

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Samsung Electronics America, Inc.
Samsung Electronics Co., Ltd.
Petitioners

v.

Cobblestone Wireless LLC
Patent Owner

Case IPR2024-00318
Patent 8,554,196

**DECLARATION OF KEVIN C. ALMEROOTH, PH.D. IN SUPPORT OF
PETITION FOR INTER PARTES REVIEW OF
UNITED STATES PATENT NO. 8,554,196**

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I. INTRODUCTION

1. I have been retained by Samsung Electronics America, Inc. and Samsung Electronics Co., Ltd. (“Petitioners”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office (“PTO”) against Cobblestone Wireless, LLC (“Patent Owner”) regarding U.S. Patent No. 8,554,196 (“the ’196 Patent”) (Ex. 1001).¹ I have been asked to submit this Declaration on behalf of Petitioners.

2. I have been asked to consider whether certain references disclose or render obvious the features recited in claims 1-5, 7, 8, 10, 12, 14, 17, 18, 20, and 21 (collectively, the “Challenged Claims”) of the ’196 Patent. My opinions are set forth below. Based on my experience and expertise, it is my opinion that the prior art renders obvious all limitations of the Challenged Claims, as I discuss in detail below.

3. I am being compensated at a rate of \$850 per hour for my work in this proceeding. My compensation is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other interest in this proceeding.

¹ Where appropriate, I refer to exhibits that I understand are to be attached to the petition for *Inter Partes* Review of the ’196 Patent.

4. All of my opinions stated in this Declaration are based on my own personal knowledge and professional judgment. I am over 18 years of age and, if I am called upon to do so, I would be competent to testify as to the matters set forth in this Declaration.

II. BACKGROUND AND QUALIFICATIONS

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 took

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 through 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 fast-forward) for near video-on-demand systems in cable systems; in particular, how to aggregate requests for movies at a cable head-end and then how to satisfy a multitude of requests using one audio/video stream broadcast to multiple receivers simultaneously. This research has continually evolved and resulted in the development of techniques to

scalably deliver on-demand content, including audio, video, web documents, and other types of data, through the Internet and over other types of networks, including over cable systems, broadband telephone lines, and satellite links.

9. 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.

10. 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.

11. 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.

12. 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.

13. More recently, I have also studied issues concerning how users choose content, especially when considering the price of that content. My research has examined how dynamic content pricing can be used to control system load. By raising prices when systems start to become overloaded (i.e., when all available resources are fully utilized) and reducing prices when system capacity is readily available, users' capacity to pay as well as their willingness can be used as factors in stabilizing the response time of a system. This capability is particularly useful in systems where content is downloaded or streamed on-demand to users.

14. 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).

15. 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 networks spans the protocol stack from applications through to the encoding and exchange of data at the data link and physical layers.

16. 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” among mobile wireless devices (i.e., communication among devices moving into communication range with each other). 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.

17. Toward the middle of the protocol stack, my research has also looked to build wireless infrastructure support to enable communication among a set of mobile devices unaided by any other kind of network infrastructure. These kinds of networks are useful either in challenged network environments (e.g., when a natural disaster has

destroyed existing infrastructure) or when suitable support for network communication never existed. The deployment of such networks (or even the use of traditional network support) are critical to support services like disaster relief, catastrophic event coordination, and emergency services deployment.

18. Yet another theme is 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.

19. One theme in my wireless network research has been cross-layer solutions and innovations. As mentioned above, with greater wireless device use and network support, we envisioned new application paradigms and services, for example, when mobile devices come into contact with each other. Instead of relying on existing infrastructure to relay communication, the devices are able to discover each other and communicate directly. Other examples include discovering and using location information to enhance users' experiences. Network support and novel applications

span use a variety of network architectures supporting users on foot, in vehicles, and across varying terrains and environments. Finally, we studied how communication efficiency can be supported through intelligent handoffs as well as location and movement prediction.

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

21. 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.”

22. 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.

23. 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.

24. 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).

25. 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.

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

27. Through my graduate education, leadership with CITS, involvement in TMP, role in the development of the Internet2 infrastructure, and consulting with ISPs, I have gained a strong understanding in the role of the Internet in our society and the challenges of deploying large-scale production networking infrastructure. CITS, since its inception, has looked at the role of the Internet in society, including how the evolution of technology have created communication opportunities and challenges, including, for example through disruptive technologies like P2P. TMP looks to focus on non-purely technical issues, including, for example, state-of-the-art business methods, strategies for successful technology commercialization, new venture creation, and best practices for fostering innovation. Through my industry collaborations and Internet2 work, I have developed significant experience in the

challenges of deploying, monitoring, managing, and scaling communication infrastructure to support evolving Internet services like streaming media, conferencing, content exchange, social networking, and e-commerce.

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

29. Additional details about my employment history, fields of expertise, courses taught, and publications are further included in my CV attached as Ex. 1004.

30. Based on my professional experience, I believe I am qualified to testify as an expert on matters related to the patent at issue.

III. MATERIALS REVIEWED

31. The opinions contained in this Declaration are based on the documents I reviewed, my professional judgment, as well as my education, experience, and knowledge.

32. In forming my opinions expressed in this Declaration, I also reviewed the following materials and information:

Exhibit No.	Description
1001	U.S. Patent No. 8,554,196
1002	Prosecution History of the '196 Patent
1003	Stefania Sesia, et al., "LTE: The UMTS Long Term Evolution from Theory to Practice

Exhibit No.	Description
1005	U.S. Patent Pub. No. 2005/0261028 (“Chitrapu”)
1006	U.S. Patent No. 8,548,525 (“Wong”)
1007	U.S. Patent No. 8,285,291 (“Dinan”)
1008	Patent Owner’s Infringement Contentions in <i>Cobblestone Wireless, LLC v. Samsung Electronics America, Inc., et al.</i> , No. 2:23-cv-00285 (E.D. Tex.) filed June 16, 2023

33. I also reviewed other materials I refer to in this Declaration in support of my opinions.

34. My opinions contained in this Declaration are based on the documents I reviewed and my knowledge and professional judgment. My opinions have also been guided by my appreciation of how a person of ordinary skill in the art would have understood the state of the art, the prior art, and the claims and the specification of the ’196 Patent at the time of the alleged invention.

