prior to selecting the terminal(s)" [and] that "Olofsson describes obtaining location information prior to selecting the terminal(s), and that, in the proposed Olofsson-Kuruvilla combination, this would have been performed by the 'information collector,' as discussed above." EX1009, 65-66.

6. Claim 9: The automatic coverage assessment method of claim 8, further comprising the step of providing the location information valid upon obtaining the measurement information for at least one of the selected one or more terminals.

122. In my opinion, Olofsson describes this limitation.

123. Olofsson describes an information collector (i.e., base station (52) or base station controller (53)) that performs the step of ***providing the location***

information valid upon obtaining the measurement information (i.e., measurement report) ***for at least one of the selected one or more terminals*** (UEs). The '089 patent explains that this step may be performed by "the information collector 7[, which] may be configured to update the location information for each of the selected one or more terminals with the *location information valid when the measurement information was obtained* from them." (EX1001, 9:25-29 (emphasis added)).

124. Olofsson teaches the same process, i.e., "[i]f the UE is capable of receiving GPS (Global Positioning System) information, *positioning information* from a GPS receiver is preferably included with test results in a measurement report. (EX1004, 14:10-12 (emphasis added); *see also id.*, 17:27-29 ("measurement data is preferably combined with a *geographical position* of the measurement." (emphasis added))). As discussed above, Olofsson describes that the base station (52) or base station controller (53) is the component that provides the measurement reports (and thus, the location information) to the test evaluation server, TES (56). (*Id.*, 14:19-26 ("The UE should report the result of the measurements to a network entity being responsible for evaluating the measurements."); 14:26-15:3 ("When measurements reports are transmitted to the target network, the receiving base station or base station controller will forward received information to the relevant TES.")).

125. My opinion is consistent with the Board's prior decision in IPR2022-00079 wherein the Board considered similar language when invalidating claim 5 of

the '089 patent. EX1001, cl. 5 (". . . wherein the information collector is further configured to provide location information valid upon obtaining the measurement information for at least one of the selected one or more terminals.); (EX1013, 22-24, 69-70).

126. Alternatively, to the extent Patent Owner argues that Olofsson does not disclose this limitation, Kuruvilla does. Specifically, Kuruvilla independently describes an information collector (i.e., data collection module (14)) that performs the step of ***providing the location information valid upon obtaining the measurement information*** (i.e., measurement report) ***for at least one of the selected one or more terminals*** (10A). Specifically, Kuruvilla teaches that "a report of the RF signal measurement [is] sent from the mobile phone 10A to the wireless network 12 (at step 407)" and "the wireless network 12 makes the location measurement (at step 409)." (EX1005, [0053-0054]). Next, "the location measurement, along with the RF signal of pilot channels at the mobile 10A . . . are stored (at step 411)." (*Id.*, [0054]). Then, "[t]he post processing module 16 [(i.e., the claimed coverage estimator)] periodically uploads the data collected by the data collection module 14 [(i.e., the claimed information collector)]." (*Id.*, [0056]). A POSITA would have understood this periodic uploading (i.e., updating) to determine whether the location information remains valid over time.

127. A POSITA would have been motivated modify Olofsson's base station (52) or base station controller (53) to provide the location information valid upon obtaining the measurement information for at least one of the selected one or more terminals, and would have reasonably expected the combination to succeed, for the reasons provided in the Motivation to Combine and Reasonable Expectation of Success Sections.

128. To the extent Patent Owner argues that location verification is missing from the Olofsson-Kuruvilla combination, location verification is not a recited claim step, and even if it were, a POSITA would have been motivated to modify the combination of Olofsson and Kuruvilla to include location verification with a reasonable expectation of success for the reasons provided in the Motivation to Combine and Reasonable Expectation of Success Sections.

7. Claim 10

(a) [10a]: The automatic coverage assessment method of claim 8, further comprising: associating the location information with at least one of the selected one or more terminals, and

129. In my opinion, Olofsson describes this limitation because Olofsson describes ***associating the location information with at least one of the selected one or more terminals*** (40). Specifically, Olofsson teaches that "the measurement data is preferably combined with a geographical position of the measurement." (EX1004, 9:14-17, 17:28-29). A POSITA would understand that the geographical position of

the *measurement* is the same as (and hence, ***associated with***) the geographical position of the *UE* (40) because the UE (40) performs the measurement. (EX1004, 10:11-15 ("a UE performs measurements of the one or more target cells)). Thus, as Olofsson explains, "[a] UE preferably then comprises receiver (49) for receiving GPS (global position system) signals." (EX1004, 17:29-18:1). "If the UE is capable of receiving GPS (Global Positioning System) information, positioning information from a GPS receiver is preferably included with test results in a measurement report." (*Id.*, 14:10-12). The measurement report also includes self-identifying information for the UE, such as its international mobile equipment identity (IMEI), which associates the reported GPS location with the particular UE. (EX1004, 20:20-21 ("including in a measurement report . . . international mobile equipment identity"), 15:19-20 ("The transmitted (22) measurement report preferably comprises at least one of International Mobile Equipment Identity, IMEI, ...")). Further, if the "UE is not capable of receiving GPS information . . . , a coarse position information is preferably derived from the cell ID of the source cell or the target cell on which the UE is camping, the measurement report including position information or cell ID of the source or target cell." (*Id.*, 14:130-16). Thus, regardless of the approach used, the resulting position information is associated with the particular UE.

130. While Olofsson alone describes ***associating the location information with at least one of the selected one or more terminals***, Kuruvilla does so as well. For example, Kuruvilla's UEs include "a global positioning system which is used in order to derive the location information," (EX1005, [0021]), or "the system includes a location module which is configured to derive the location from the associate mobile unit's positioning at a given time," (*Id.,* [0022]). Kuruvilla explains that "[m]obile unit location measurement can be performed through methods known in the art," (*Id.*, [0044]), and the "location data, RF signals at the mobile and the network, mobile ID, and timestamp (at step 217)" are "stored at the post-processing module 16," (*Id.,* [0046]), which a POSITA would understand to be the claimed coverage estimator, as discussed above, *see supra* § IX.A.3(g).

131. A POSITA would have been motivated to associate a terminal with its corresponding location information to ensure the "recording [of] precise location data for the mobile unit" and "mapping the precise location data of the radio frequency representing the positioning of the mobile unit at a given time." (EX1005, [0009]). As a POSITA would understand, doing so is required to successfully achieve the goals of Olofsson and Kuruvilla—i.e., to "identify geographical areas which distribute poor radio frequency coverage," (EX1005, Abstract), and/or "estimate [ ] service quality and radio coverage provided in order not to receive a great number of complaints and for being capable of putting a price on [ ] offered

service in relation to perceived value of a customer and expected demand for offered services," (EX1004, 5:2-7).

(b) [10b]: forwarding the location information associated with the at least one of the selected one or more terminals to the coverage estimator.

132. In my opinion, Olofsson describes this limitation because Olofsson describes ***forwarding the location information associated with the at least one of the selected one or more terminals*** (40) ***to the coverage estimator*** (56). Specifically, Olofsson teaches providing the UE location with the signal measurements in the measurement report (as discussed above for Limitation [10a]), and the measurement report is forwarded to the TES (56). (EX1004, 14:26-15:1 ("When measurement reports are transmitted to the target network, the receiving base station or base station controller will forward received information to the relevant TES."), 14:6-17 (GPS location or position information is included in the measurement report), 17:27-29 ("measurement data is preferably combined with a geographical position of the measurement")).

133. Although Olofsson alone teaches ***forwarding the location information associated with the at least one of the selected one or more terminals to the coverage estimator***, Kuruvilla also provides this teaching. Specifically, Kuruvilla describes that "data collection module 14 is used to collect data" that "stems from the radio frequency and represents the positioning of the mobile unit 10A – 10D at

a given time" and "includes location information and the given time when the data was collected." (EX1005, [0036]). Kuruvilla's ***coverage estimator*** (i.e., post processing module 16) "periodically uploads the data collected by the data collection module 14." (EX1005, [0055]). Kuruvilla describes that after the data is forwarded to the coverage estimator, "the data may then be sent to a printer 20 in order to create a [coverage] map 22 to be used by an administrator." (*Id.*, [0056]).