IV. LEGAL STANDARDS

35. Petitioners’ attorneys have explained to me the legal standards that apply in this case. My understanding of those standards is described below. I am not an attorney, and I do not have formal training in the law regarding patents. I have used my understanding of the following legal principles set forth in this section in reaching my opinions.

36. I understand that, in this proceeding, Petitioners have the burden of proving that the challenged claims are invalid by a preponderance of the evidence.

A. Obviousness

37. I have been informed that a claim is invalid as obvious under 35 U.S.C. § 103 (pre-AIA) if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time of the invention to a person of ordinary skill in the art. I have been informed that the following matters are relevant to determining whether the claimed invention would have been obvious: (1) the scope and content of the prior art, (2) the difference or differences between the patent claim and the prior art, (3) the level of ordinary skill in the art at the time the invention of the patent, and (4) any secondary considerations or objective indicia of non-obviousness.

38. I have been informed that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. When a claim simply arranges prior art elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, then such a combination is obvious. When a patent claims a structure already known in the prior art altered by the mere substitution of one element for another known in the field, the combination is likely to be obvious unless the combination yields an unpredictable result.

39. I have been informed that when a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill in the art can implement a predictable variation, such a variation is likely unpatentable. For the same reason, if a technique has been used to improve one device, and one of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. One question to consider is whether the improvement is more than predictably using prior art elements according to their established functions.

40. I have been informed that it may often be necessary, in a validity analysis, to consider whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. This can be accomplished by looking to interrelated teachings of multiple patents or other publications or pieces of prior art; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by one of ordinary skill in the art.

41. I have been informed that a validity analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim; it is appropriate to take account of the inferences and creative steps that a person of ordinary

skill in the art would employ. I have been informed that a person of ordinary skill in the art is a person of ordinary creativity, not an automaton.

42. I have been informed that a claim composed of several elements is not proved obvious merely by demonstrating that each element was, independently, known in the prior art. I have been informed that it can be important to identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does. I am told that one way that subject matter can be proved obvious is by noting there existed at the time of the invention a known problem for which there was an obvious solution encompassed by the patent's claims. I have been informed that any need or problem known in the field of endeavor at the time of the claimed invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

43. I have been informed that one should not assume that a person of ordinary skill in the art attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem. Instead, I have been informed that since familiar items may have obvious uses beyond their primary purposes, in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple prior art references together like pieces of a puzzle.

44. I have been informed that, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable

solutions, persons of ordinary skill in the art have good reason to pursue the known options within their technical grasp. If this leads to the anticipated success, the product was likely not accomplished by innovation but by using ordinary skill and common sense. I have been informed that, in such an instance, the fact that the combination was obvious to try may show that the combination was obvious.

45. I have been informed that, when determining whether a claimed combination would have been obvious, the correct analysis is not whether a person of ordinary skill in the art, writing on a blank slate, would have chosen the particular combination of elements described in the claim. Instead, I have been informed that the correct analysis considers whether one of ordinary skill, facing the wide range of needs created by developments in the field of endeavor, would have seen a benefit to selecting the combination claimed.

46. I have been informed that, when determining whether a claimed invention is obvious, any “secondary considerations” of non-obviousness identified by the patentee should also be considered. These secondary considerations can include:

- commercial success of the invention, causally related to the invention itself rather than to companion factors, such as advertising or attractive packaging;
- the invention taught away from the technical direction followed by those skilled in the art;

- a long-felt but unsatisfied need for the invention while the needed implementing arts and elements had long been available;
- the invention achieves results unexpected to those skilled in the art;
- copying of the invention by competitors as distinguished from their independent development
- unsuccessful attempts by those skilled in the art to make the invention;
- acquiescence by the industry to the patent's validity by honoring the patent through taking licenses or not infringing the patent, or both; and
- skepticism, disbelief in or incredulity by those skilled in the art that the patentee's approach worked.

47. I have been informed that, for the above information to impact the obviousness of a patent claim, there must be a nexus between the alleged secondary considerations and the claims. In addition, I have been informed that the burden of introducing evidence of secondary considerations generally is on the Patent Owner. If the Patent Owner or its expert should assert secondary considerations of non-

obviousness, I reserve the right to provide a Declaration addressing assertions of non-obviousness due to secondary considerations.

B. Claim Construction

48. I have been informed that claim terms are typically given their plain and ordinary meanings, as would have been understood by a person of ordinary skill in the art at the time of the earliest alleged priority date. I have further been informed that when considering the meaning of any terms in the Challenged Claims of the '196 Patent, I should apply the plain and ordinary meaning of those terms. I have further been informed that in considering the meaning of the claims, one must consider the language of the claims, the specification, and the prosecution history of record.

49. I have been informed that in general, a preamble limits the invention if it recites essential structure or steps, or if it is necessary to give life, meaning, and vitality to the claim. I have further been informed that a preamble is not limiting where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention. I have further been informed that dependence on a particular disputed preamble phrase for antecedent basis may limit claim scope because it indicates a reliance on both the preamble and claim body to define the claimed invention. I have further been informed that clear reliance on the preamble during prosecution to distinguish the claimed invention from the prior

art transforms the preamble into a claim limitation because such reliance indicates use of the preamble to define, in part, the claimed invention.

V. PERSON OF ORDINARY SKILL IN THE ART AND THE TIME OF THE ALLEGED INVENTION

50. I have been asked to assume that the '196 Patent is entitled to its earliest alleged priority date of August 24, 2011. See Ex. 1001. Beyond this assumption, I have not undertaken an analysis to determine the earliest priority date to which the '196 Patent is entitled.

51. Based on the materials and information I have reviewed and based on my experience in the technical areas relevant to the '196 Patent, a person of ordinary skill in the art at the time of the alleged invention of the '196 Patent would have had at least a bachelor's degree in electrical engineering, computer engineering, computer science, physics, or the equivalent, and at least two years of experience working in the field. Relevant working experience would include experience with cellular telecommunications and networking, radio-access network architectures, protocols, and signal propagation in wireless networks. More education can supplement practical experience and vice versa. Based on my knowledge and experience, including as discussed above in Section II, I was a person of ordinary skill in the art at the time of the alleged invention of the '196 Patent and can provide opinions regarding the knowledge of a person of ordinary skill in the art as of that time. My opinions herein are, where appropriate, based on my understandings as to a person of ordinary skill in

the art at that time. I myself had these capabilities at the time of the alleged invention of the '196 Patent.