134. In my opinion, a POSITA would have been motivated to ***forward the location information associated with the at least one of the selected one or more terminals to the coverage estimator***, as taught in Olofsson and Kuruvilla, in order to "evaluat[e] the measurements," (EX1004, 14:19-21, 18:11-13), and "record and store the data and organize [it] into a report," (EX1005, [0040]).

8. Claim 12

(a) [12pre]: A non-transitory computer-readable medium having instructions stored thereon that, when executed by a processor of a telecommunications infrastructure comprising a first wireless access network and the second wireless access network, the first and second wireless access networks capable of providing services to a plurality of terminals, causes the telecommunications infrastructure to carry out operations of an automatic coverage assessment method for generating a coverage assessment for the second wireless access network, the operations including:

135. To the extent the preamble is limiting, in my opinion, Olofsson describes the preamble.

- ***"A non-transitory computer-readable medium having instructions stored thereon"***

136. Olofsson describes "software enabled units and devices," which would include computer-readable media having instructions stored thereon to implement the disclosed functionalities. (EX1004, 19:7-12). A POSITA would understand that the described processes—such as selecting and instructing UEs, transmitting measurement reports, and processing the data in a test evaluation server (TES 56)—require executing program instructions. (EX1004, 5:22-6:3; 18:11-13).

- ***"when executed by a processor of a telecommunications infrastructure . . .* [*the non-transitory computer-readable medium*] *causes the telecommunications infrastructure to carry out operations of an automatic coverage assessment method for generating a coverage assessment for a second wireless access network,***

137. In my opinion, as discussed above for claim 6, Olofsson's telecommunications infrastructure includes, *inter alia*, a base station, base station controller, test evaluation server (TES 56)—that work together to automatically generate a coverage assessment for a second wireless access network. A POSITA would understand that these components operate under software instructions stored on a non-transitory computer-readable medium and executed by a processor. (EX1004, 18:11-13 ("Measurement reports received are processed in a test evaluation server, TES, (56) comprising storage elements and processing circuitry"))). A POSITA would recognize that the processor of the TES executes

instructions to: (1) receive measurement reports from the UEs; (2) store the data in storage elements; and (3) process the data to generate the coverage assessment for the second wireless access network. (EX1004, 5:22-24, 6:4-6). The TES processes these reports to generate a performance comparison or validation of the target network—a coverage assessment that allows providers to evaluate service quality and radio coverage prior to opening the network for public use. (EX1004, 6:10-12, 5:2-7).

- ***the telecommunications infrastructure comprising a first wireless access network and the second wireless access network, the first and second wireless access networks capable of providing services to a plurality of terminals, the operations including:***

138. In my opinion, Olofsson alone describes or in view of Kuruvilla renders obvious this limitation, to the extent the preamble is limiting. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* Limitation [6pre].

(b) [12a]: collecting, at an information collector, information from terminals by:

139. In my opinion, Olofsson alone describes or in view of Kuruvilla renders obvious this limitation, to the extent the preamble is limiting. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* Limitation [6a].

(c) [12b]: selecting one or more terminals from at least part of the plurality of the terminals, the at least part of the plurality of the terminals capable of communicating with both the first wireless access network and the second wireless access network,

140. In my opinion, Olofsson alone describes or in view of Kuruvilla renders obvious this limitation, to the extent the preamble is limiting. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* Limitation [6b].

(d) [12c]: instructing the selected one or more terminals to measure signals from the second wireless access network,

141. In my opinion, Olofsson alone describes or in view of Kuruvilla renders obvious this limitation, to the extent the preamble is limiting. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* Limitation [6c].

(e) [12d]: obtaining measurement information indicative of the signals measured from the second wireless access network by the selected one or more terminals, and

142. In my opinion, Olofsson alone describes or in view of Kuruvilla renders obvious this limitation, to the extent the preamble is limiting. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* Limitation [6d].

(f) [12e]: providing the measurement information to a coverage estimator; and

143. In my opinion, Olofsson alone describes or in view of Kuruvilla renders obvious this limitation, to the extent the preamble is limiting. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* Limitation [6e].

(g) [12f]: generating, at the coverage estimator, the coverage assessment for the second wireless access network by:

144. In my opinion, Olofsson alone describes or in view of Kuruvilla renders obvious this limitation, to the extent the preamble is limiting. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* Limitation [6f].

(h) [12g]: obtaining the measurement information from the information collector, and

145. In my opinion, Olofsson alone describes or in view of Kuruvilla renders obvious this limitation, to the extent the preamble is limiting. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* Limitation [6g].

(i) [12h]: based on the obtained measurement information, generating the coverage assessment for

the second wireless access network of the telecommunications infrastructure.

146. In my opinion, Olofsson alone describes or in view of Kuruvilla renders obvious this limitation, to the extent the preamble is limiting. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* Limitation [6h].

B. Ground 2: Claims 6-10 and 12 are Rendered Obvious by Lee in light of Shrum

147. Lee describes a broadcast server 100 and management server 150 (i.e., collectively, an information collector) to collect signal quality and location information in a telecommunications infrastructure comprising a first and second wireless access network—i.e., a mobile communications network and a mobile broadcasting network, respectively. (EX1006, [0026]). It describes using mobile terminals to collect signal quality information at a particular location and report the signal quality measurement results to the management server portion of the information collector. (EX1006, Abstract). Shrum further describes server/processor 128 (i.e., coverage estimator) that processes signal quality and location data collected from wireless devices and generates coverage maps. These coverage maps identify areas with poor signal strength, dropped connections, or restricted usage zones and provide actionable insights to improve network performance and plan infrastructure upgrades. (EX1007, 7:27-34).

148. In my opinion, a POSITA would have been motivated to generate a coverage map, as disclosed in Shrum, based on the information collected by Lee's information collector, rendering the challenged claims obvious.

1. Motivation to Combine

149. In my opinion, a POSITA would have been motivated to combine Lee with the teachings of Shrum for the following reasons.

150. In my opinion, Lee and Shrum are analogous art because they are in the same field of endeavor as each other and the '089 patent—the relevant field being using mobile devices to collect signal quality information and transmit measurement results to the system, which assesses signal coverage in wireless telecommunication networks. (EX1006, [0026]; EX1007, 2:25-36; EX1001, 2:18-24).

151. In my opinion, a POSITA would recognize that the teachings of Lee and Shrum complement each other because they provide different but related components of a system designed to enhance cellular and mobile network performance through signal data collection and analysis. (EX1006, [0026]; EX1007, 1:43-50). Specifically, Lee teaches an information collector using mobile devices to collect and store signal data in a second wireless access network (i.e., mobile broadcasting network), (EX1006, [0026]), but does not disclose an coverage estimator for generating coverage map. However, Shrum teaches using collected signal data to generate coverage maps identifying geographic areas with poor

coverage or service interruptions, but does not expressly describe how the data is collected in the first instance. (EX1007, 1:43-50). Accordingly, a POSITA would have been motivated to combine the teachings of Lee and Shrum to provide a method for collecting and evaluating (e.g., assessing) information relating to signal coverage.

152. In my opinion, regarding claim 6, a POSITA would have been motivated to incorporate components necessary to perform a ***visual*** coverage assessment (e.g., coverage map (400) or (500)) at a coverage estimator (i.e., server/processor (128)), as taught in Shrum, to enhance the accuracy and granularity of coverage assessments, enabling faster and more precise identification of network deficiencies and areas for improvement. Visual representations of data are often easier to interpret than the data in numerical form. And coverage maps "advise a user to seek (or avoid) certain wireless signal service areas, and provide general wireless signal availability information for a particular geographic area." (EX1007, 7:58-63). The maps may also include "geographic information, roads and highways, types and locations of wireless support resources, areas of known inadequate (i.e., poor) or non-existent wireless signal coverage, real-time information regarding wireless signal outages, restricted wireless usage zones, and other data." (EX1007, 5:18-25).

153. In my opinion, regarding claim 8, a POSITA would have been motivated to obtain the location information of prospective terminals ***prior to selecting*** them to perform measurements when attempting to assess the coverage in a particular geographic area. Indeed, a POSITA may want to verify that the mobile terminal is located in the relevant area before causing it to measure signal information and assessing the coverage and also have the ability to measure signal quality in several, or all areas. (EX1006, [0009]). Thus, in this case, the POSITA would need to have the location information ***before*** measurement information is collected to have the flexibility to select a single location or multiple locations. A POSITA would have further understood that location information could be collected both ***before*** and ***after*** measurement information is collected for coverage assessment to accomplish the same result. (*See Uber Techs., Inc. v. X One, Inc.*, 957 F.3d 1334, 1339 (Fed. Cir. 2020) ("because the [two identified solutions] were both well known in the art, and were the only two identified, predictable solutions for [meeting the limitation], it would have been obvious to substitute [one solution for the other].").

154. In my opinion, regarding claim 10, a POSITA would have been motivated to forward location information to the coverage estimator to enable it to generate an accurate coverage map, which identifies specific locations with low signal coverage. EX1007, 7:19-42).

2. Reasonable Expectation of Success

155. In my opinion, a POSITA would have had a reasonable expectation of success in combining Lee with the teachings of Shrum.

156. A POSITA would have reasonably expected success when combining Lee and Shrum because both references disclose systems that perform well-defined, complementary functions using established technologies. Accordingly, combining the references would have involved nothing more than the application of known techniques in a predictable way. For example, a POSITA would have recognized that the data collected in Lee's information collector—e.g., signal strength, location, and quality information—is precisely the type of data that Shrum's server/processor uses to generate coverage maps. Combining the two would be a logical and predictable step, as the output of Lee's system (measurement data) can serve as input to Shrum's system to generate coverage map. A POSITA would have considered this hardware/software integration to routine and well within the knowledge and skill of a POSITA, as it merely requires transmitting measured data from Lee's information collector (i.e., illustrated in FIG. 1) to Shrum's coverage estimator (i.e., server/processor 128).

3. Claim 6

(a) [6pre]: An automatic coverage assessment method for generating a coverage assessment for a second wireless access network of a telecommunications infrastructure comprising a first wireless access network and the

second wireless access network, the first and second wireless access networks capable of providing services to a plurality of terminals, the method comprising:

157. In my opinion, Lee describes this limitation to the extent the preamble is limiting.

158. With respect to the limitation: "[a] *automatic coverage assessment method for generating a coverage assessment for a second wireless access network of a telecommunications infrastructure.*" Lee describes "a method for measuring signal quality information in a mobile broadcasting network [(110)]," (EX1006, [0003]), which a POSITA would have interpreted as ***an automatic coverage assessment method***. Lee's coverage assessment method is "***automatic***," as it involves automated triggers and processing without human operation. (EX1006, Abstract, [0024], [0058], [0059] ("mobile broadcasting terminal automatically collects low-signal strength area information, and provides it to the server, so that the mobile broadcasting provider can costly, rapidly and easily analyze the state of the mobile network on an area-by area basis").

159. Lee's method also involves ***generating a coverage assessment for a second wireless network*** (mobile broadcasting network (110)) ***of a telecommunication infrastructure***, as illustrated in Fig. 1:

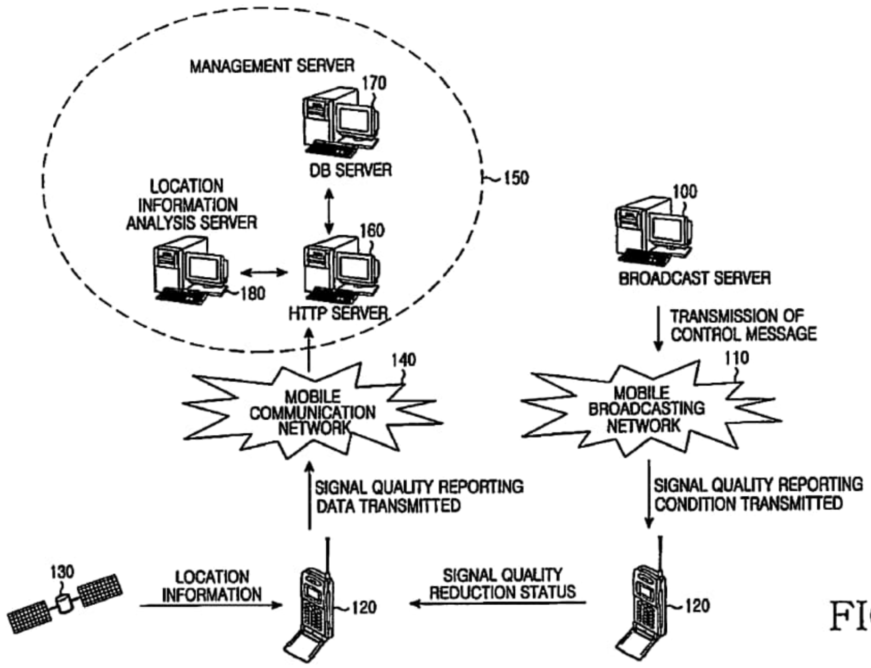


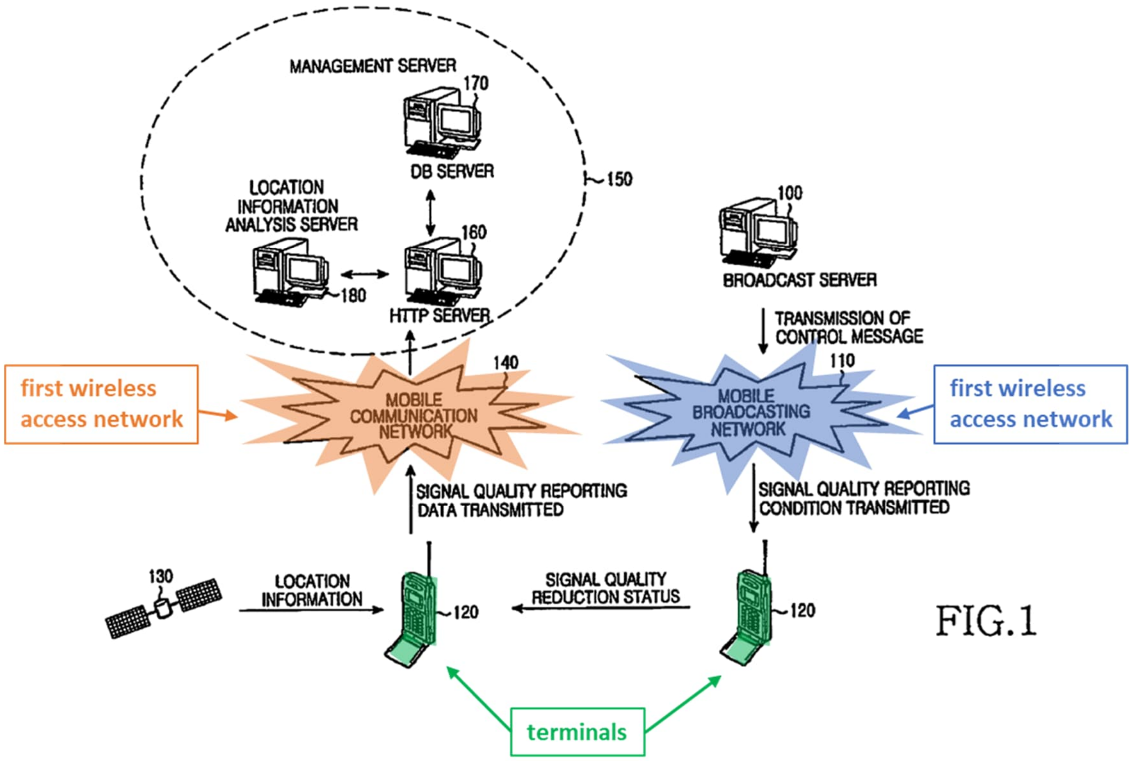
FIG.1

160. Figure 1 shows an infrastructure supporting digital multimedia broadcasting, digital video broadcasting, or media forward link only, which are each telecommunication means. According to Lee, "data for the areas where signal quality of each mobile terminal is less than or equal to a threshold is accumulated in [a] DB server 170." (EX1006, [0057]). "FIG. 7 [of Lee] shows a database for collected data, and data is accumulated in the database so that it is possible to comprehend temporal/regional distribution of mobile terminals." (EX1006, [0058]). "[S]ince it is possible to comprehend temporal/regional distribution of mobile terminals using the collected information, the mobile broadcasting provider can efficiently manage the mobile broadcasting service." (EX1006, [0059]).