VI. THE '196 PATENT

A. Description of the '196 Patent's Specification

52. U.S. Pat. No. 8,554,196 (the "'196 patent") is directed to "Technologies and implementations for providing network coverage by cycling through beam shape coverage configurations." Ex. 1001, Abstract. The claims are directed to cycling through two or more coverage configurations. For example, "a first coverage configuration may include a beam that may be relatively wide such that it may provide coverage for all the devices in an area or sector." Ex. 1001, 3:38-41. And a "second coverage configuration may include a beam that may be relatively narrow such that it may provide coverage by the first network type for one or more continuous use devices in the area." *Id.*, 3:42-45.

53. The '196 patent describes "continuous use devices" as "a device that may be actively involved in a substantially continuous service with the network," such as "a voice call, a download, a content streaming, or the like." *Id.*, 3:47-51. The '196 patent further describes "interval use devices" that "may have applications that require intermittent updating such as, for example, social networking applications, email, Really Simple Syndication (RSS) feeds, map updates, game update, sports score update, or the like." *Id.*, 4:10-13. Because of the intermittent use of such applications,

“during the second coverage configuration, the interval use devices may be on a less capable network.” *Id.*, 4:14-15.

B. The '196 Patent's Prosecution History

54. I have reviewed the prosecution history of the '196 Patent. The '196 Patent originated with the filing of U.S. Patent Application No. 13/321,792 (“the '792 App.”) on November 21, 2011. Ex. 1001, Cover. The '196 Patent claims ultimate priority to PCT Application No. PCT/US2011/049003, which was filed on August 24, 2011. *Id.* The Patentee also petitioned to join the Patent Prosecution Highway program based on the PCT application, which was granted on March 7, 2012. Ex. 1002, 244.

55. After joining the Patent Prosecution Highway program, the '196 Patent had a brief prosecution history consisting only of a single rejection. In that non-final rejection, the examiner rejected all claims under 35 U.S.C. § 103(a) as unpatentable over Vendryes (U.S. Patent No. 6,546,259) in view of Gale et al. (U.S. Patent App. Pub. No. 2011/0223925). Ex. 1002, 70. In response, the applicant amended the claims to specify that the continuous use device is “actively involved in a substantially continuous service with the network.” Ex. 1002, 42-60. The applicant also argued that Gale does not disclose continuous service with the network. *Id.* Following those amendments, the examiner allowed the claims. *Id.*, 33.

C. Interpretation of the '347 Challenged Claims

56. For the purposes of my analysis in this IPR proceeding, I understand that the words of a claim are given their plain meaning that those words would have had to a POSITA at the time of the alleged invention. I also understand that the structure of the claims, the specification, and the prosecution history may also be used to better construe a claim insofar as the plain meaning of the claims cannot be understood. Moreover, I understand that even treaties and dictionaries may be used, albeit under limited circumstances, to determine the meaning attributed by a POSITA to a claim term at the time of filing. Furthermore, I understand that a Patent Owner's own apparent interpretation of certain terms in related proceedings can be considered to determine the meaning of patent claims in an IPR proceeding.

57. I have followed this approach in my analysis, and I have applied the plain and ordinary meaning of those terms as the would have been interpreted by a POSITA at the time the invention was made (not today). For purposes of my analysis here, I have used the August 24, 2011 priority date of the '196 Patent as the date of the invention.

VII. SUMMARY OF THE PRIOR ART

A. Chitrapu (Ex. 1005)

58. Chitrapu discloses a base station that provides network coverage using three types of beams: (1) omni-directional beams for initial handshaking, (2) cover beams for intermittent usage such as broadcasting and paging, and (3) center beams for

high-throughput, high quality-of-service transmissions. Chitrapu discloses “a base station” that provides network coverage to “a plurality of WTRUs,” *i.e.*, “wireless transmit/receive units” that include “any ... type of device capable of operating in a wireless environment.” Ex. 1005, ¶18, 11; Fig. 3A. For example, in Figure 3A, omnidirectional beam 206 and cover beam 204 both provide network coverage to devices 216 and 218 (and additional devices not shown).