AREA	Signal Quality (SNR)	reporting time	Terminal Name	IMEI
A	10db	2007-10-1 11:00	SGH-P930	000000000000000
B	20db	2007-10-2 09:00	SGH-P930	000000000001001
C	5db	2007-10-2 17:13	SGH-P940	000000000000203
D	3db	2007-10-4 22:00	SGH-P940	000000000200400
E	25db	2007-10-3 10:30	SGH-P930	000000000030040

(EX1006, FIG. 7). As described in more detail below, Lee's method of "manag[ing] the mobile broadcasting service" using the collected signal quality data comprises generating a ***coverage assessment***. (EX1006, [0059] ("By accumulating the automatically collected data, the management server 150 can easily determine how many terminals have a signal quality less than or equal to a threshold in certain areas.")).

161. With respect to the limitation: "*telecommunications infrastructure comprising a first wireless access network and the second wireless access network, the first and second wireless access networks capable of providing services to a plurality of terminals.*" Lee describes a ***telecommunications infrastructure comprising a first wireless access network*** (i.e., "mobile communication network 140") ***and a second wireless access network*** (i.e., "mobile broadcasting network 110"). (EX1006, [0027], [0030]). In my opinion, FIG. 1 of Lee is a diagram illustrating "a system configuration for collecting information on low-reception strength areas in a mobile broadcasting network." (EX1006, [0025]).



(EX1006, FIG. 1 (color annotations added)).

162. Further, a POSITA would have understood from Lee that ***the first wireless access network*** (140) ***and second wireless access network*** (110) ***are capable of providing services to a plurality of terminals*** (120). Regarding the first wireless access network, Lee describes that "[a] mobile terminal supporting mobile broadcasting, such as terrestrial DMB, satellite DMB, DVB-H, and Media FLO, receives signals from a mobile broadcasting server . . . in order to perform broadcasting reception and reproduction." (EX1006, [0006]).

163. Finally, Lee explains that "[a]lthough only one mobile terminal 120 is illustrated in FIG. 1 . . . , reporting data for signal quality is collected in one or more

terminals," which is a plurality of terminals. (EX1006, [0026]). In fact, Lee teaches that "it is preferable to collect reporting data from one or more mobile terminals." (*Id.*).

(b) [6a]: collecting, at an information collector, information from terminals by:

164. In my opinion, Lee describes this limitation

165. Lee describes ***collecting, at an information collector*** (i.e., "system for collecting signal quality information" (FIG. 1) (EX1006, [0026])) ***information from terminals*** (120). Lee explains that "[t]he management server 150 [of the system for collecting signal quality information (FIG. 1)] collects signal quality measurements of each area based on the reporting message transmitted from one or more mobile broadcasting terminals [(120)]." (EX1006, [0031]). According to Lee, '[b]y accumulating the automatically collected data, the management server 150 can easily determine how many terminals [(120)] have a signal quality less than or equal to a threshold in certain areas." (EX1006, [0058]).

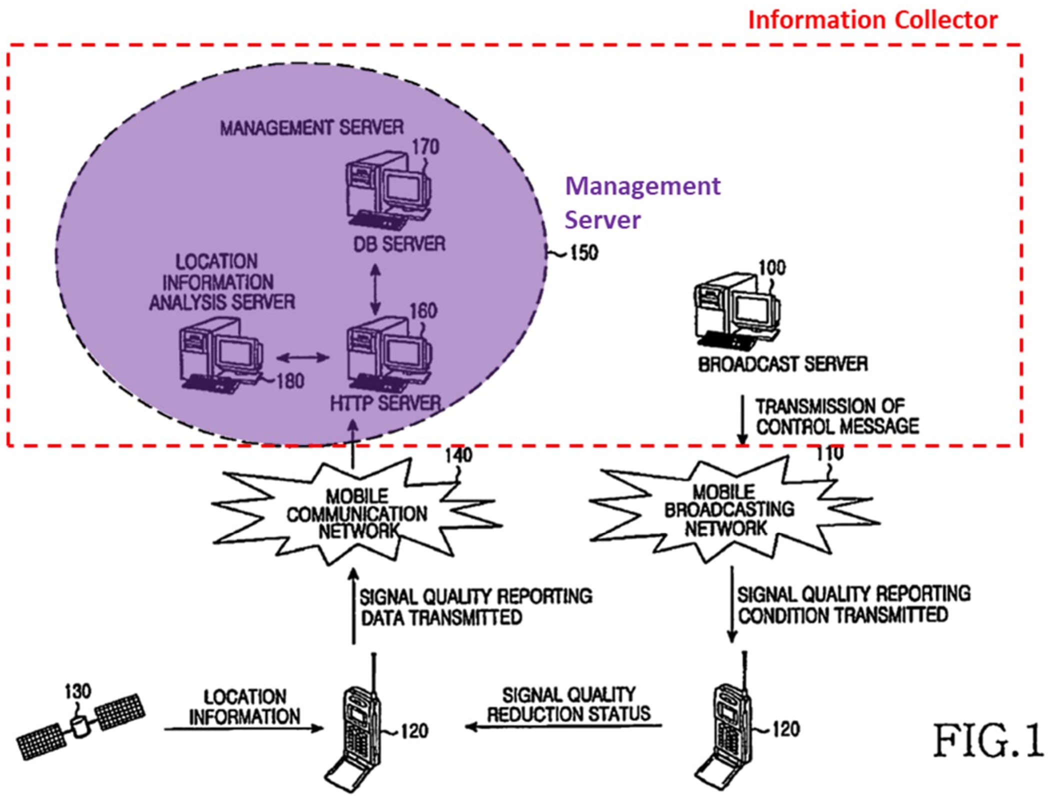


FIG.1

(EX1006, FIG. 1 (color annotations added)).

(c) [6b]: selecting one or more terminals from at least part of the plurality of the terminals, the at least part of the plurality of the terminals capable of communicating with both the first wireless access network and the second wireless access network,

166. In my opinion, Lee teaches this limitation

167. Lee teaches that the combination of broadcast server 100 and management server 150 (i.e., collectively "information collector")***selects*** information collector (FIG. 1) ***selecting one or more terminals*** (120) ***from at least part of the plurality of the terminals*** (120). As an initial matter, "***at least part*** of the plurality of terminals" necessarily encompasses ***all*** of the plurality of terminals.

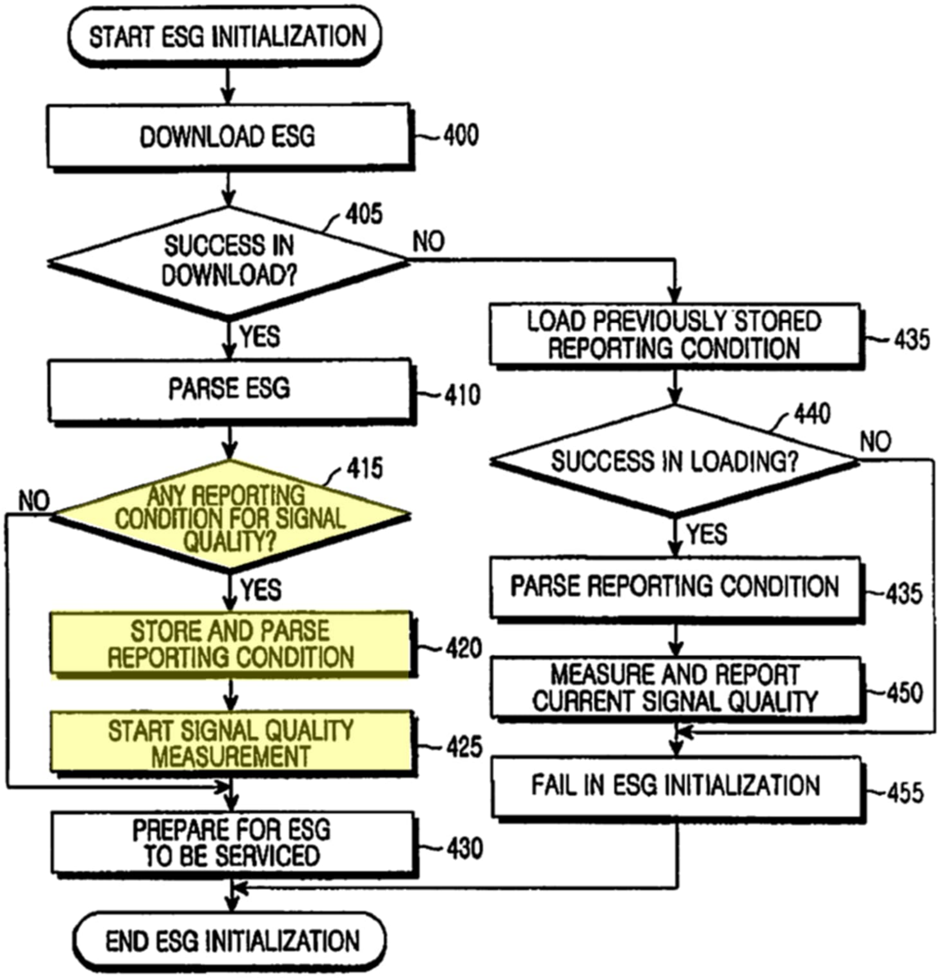
Further, Lee describes that "broadcast server 100 provides reporting conditions for signal quality to the mobile terminal 120 via a mobile broadcasting network 110." (EX1006, [0027]). Specifically, "broadcast server 100 generates a control message including a reporting condition for signal quality, and broadcasts it within the mobile broadcasting network 110." (EX1006, [0027]). ""The mobile terminal transmits a reporting message for signal quality to a server (management server) managing signal qualities, if it satisfies the reporting condition." (EX1006, [0024], [0028]). Thus, a POSITA would have understood that the broadcast server (100) of the ***information collector*** (FIG. 1) selects one or more of the plurality of terminals by broadcasting the control message for the terminals (120) to receive.

168. Further, as discussed above for limitation [6pre], the plurality of terminals in Lee are ***capable of communicating with both the first wireless access network*** (140) ***and the second wireless access network*** (110). (EX1006, FIG. 1 (showing terminal 120 connected to mobile communication network 140 and mobile broadcasting network 110), [0026] (confirming that only one mobile terminal is illustrated in FIG. 1, but noting that a plurality of terminals are used for data collection)).

(d) [6c]: instructing the selected one or more terminals to measure signals from the second wireless access network,

169. In my opinion, Lee describes this limitation

170. Lee describes ***instructing the selected one or more terminals*** (40) ***to measure signals from the second wireless access network*** (110). Specifically, Lee describes a "broadcast server (100) [that] generates a control message" (EX1006, [0012]), and "[t]he control message can include, for example, an Electronic Service Guide (ESG) message," (EX1006, [0027]). Lee explains that "[t]he terminal 120 measures signal quality only when a reporting condition is included in the ESG message." (EX1006, [0028]). Thus, a POSITA would have understood that broadcast server 100 of the information collector (FIG. 1) instructs a terminal 120 to measure signals only when the server 100 includes a reporting condition in the control message. FIG. 5 shows the instruction steps 415, 420, 425:



(EX1006, FIG. 4 (color annotations added).

(e) [6d]: obtaining measurement information indicative of the signals measured from the second wireless access network by the selected one or more terminals, and

171. In my opinion, Lee describes this limitation

172. Lee describes a broadcast server 100 and a management server 150 which are collectively an information collector (FIG. 1) ***obtaining measurement information indicative of the signals measured from the second wireless access network*** (110) ***by the selected one or more terminals*** (120). Specifically, Lee

teaches that "[t]he mobile terminal 120 measures signal quality at the current location referring to the reporting condition, and then transmits a reporting message composed of measurement results and area information corresponding to the current location." (EX1006, [0028]). Lee describes that the signals are measured ***from the second wireless access network*** because the terminals "measur[e] signal quality information in a mobile broadcasting network." (EX1006, [0024] ("Since information on low-signal quality areas is automatically collected from the mobile terminal in this way, it is possible to rapidly and easily detect the status of the mobile broadcasting network depending on the collected information."). "Subsequently, the mobile terminal 120 reports the generated signal quality reporting messages to the management server 150" portion of the information collector. (EX1006, [0030]). "The management server 150 collects signal quality measurement of each area based on the reporting message . . . ." (EX1006, [0031]).

(f) [6e]: providing the measurement information to a coverage estimator

173. In my opinion, as discussed above, Lee describes a combined broadcast server 100 and management server 150 (i.e., collectively, "information collector"), having "a database in which reporting data for signal quality is stored." (EX1006, [0022], [0058] ("Specifically, signal quality data is stored in DB server 170."). According to Lee, "data is accumulated in the database so that it is possible to

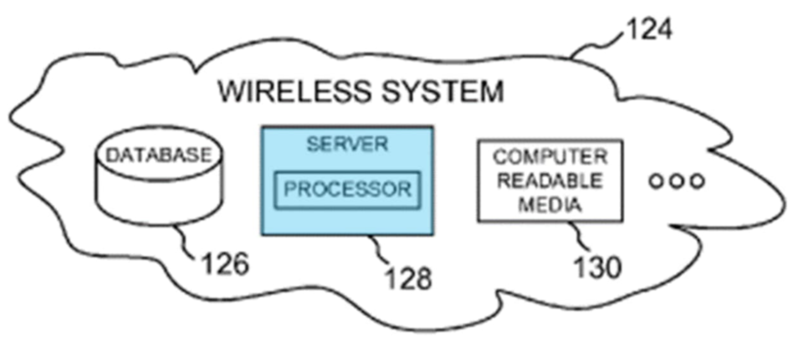
comprehend temporal/regional distribution of mobile terminals." (EX1006, [0058]). And "[b]y accumulating the automatically collected data, the management server 150 can easily determine how many terminals have a signal quality less than or equal to a threshold in certain areas." (EX1006, [0058]). A POSITA would understand the signal quality data received and stored in Lee's database to be ***measurement information***. Lee does not expressly disclose that the measurement information is provided to a ***coverage estimator***. However, this limitation is obvious in view of Shrum.

174. Like Lee, Shrum describes "acquiring data pertaining to wireless sessions and storing that data (typically, but not necessarily) as discrete records (one record per wireless session) into a database, such as database 126." (EX1007, 4:33-37). Shrum explains that "[i]n this way, a growing deposit of information, including records corresponding to any number of wireless systems users (i.e., clients) can be accumulated over time and analyzed for meaningful information." (EX1007, 4:37-40). For example, "poor signal strength or 'call dropping' in an area can indicate localities where additional wireless system 124 resources are needed" and such information can be used to advise users of wireless devices about areas prone to, or presently experiencing, wireless access trouble." (EX1007, 4:40-45).

175. To accomplish these ends, Shrum describes ***providing the measurement information*** (i.e., data, such as "overall signal strength, signal-to-

noise ratio (SNR) and failed versus successful wireless signal session status" (EX1007, 4:1-2)) to a server 128 (i.e., a ***coverage estimator***). Specifically, Shrum's wireless system (124) includes "a database 126, a server 128 and computer-readable storage media 130." (EX1007, 3:1-2). Shrum teaches that when a wireless device 102 "requests signal coverage mapping from their present location to a user-defined destination," the wireless system 124 accesses the database 126 . . . having information relevant to the user's request." (EX1007, 4-18). "[T]he wireless system 124 determines the recommended route for the user" and "provides a signal coverage map including the recommended route to the wireless device 102 of the user." (EX1007, 5:29-30, 43-45, 10:27-29 ("A system comprising a processor to generate a map").