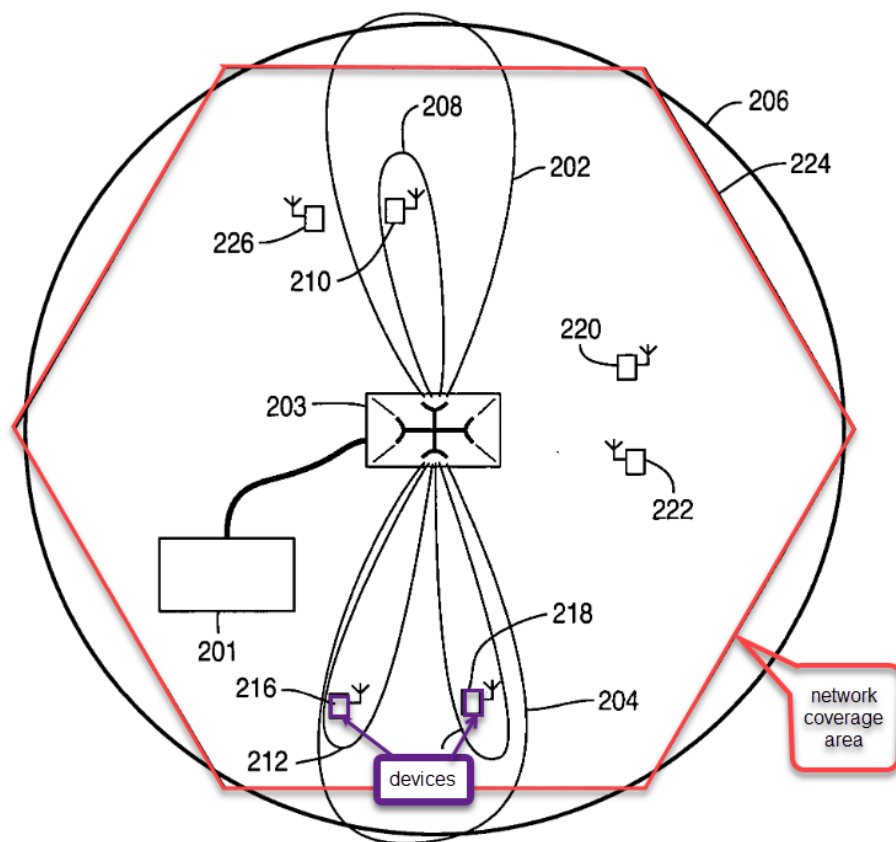


FIG. 3A

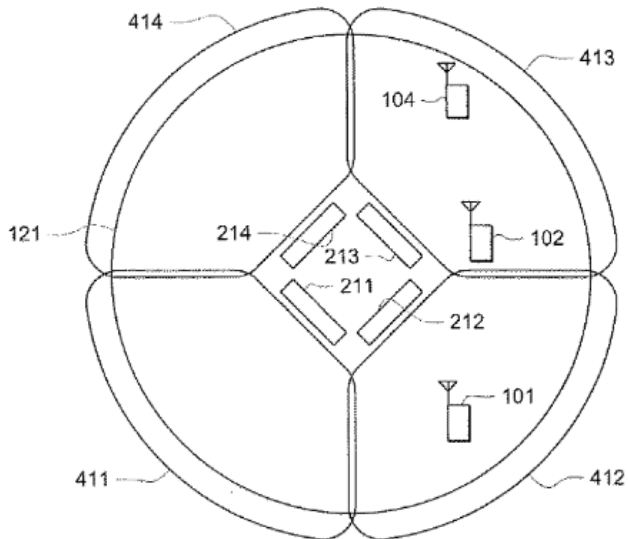
59. Chitrapu further discloses that when “new cover beams need to be deployed to bring additional WTRUs [*i.e.*, **devices**] within the coverage areas of a cover beam,” the system “may adjust [a pre-existing] cover beam ... and deploy an additional

center beam ... focused” on the device. *Id.*, ¶24. For example, in Figure 3A, device 226 is not currently being covered by a cover or center beam.

B. Wong (Ex. 1006)

60. Wong teaches a system where “various narrow and/or wide antenna patterns may be selected ... for directing to particular portions of [a] service area ... and the initial scheduling plan invoked by scheduler 242 may be adapted.” Ex. 1006, 8:51-54. In a “highly simplified representation,” Figure 4 of Wong depicts “4 substantially 90° antenna patterns [411-414]”, which together “provide illumination of service area 121.” *Id.*, 8:56-67.

FIG. 4

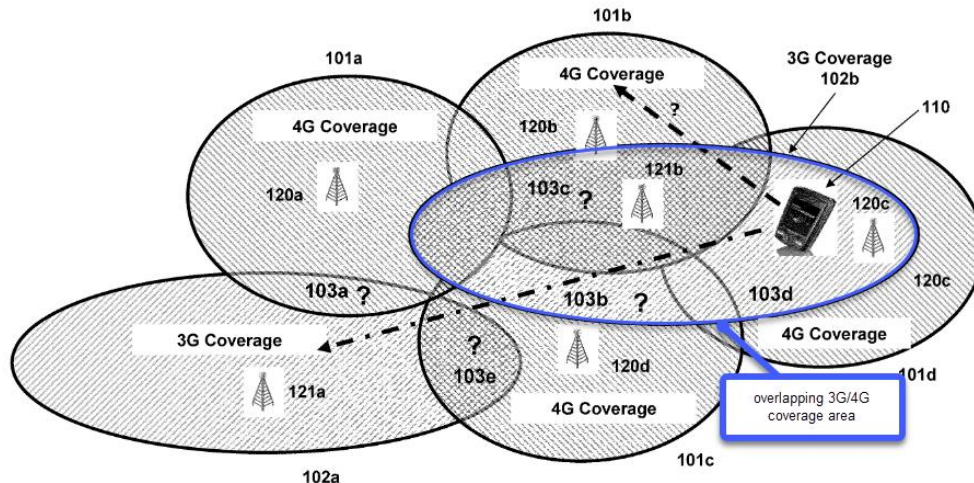


61. Wong teaches that the scheduler could cycle to another coverage configuration which uses narrow beams by selecting antenna patterns depicted in Figure 5, where “antenna pattern 413 has been replaced with antenna patterns 513 and

514,” both of which are narrower than the beam in antenna pattern 413. Ex. 1006, 12:58-59. In particular, “[a]ntenna pattern 514 provides a more narrow beam antenna pattern consistent with the higher utilization of the corresponding portion of service area 121.” *Id.*, 12:64-67.

C. Dinan (Ex. 1007)

62. Dinan teaches a “operating a dual-mode 3G/4G communications device capable of operating in either a 3G or 4G network when in an area with overlapping 3G and 4G coverage.” Ex. 1007, 7:19-22. Thus, as depicted in Figure 1, “dual-mode device 110 is in a coverage overlap area with acceptable 3G and 4G network access.” *Id.*, 12:45-46.



63. Dinan further describes an algorithm for determining whether a device is assigned 3G or 4G service. In particular, Dinan uses “QoS categories” to “assign relatively higher or lower priority to various application types.” Ex. 1007, 11:48-49. For example, “streaming of high definition (HD) video, video conferencing, and voice

(e.g., VoIP) may be assigned a highest QoS category, i.e., category ‘C1’, while applications of lesser relative importance or with less stringent data latency requirements may be assigned lower QoS categories ‘C2’ or ‘C3’.” *Id.*, 11:49-54. A higher QoS category will be given priority to 4G service, whereas a lower QoS category will often be assigned 3G service. *Id.*, 15:3-38.

VIII. GROUND 1: CHITRAPU RENDERS OBVIOUS CLAIMS 1-5, 7, 10, 12, 14, 17, 18, 20, AND 21

A. Independent Claim 1

1[pre]: A method for providing network coverage for a group of devices in an area comprising:

64. In my opinion, to the extent the preamble is limiting, Chitrapu discloses this limitation. Chitrapu discloses “a base station” that provides network coverage to “a plurality of WTRUs,” i.e., “wireless transmit/receive units” that include “any ... type of device capable of operating in a wireless environment.” Ex. 1005, ¶18, 11; Fig. 3A. Figure 3A depicts the base station 203 providing coverage for those devices in an area around the base station using, for example, omni-directional beam 206, cover beams 202, 204, and center beams 212, 214, and 208. *Id.* For example, in Figure 3A, omni-directional beam 206 and cover beam 204 both provide network coverage to devices 216 and 218 (and additional devices not shown).