FIG. 1



(EX1007, FIG. 1 (excerpted and color annotations added)). A POSITA would have understood that it is the server/processor 128 in Shrum's wireless system that estimates the coverage and generates the coverage map based on the measurement information stored in the database.

176. A POSITA would have been motivated to add coverage assessment and estimation, as taught by Shrum, to Lee's system, and to use Lee's measurement information for coverage estimation, and would have reasonably expected the combination to succeed, for the reasons provided in the Motivation to Combine and Reasonable Expectation of Success Sections. .

(g) [6f]: generating, at the coverage estimator, the coverage assessment for the second wireless access network by:

177. In my opinion, Lee renders this limitation obvious in view of Shrum. As discussed above for Limitation [6d], Lee teaches "collecting signal quality information in a mobile broadcasting network," (i.e., second wireless access network (110)). (EX1006, [0026]). Lee does not expressly disclose a coverage estimation that performs coverage assessment. However, Shrum teaches ***generating, at a coverage estimator*** (processor (128)), ***a coverage assessment*** (signal coverage map (400) or (500)) ***for a second wireless access network*** (100). (EX1007, 10:27-30 ("A system comprising: ***a processor to generate a map***, the map comprising content indicative of at least a geographic area . . . ."); 9:15-20 ("generate, based on data acquired during wireless sessions in a geographic area, a map in accordance with a request from a wireless device, the request corresponding to the geographic area, the map including content corresponding to a ***wireless service associated with the geographic area***, . . .").

178. A POSITA would have been motivated to apply coverage assessment and estimation, as taught by Shrum, to Lee's system, and would have reasonably expected the combination to succeed, for the reasons provided in Motivation to Combine and Reasonable Expectation of Success Sections.

(h) [6g]: obtaining the measurement information from the information collector, and

179. Lee renders this limitation obvious in view of Shrum. For example, as described above for Limitation [6d], Lee describes a broadcast server 100 and management server 150 (i.e., collectively, "information collector") having "a database in which reporting data for signal quality is stored." (EX1006, [0022], [0058] ("Specifically, signal quality data is stored in DB server 170.").

180. This limitation is obvious in view of Shrum. As discussed in Limitations [6e] and [6f] Shrum describes ***a coverage estimator*** (i.e., server/processor 128) that ***obtains measurement information*** (i.e., data, such as "overall signal strength" or "signal-to-noise ratio (SNR)") from a database (126). (EX1007, 4:1-2)). In the combined system, the coverage estimator as taught by Shrum would obtain the measurement information from the database provided by Lee's information collector.

181. A POSITA would have been motivated to add coverage assessment and estimation, as taught by Shrum, to Lee's system, and to use Lee's measurement

information for coverage estimation, and would have reasonably expected the combination to succeed, for the reasons provided in the Motivation to Combine and Reasonable Expectation of Success.

(i) [6h]: based on the obtained measurement information, generating the coverage assessment for the second wireless access network of the telecommunications infrastructure.

182. In my opinion, the Lee-Shrum combination teaches this limitation

183. Lee renders this limitation obvious in view of Shrum. As discussed above for Limitation [6g], Lee describes an information collector (FIG. 1) that ***obtains measurement information*** (i.e., signal quality) ***from a second wireless access network*** (i.e., broadcasting network (110)) ***of the telecommunications infrastructure***. (EX1006, [0028] ("The mobile terminal 120 measures signal quality at the current location"), [0026] ("collecting signal quality information in a mobile broadcasting network")). The "signal quality data is stored in DB server 170" in a "database for collected data" (FIG. 7). (EX1006, [0058]).

184. Shrum describes a ***coverage estimator*** (server/processor (128)) that ***generates a coverage assessment*** (i.e., map (400)/(500)) ***based on obtained measurement information*** (i.e., signal quality data). (EX1007, 9:15-18 ("one or more processors . . . generate, based on data acquired during wireless sessions in a geographic area, a map in accordance with a request from a wireless device.").

185. A POSITA would have been motivated to add coverage assessment and estimation, as taught by Shrum, to Lee's system, and to use Lee's measurement information for coverage estimation, and would have reasonably expected the combination to succeed, for the reasons provided in the Motivation to Combine.

4. Claim 7: "The automatic coverage assessment method of claim 6, further comprising the step of triggering the information collector to select the one or more terminals."

186. In my opinion, Lee describes this limitation

187. Lee describes a broadcast server 100 and management server 150 (i.e. collectively, an "information collector") that selects one or more terminals (120) by broadcasting a control message within the mobile broadcasting network (110). (EX1006, [0027] ("The broadcast server 100 generates a control message including a reporting condition for signal quality, and broadcasts it within the mobile broadcasting network 110."); [0026] ("Referring to FIG. 1, a system for collecting signal quality information [(i.e., ***information collector***)] in a mobile broadcasting network includes a broadcast server 100 . . . and a management server 150."); [0024] ("The mobile terminal transmits a reporting message for signal quality to a server (management server) managing signal qualities, ***if*** it satisfies the reporting condition") (emphasis added)). A POSITA would have understood that the broadcast server (100) necessarily must be triggered (or caused) to broadcast a control message, at least initially, with program instructions, a trigger event, or the like.

5. Claim 8*:* "The automatic coverage assessment method of claim 6, further comprising the step of obtaining location information for at least one of the at least part of the plurality of terminals prior to selecting the one or more terminals."

188. In my opinion Lee discloses this limitation. Lee describes ***obtaining location information for at least one of the at least part of the plurality of terminals*** (120) ***prior to selecting the one or more terminals*** (120). Lee describes that "[t]he current location can be acquired with various methods such as, for example, a Global Positioning System (GPS) satellite 130." (EX1006, [0030]; FIG. 1).

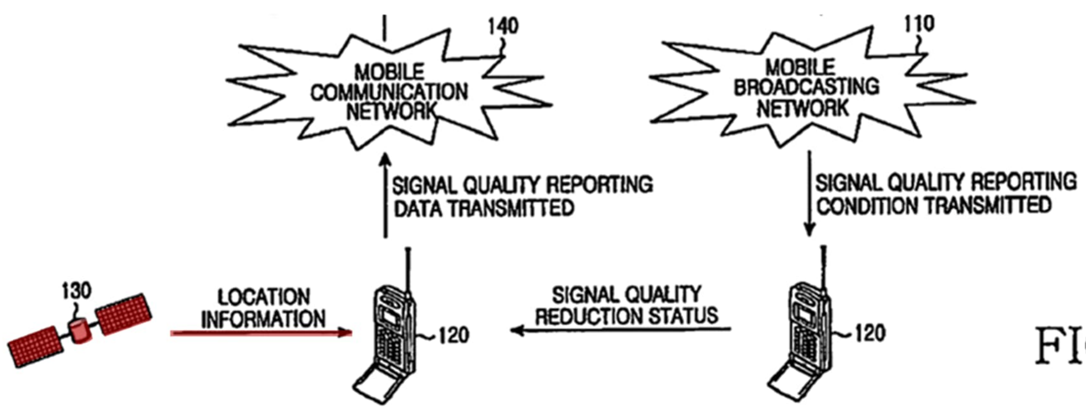
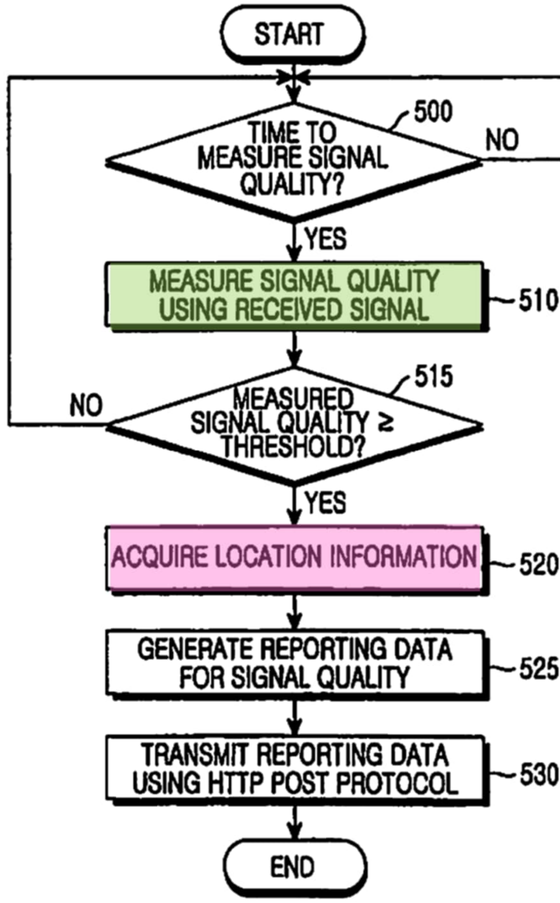


FIG.1

(EX1006, FIG. 1 (excerpted and color annotations added)). In Lee, "[i]f it is determined that the measured signal quality is less than or equal to the threshold, the mobile terminal 120 acquires its current location information in step 520." (EX1006, [0055]).



189. Lee does not expressly disclose that location information may also be obtained ***before*** selecting the terminals to measure signal quality. However, it would have been obvious to obtain location information before selection in view of Shrum.

190. Shrum describes a registration process that includes an initial "instantaneous geographic location" determination when a wireless device 102 establishes communication with the wireless system infrastructure (e.g., initiates a phone call). (EX1007, 3:55-4:4). As part of this process, an initial geographic location (i.e., ***location information***) for the terminal is obtained before any signal quality measurement are performed. (EX1007, 9:5-11) ("The

method . . . comprising: determining a present location of the wireless device; determining a signal metric corresponding to the wireless communication between the wireless system and the wireless device; and writing the present location and the signal metric to a database resource of the wireless system.”). For example, Shrum describes that the wireless system is “aware of the user’s origin and destination” even when it has not yet measured the terminals signal quality. (EX1007, 5:14-15).

191. In view of Lee and Shrum, a POSITA would have understood that location information could be collected both ***before*** and ***after*** measurement information is collected for coverage assessment. (*see Uber Techs., Inc. v. X One, Inc.*, 957 F.3d 1334, 1339 (Fed. Cir. 2020) (“because the [two identified solutions] were both well known in the art, and were the only two identified, predictable solutions for [meeting the limitation], it would have been obvious to substitute [one solution for the other].”).

192. Moreover, when attempting to assess the coverage in a particular geographic area, in my opinion a POSITA would have been motivated to obtain the location information of prospective terminals ***prior to selecting*** them to perform measurements. Indeed, a POSITA may want to verify that the mobile terminal is located in the relevant area before causing it to measure signal information and assessing the coverage and also have the ability to measure signal quality in several, or all areas. (EX1006, [0009]). Thus, in this case, the POSITA would need to have

the location information ***before*** measurement information is collected to have the flexibility to select a single location or multiple locations.

193. Moreover, a POSITA would have reasonably expected success when making this combination for the reasons discussed above.

6. Claim 9: "The automatic coverage assessment method of claim 8, further comprising the step of providing the location information valid upon obtaining the measurement information for at least one of the selected one or more terminals."

194. In my opinion, the combination of Lee and Shrum discloses this limitation. The Lee-Shrum combination describes a broadcast server 100 and management server 150 (i.e., collectively, "information collector") ***providing the location information valid upon obtaining the measurement information*** ("measured signal quality") ***for at least one of the selected one or more terminals*** (120). Specifically, Lee teaches that "the reporting message is generated using the measurement signal quality [(i.e., ***measurement information***)] and area information corresponding to the current location [(i.e., ***location information***)]" of the mobile terminal (120). (EX1006, [0013]). According to Lee, "the mobile terminal 120 transmits the reporting message to the management server 150." (EX1006, [0057]).

195. Specifically, "the reporting message is first delivered to the HTTP server 160 and then provided to the location information analysis server 180, so that HTTP server 160 is provided with correct [(i.e., ***valid***)] area information from the

location information analysis server 180." (EX1006, [0057] (emphasis added)). "Then the HTTP server 160 adds the reporting message and it's [sic] associated area information together, and stores it in the DB server 170." (*Id.*).

196. In my opinion, Lee's disclosure is consistent with the '089 patent, which provides that, "the information collector 7 may be configured to update the location information for each of the selected one or more terminals with the *location information valid when the measurement information was obtained* from them." (EX1001, 9:25-29 (emphasis added)).

7. Claim 10

(a) [10a]: The automatic coverage assessment method of claim 8, further comprising: "associating the location information with at least one of the selected one or more terminals, and

197. In my opinion, Lee discloses this limitation. Lee describes ***associating the location information with at least one of the selected one or more terminals*** (120). Specifically, Lee teaches that "the mobile terminal 120 acquires its current ***location information***." (EX1007, [0055]). "After acquiring its location information, the mobile terminal 120 generates a reporting message for signal quality." (EX1006, [0055]). According to Lee, "the current location information, a measurement time, and identification information for the mobile terminal can be included in the reporting message." (EX1006, [0056]). FIG.6 shows an exemplary

reporting message ***associating the location information with at least one of the selected one or more terminals***:

```
<complexType name="SNRReportingData">
    <Sequence>
        <element name="currTime" type="dateTime"/>
        <element name="TerminalName" type="mpeg7:TextualType" minOccurs="0"/>
        <element name="IMEI" type="mpeg7:TextualType" minOccurs="0"/>
        <element name="SNR" type="Integer"/>
        <element name="LocationInfo" type="anyType"/>
    </Sequence>
</complexType>
```

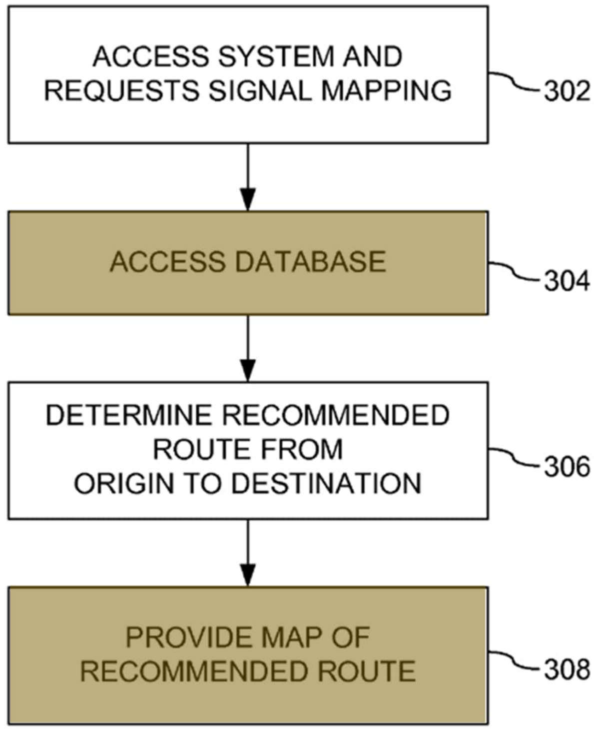
(EX1007, FIG. 6 (color annotations added)).

(b) [10b]: forwarding the location information associated with the at least one of the selected one or more terminals to the coverage estimator

198. The Lee-Shrum combination further describes ***forwarding the location information associated with the at least one of the selected one or more terminals to the coverage estimator***. As discussed above, supra § X.C.5(a), Lee describes ***location information associated with the at least one of the selected one or more terminals*** (120). (EX1006, [0056] (referring to the reporting message of FIG. 6, "'LocationInfo' indicates the current location information of the mobile terminal or area information at the current location."). Per Lee, "[w]hen ***location information*** is including in the reporting message, the HTTP server 160 delivers the location information included in the reporting message to the location information analysis server 180 in order to acquire area information such as detailed area names."