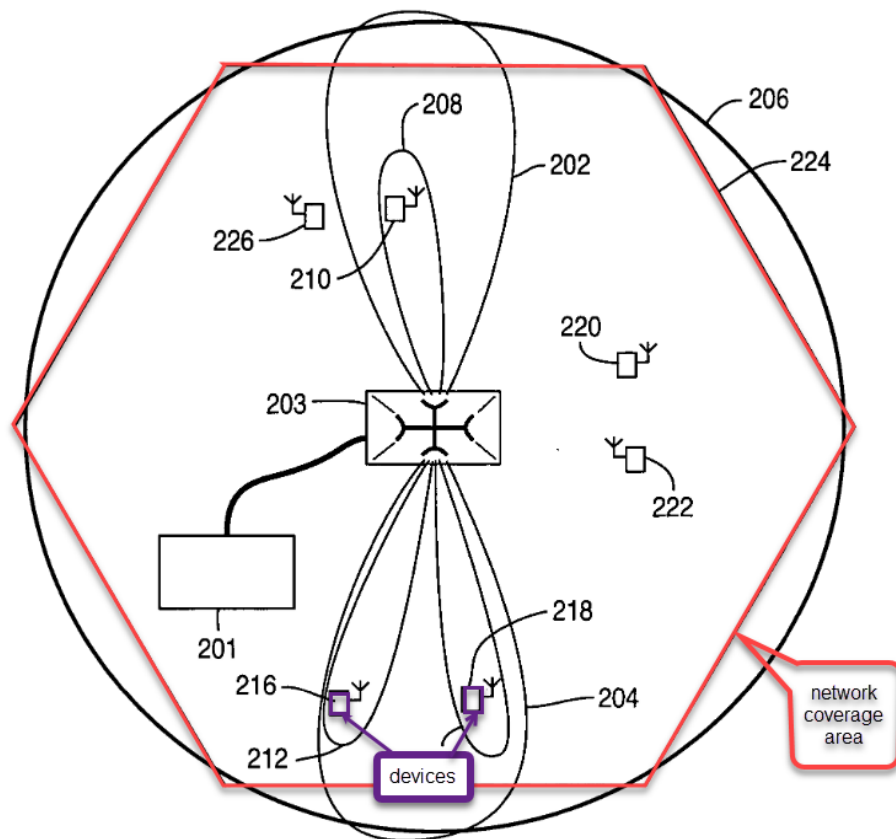


FIG. 3A

1[a]: cycling over time through a coverage sequence that includes providing a first coverage configuration and providing a second coverage configuration, wherein:

65. In my opinion, Chitrapu discloses this limitation. As I discuss below for limitations 1[b], 1[c], and 1[d], Chitrapu discloses a **first coverage configuration** that provides coverage with a cover beam. Chitrapu also discloses a **second coverage configuration** that provides coverage with a center beam (as well as an omnidirectional beam).

66. First, in my opinion, Chitrapu discloses **cycling over time** through these two coverage configurations. For example, Chitrapu discloses that when “new

cover beams need to be deployed to bring additional WTRUs [*i.e.*, **devices**] within the coverage areas of a cover beam,” the system “may adjust [a pre-existing] cover beam ... and deploy an additional center beam ... focused” on the device. Ex. 1005, ¶24. For example, in Figure 3A (above), device 226 is not currently being covered by a cover or center beam. The system may adjust cover beam 204 to cover device 226, thereby cycling through the **first coverage configuration**, as shown in Figure 3B annotated below.

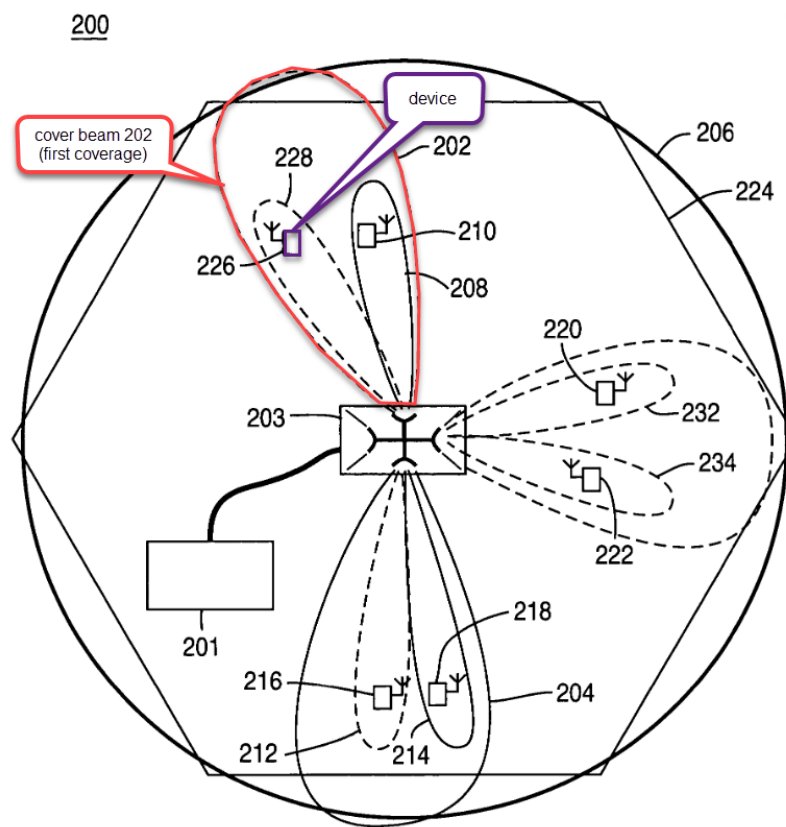


FIG. 3B

67. The system then deploys a new center beam focused on device 226, thereby cycling through the **second coverage configuration**, as shown below in

annotated Figure 3B. Thus, as devices enter the coverage area, the system will cycle through these coverage configurations over time by first adjusting (or creating new) cover beams to cover the device and then deploying a center beam on the device.