(EX1006, [0032]). Next, "the HTTP server 160 adds the reporting message and it's [sic] associated area information together, and stores it in the DB server 170," which contains "a database for collected data." (EX1006, [0057]-[0058]).

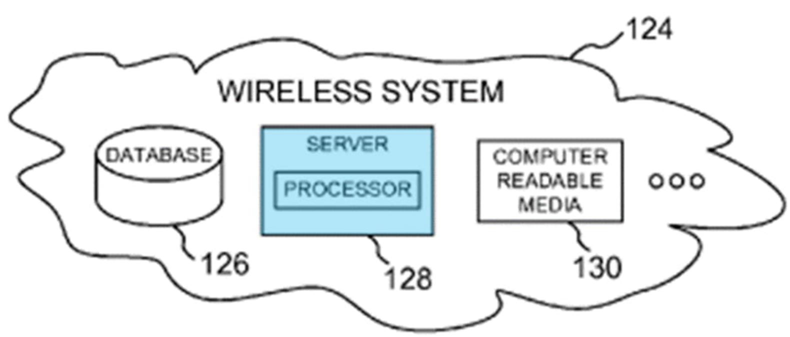
199. Shrum describes ***forwarding location information associated with the at least one of the selected one or more terminals*** (102) ***to a coverage estimator*** (i.e., server/processor (128))." Shrum teaches that "[t]he geographic location of the wireless device 102 can be determined in any suitable way including, as non-limiting examples, global position system (GPS) signals received by the wireless device 102. (EX1007, 3:55-60). Per Shrum, "the geographic location . . . [is] written to the database 126." (EX1007, 4:14-16). If a user "requests signal coverage mapping from their current location," Shrum's "wireless system 124 accesses the database 126 . . . having information relevant to the user's request" (e.g., geographic information, areas of known inadequate (i.e., poor) or non-existent wireless signal coverage, real-time information regarding wireless signal outages, restricted wireless usage zones, and other data (individually or collectively, ***location information***)). (EX1007, 5:16-25). FIG. 3 shows this process:



(EX1007, FIG. 3 (color annotations added)).

200. Wireless system (124) includes a server (128) having a processor. (EX1006, [FIG. 1], 1:51-61).

FIG. 1



(EX1007, FIG. 1 (excerpted and color annotations added)).

201. A POSITA would have understood that when server/processor 128 accesses database 126, ***the location information*** stored in database 126 is ***forwarded***

to the coverage estimator (i.e., server/processor 128). The processor of server 128 then "generate[s], based on data acquired during wireless session in a geographic area, a map in accordance with a request from a wireless device." (EX1007, 9:16-18).

202. A POSITA would have been motivated to combine the teachings of Lee and Shrum such that location information is forwarded from the information collector to the coverage estimator for the reasons provided in the Motivation to Combine and Reasonable Expectation of Success Sections.

8. Claim 12

(a) [12pre]: "A computer program comprising software code portions configured for, non-transitory computer-readable medium having instructions stored thereon that, when executed by a processor of a telecommunications infrastructure comprising a first wireless access network and the second wireless access network, the first and second wireless access networks capable of providing services to a plurality of terminals, causes the telecommunications infrastructure to carry out operations of an automatic coverage assessment method for generating a coverage assessment for the second wireless access network, the operations including: performing one or more steps of the method of claim 6:"

203. To the extent the preamble is limiting, in my opinion the Lee-Shrum combination describes the preamble.

- ***"A non-transitory computer-readable medium having instructions stored thereon when executed by a processor of a telecommunications infrastructure"***

204. The Lee describes a ***non-transitory computer-readable medium*** having instructions stored thereon. Specifically, Lee describes that "[a] broadcast server," *i.e,* provides a reporting condition for signal quality to a mobile phone using a control message . . . [i]n this way, information on the low-signal quality area is automatically collected from the mobile terminal." (EX1006, 1:51-52). A POSITA would have understood that the "broadcast server," which is ***part of the telecommunications infrastructure***, must contain ***a processor*** to carry out Lee's teachings. This processor would have executed software ***instruction found on a non-transitory computer-readable medium***.

205. With regard to the limitation, "[the non-transitory computer-readable medium] causes the telecommunications infrastructure to carry out operations of an automatic coverage assessment method for generating a coverage assessment for a second wireless access network." *See* above regarding limitation [6pre].

206. With regard to the limitation: "the telecommunications infrastructure comprising a first wireless access network and the second wireless access network, the first and second wireless access networks capable of providing services to a plurality of terminals, the operations including," in my opinion, the Lee-Shrum combination describes or renders obvious this limitation. *See* above regarding limitation [6pre].

(b) [12a]: collecting, at an information collector, information from terminals by:

207. In my opinion, the Lee-Shrum combination describes or renders obvious this limitation. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* above regarding limitation [6a].

(c) [12b]: selecting one or more terminals from at least part of the plurality of the terminals, the at least part of the plurality of the terminals capable of communicating with both the first wireless access network and the second wireless access network,

208. In my opinion, the Lee-Shrum combination describes or renders obvious this limitation. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* above regarding limitation [6b].

(d) [12c]: instructing the selected one or more terminals to measure signals from the second wireless access network,

209. In my opinion, the Lee-Shrum combination describes or renders obvious this limitation. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* above regarding limitation [6c].

(e) [12d]: obtaining measurement information indicative of the signals measured from the second wireless access network by the selected one or more terminals, and

210. In my opinion, the Lee-Shrum combination describes or renders obvious this limitation. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* above regarding limitation [6d].

(f) [12e]: providing the measurement information to a coverage estimator; and"

211. In my opinion, the Lee-Shrum combination describes or renders obvious this limitation. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* above regarding limitation [6e].

(g) [12f]: generating, at the coverage estimator, the coverage assessment for the second wireless access network by:

212. In my opinion, the Lee-Shrum combination describes or renders obvious this limitation. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* above regarding limitation [6f].

(h) [12g]: obtaining the measurement information from the information collector, and

213. In my opinion, the Lee-Shrum combination describes or renders obvious this limitation. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* above regarding limitation [6g].

(i) [12h]: based on the obtained measurement information, generating the coverage assessment for the second wireless access network of the telecommunications infrastructure."

214. In my opinion, the Lee-Shrum combination describes or renders obvious this limitation. To extent the language is not identical, I've relied on the same evidence and reached the same conclusion for this element as I did above. *See* above regarding limitation [6h].

VIII. SECONDARY CONSIDERATION

215. I am not aware of any secondary considerations, or so-called "objective indicia of non-obviousness" for the challenged claims.

216. Secondary considerations could include things like commercial success of a product due to the merits of the claimed invention; a long felt need for the solution provided by the claimed invention; unsuccessful attempts by others to find the solution provided by the claimed invention; copying of the claimed invention by others; unexpected and superior results from the claimed invention; acceptance by

others of the claimed invention as shown by praise from others in the field or from the licensing of the claimed invention; teaching away from the conventional wisdom in the art at the time of the invention; independent invention of the claimed invention by others before or at about the same time as the named inventor thought of it; and other evidence tending to show obviousness.

217. Patent Owner has not identified any such secondary considerations, and I am not independently aware of any. For example, Patent Owner has no commercial products embodying the ’089 patent that I am aware of. Additionally, as discussed throughout, the claimed features reflect predictable results of combining known elements according to their known functions, and thus, there are no unexpected and superior results from the claimed invention. Also, there are no licenses of the ’089 patent of which I am aware.

218. Further, even if Patent Owner were to assert that secondary considerations exist, given the strong reasons that the challenged claims are obvious in light, including the motivations to combine the references set forth above, I do not believe any such secondary considerations would rise to the level of overcoming the invalidity opinions I have expressed.

219. I understand that Patent Owner may address the issue of secondary considerations more fully in the future. I reserve the right to respond to any specific bases for such secondary considerations that Patent Owner may identify.

IX. CONCLUSION

220. For the reasons set forth above, I believe claims 6-10 and 12 of the ’089 patent are unpatentable in view of the prior art. In signing this declaration, I understand that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in this 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.

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

Dated: January 25, 2025 By: Kevin C Almeroth
Kevin C. Almeroth, Ph.D.