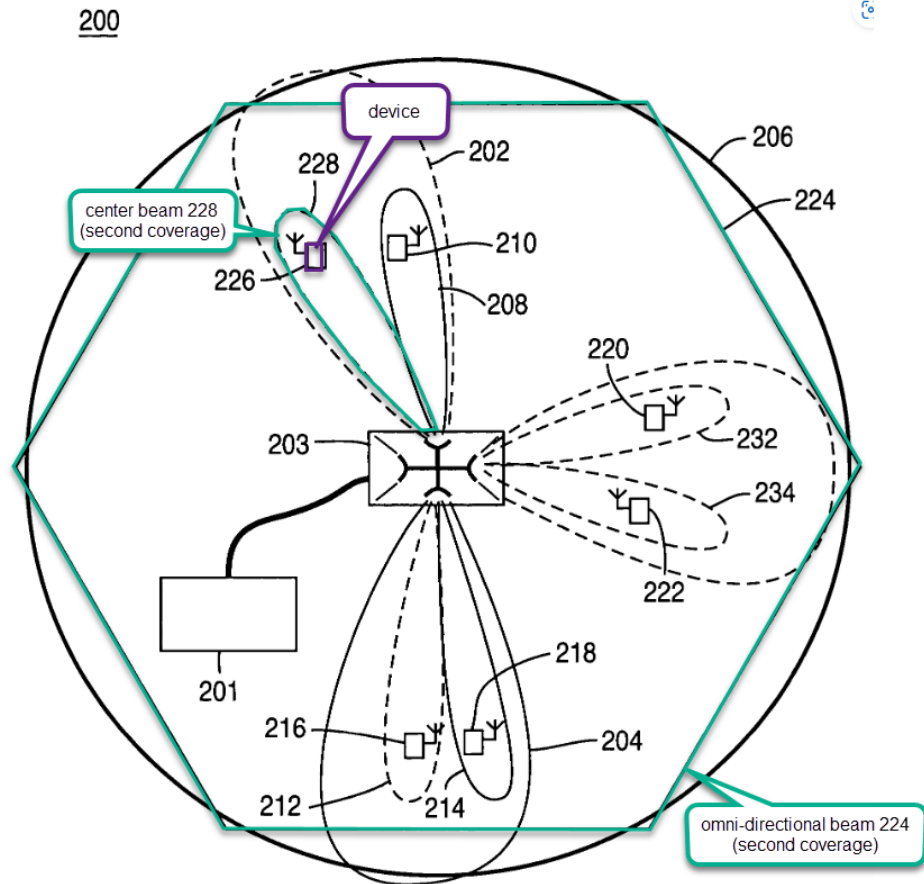


FIG. 3B

1[b]: providing the first coverage configuration includes transmitting a first beam of a first network that is configured to provide coverage for the group of devices; and

68. In my opinion, Chitrapu discloses this limitation. Chitrapu discloses a **first coverage configuration** that includes a “cover beam” (i.e., **a first beam of a first network**) which provides coverage for a group of devices. For example, in Figure 3B,

cover beam 202 provides coverages for the group of devices 226 and 210, as well as other devices. Ex. 1005, ¶18 (“It is noted that each WTRU [i.e., **device**] shown herein may represent a single WTRU or a group of WTRUs wherein the group may include any number of WTRUs.”).

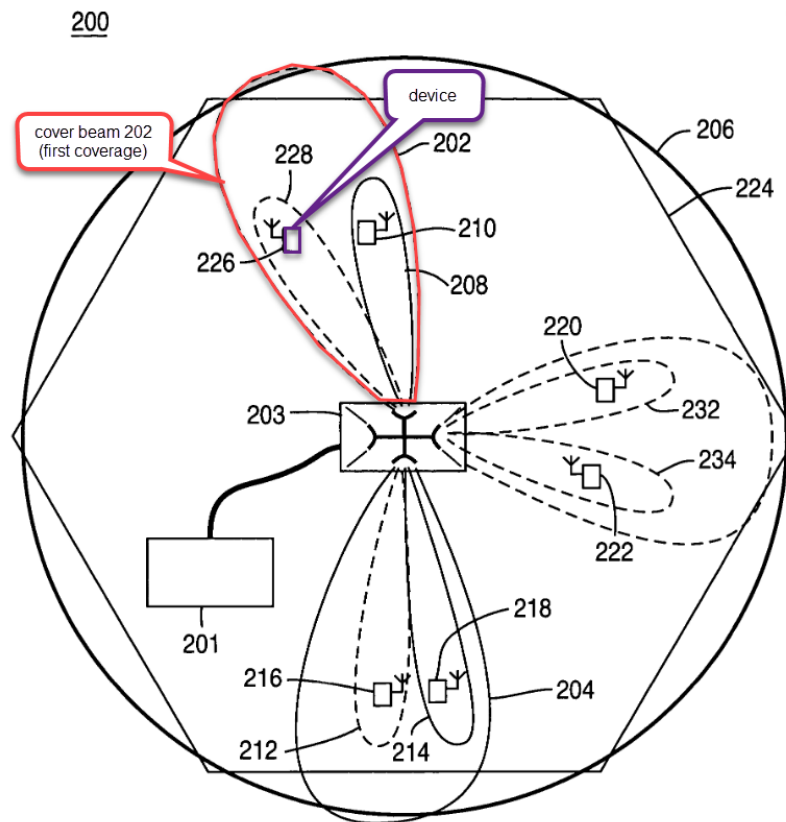


FIG. 3B

1[c]: providing the second coverage configuration includes transmitting a second beam of the first network that is narrower than the first beam and configured to provide coverage to at least one continuous use device of the group of devices, the at least one continuous use device being actively involved in a substantially continuous service with the network,

69. Chitrapu discloses or renders obvious this limitation. Chitrapu discloses a ***second coverage configuration*** that includes a “center beam” and an

“omni-directional beam,” as shown in the annotated Figure 3B below. As I discuss below, the “center beam” is the **second beam** and the omni-directional beam provides the **second network coverage** (which I discuss in limitation 1[d]).

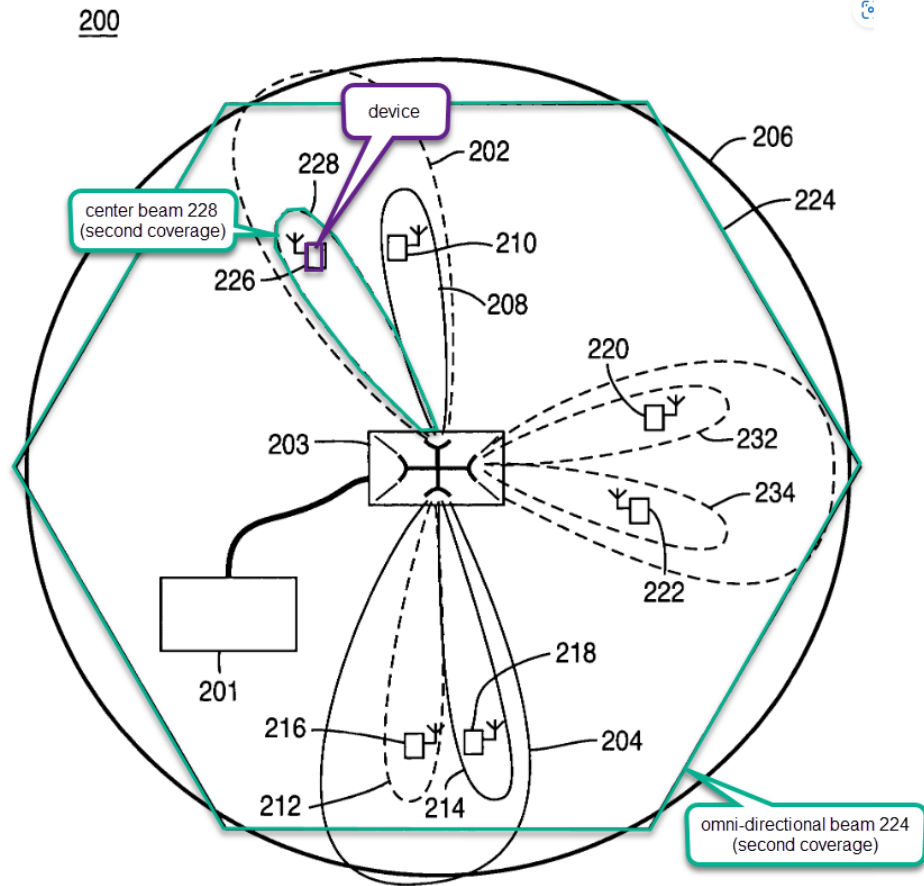


FIG. 3B

70. The center beam is a **second beam of the first network**. Chitrapu discloses and depicts that center beam 228 is **narrower** than cover beam 202 (i.e., **first beam of the first network**). Ex. 1005, ¶12 (“The cover beam 154 has a wider coverage area than the center beam 156.”). Center beam 228 and cover beam 202 are of the

same first network because they are part of the same nested beam. *Id.* (“The nested beam 152 includes a cover beam 154 and at least one center beam 156.”).

71. Chitrapu also discloses that its center beams are ***configured to provide coverage to a continuous use device***. For example, Chitrapu discloses that the center beam “is preferably used for transmission/reception of user data.” Ex. 1005, ¶15. A center beam, being a narrow beam, is “particularly efficient” when one “want[s] to maximize throughput.” *Id.*, ¶4. A center beam should “maintain data transmission/reception at an acceptable level of QOS.” *Id.*, ¶22. Together, Chitrapu discloses that the center beam provides high throughput transmission/reception of data that is at a level of quality of service. A POSITA would understand that transmission/reception of user data where maximum throughput is desired that meets an adequate level of QOS refers to ***substantially continuous service*** for the ***continuous use device***, such as the streaming of data (*e.g.*, video or audio) or downloading of data. This is because continuous services require high throughput and high QOS—for example, given the demands of video streaming, it requires high amounts of data (high throughput) without interruption (high QOS).

72. But to the extent Patent Owner argues that these disclosures in Chitrapu do not constitute disclosures of a continuous use device, in my opinion, it would have been obvious to a POSITA that the coverage provided by Chitrapu’s center beam is for a ***continuous use device actively involved in substantially continuous***

service. Chitrapu discloses that the center beam provides transmission/reception of data that has “maximize[d]” throughput and “an acceptable level of QOS.” Ex. 1005, ¶¶4, 22. A POSITA would have been motivated to use Chitrapu’s center beam to provide substantially continuous service such as streaming or downloading of data because the provision of high throughput, high QOS transmission of data is readily suited for substantially continuous services like streaming and downloading data. A POSITA would be motivated because users would find it desirable that use Chitrapu’s center beam for such services, as that would provide the highest service level (as opposed to using a less capable coverage for providing such services).

1[d]: and providing coverage by a second network to a plurality of interval use devices of the group of devices.

73. In my opinion, Chitrapu discloses this limitation. As shown in the annotated Figure 3B below, the ***second coverage configuration*** also includes an omni-directional beam 224 which provides coverage to interval use devices, such as the plurality of devices 210. See Ex. 1005, ¶18 (“It is noted that each WTRU [*i.e.*, ***device***] shown herein may represent a single WTRU or a group of WTRUs wherein the group may include any number of WTRUs.”). The omni-directional beam coverage can be provided, for example, when devices no longer need center beam coverage. *Id.*, ¶20; Figure 3A (depicting several devices with omni-directional beam coverage but without center beam coverage). This is especially the case because when a device needs center beam coverage, the omni-directional beam can locate the device so that the system can

direct a center beam towards the device. *Id.* Although device 210 below is shown as being covered by a center beam, since center beams are only provided “as needed,” a POSITA would understand that some devices may no longer need a center beam and would thus only have coverage by the cover beam or the omni-directional beam.

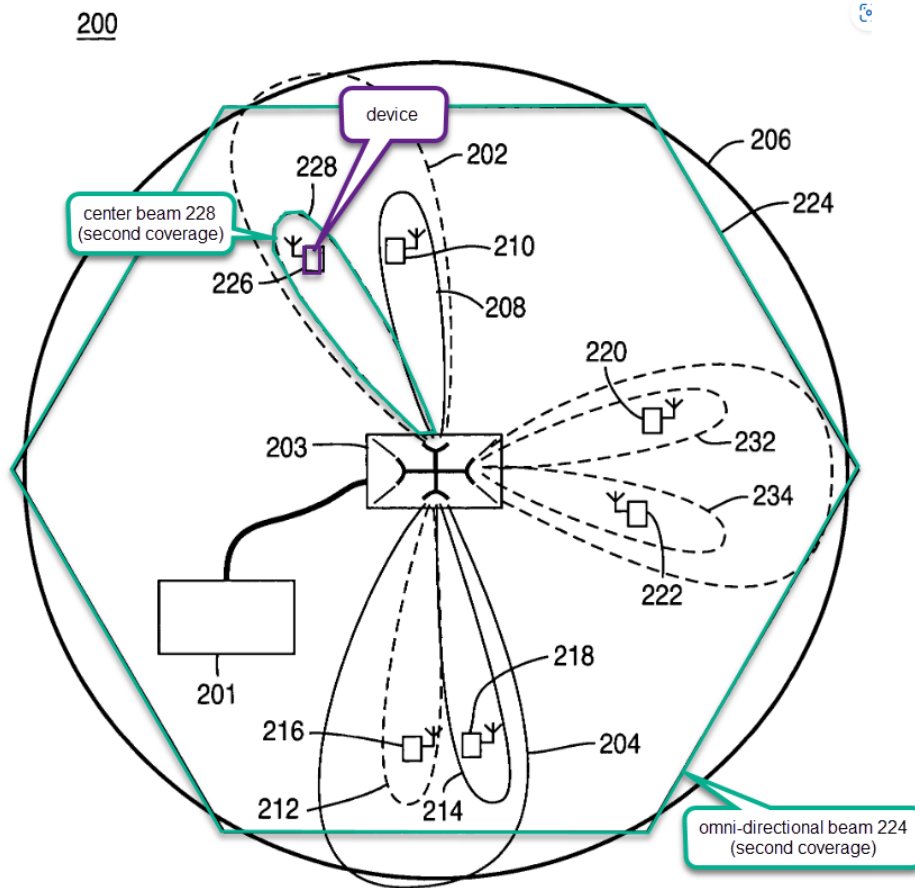


FIG. 3B

74. Chitrapu describes that the omni-directional beam “is preferably used for initial handshaking procedures when WTRUs ... begin operating within the coverage area,” and may also “be used for paging, [or] broadcasting,” thereby providing coverage to the claimed *interval use devices*. As the ’196 patent explains,

an interval use device “may have applications that require intermittent updates.” Ex. 1001, 4:63-66. A POSITA would understand that **initial** handshaking procedures only require intermittent use of data because they only occur initially when the device “begin[s] operating within the coverage area.” *Id.* A POSITA would further understand that broadcasting and paging are also intermittent. Patent Owner’s infringement contentions also assert that “5G devices transition from transmitting data active mode to inactive or idle modes,” where the idle mode supports “UE paging.” Ex. 1008, 22-23. Thus, Chitrapu’s disclosures are consistent with Patent Owner’s theories.

75. Chitrapu’s **omni-directional beam** is on a different, **second network** than the cover and center beams of the first network because it is not part of the nested beam that comprises the cover and center beams. Moreover, whereas the cover and center beams may adjust its position to provide coverage to devices, the omni-directional beam always provides coverage within the coverage area 224, thereby generally constituting coverage of a different set of network devices than the cover and center beams. Ex. 1004, ¶25 (“[C]over beams ... cover only a portion of the coverage 224 ...”). Moreover, the ’196 patent often describes the networks in terms of capability, such as one network being “less capable” than another network—as discussed above, Chitrapu discloses that the omni-directional beam provides less capable network coverage (*e.g.*, initial handshaking) compared to the cover and center beams.

B. Dependent Claim 2: “The method of claim 1, wherein the providing the second coverage configuration comprises determining a direction of transmission for the second beam based at least in part on a location of the at least one continuous use device.”

76. In my opinion, Chitrapu discloses this limitation. Chitrapu discloses that, when providing the center beam of the *second coverage configuration*, the system will “perform[] an analysis to determine the *direction of arrival* of at least one signal received from [the] WTRU” and “[a]ccording to the determined direction of arrival, the center beam ... is steered to the *location of the WTRU*.” Ex. 1005, ¶20. In other words, when a device “changes position, ... the center beam ... may be adjusted to remain focused on the” device. *Id.* A POSITA would understand that adjusting/steering the center beam to focus on the device’s location means adjusting/steering the beam in the direction of the device.

C. Dependent Claim 3: “The method of claim 1, wherein the second beam of the first network is further configured to provide coverage to a second continuous use device of the group of devices.”

77. In my opinion, Chitrapu discloses this limitation. As discussed above, Chitrapu discloses and depicts that a center beam provides coverage to a WTRU. Chitrapu further discloses that a WTRU “may represent a single WTRU or a group of WTRUs wherein the group may include any number of WTRUs.” Ex. 1005, ¶15. Thus, the center beam provides coverage to “a group of WTRUs.” *Id.*

D. Dependent Claim 4: “The method of claim 1, wherein a subsequent iteration of providing the second coverage configuration includes transmitting the second beam of the first network configured to provide coverage to a second continuous use device, and wherein the at least one continuous use device has transitioned to being an interval use device.”

78. In my opinion, Chitrapu discloses this limitation. Chitrapu discloses that a pre-existing center beam “is steered to the location of the WTRU ..., ***as needed***, for transmission/reception of data.” Ex. 1005, ¶20. A POSITA would understand from this disclosure that when a device needs high throughput transmission of data, a center beam can be steered to that device—and similarly, when a device does not need high throughput transmission of data, a center beam can be steered away from that device and to another. Thus, Chitrapu discloses that in a first iteration, a center beam is focused on a first device, and in a subsequent iteration, when another device needs transmission of data (*i.e. a second continuous use device*) but the first device does not, the center beam (*i.e. second beam of the first network*) can be steered away from the first device to provide coverage to the second device. Since the first device still has coverage from the omni-directional beam (or a cover beam) that provides handshaking, broadcasting and paging support, it has ***transitioned to being an interval use device***. *Id.*

79. Alternatively, Patent Owner has asserted in its infringement contentions that this claim is met “by the second beam ... provid[ing] coverage to a second device” and a device on a second network (*i.e., 5G network*) “transition[ing] ...

to inactive or idle modes.” Ex. 1008, 22. Chitrapu discloses that the center beam can provide coverage to “a group of WTRUs,” where one of them would be the ***second continuous use device***. Ex. 1005, ¶18. Chitrapu further discloses that “WTRUs are constantly moving” and that a center beam provides coverage “as needed,” which a POSITA would understand to mean that a WTRU can transition to an idle mode where only broadcasting or paging services from the omni-directional beam or cover beam are needed, *i.e. transitioned to being an interval use device*. *Id.*, ¶20.

E. Dependent Claim 5: “The method of claim 1, wherein the first network and the second network are different network types.”

80. In my opinion, Chitrapu discloses or renders obvious this limitation. Chitrapu discloses that “the present invention may be implemented in ***any*** type of wireless communication system,” including “UMTS-TDD, UMTS-FDD, CDMA2000, TDSCDMA, GSM, WLAN, WPAN, WMAN or any other type of wireless communication system.” Ex. 1005, ¶27. A POSITA would understand that it was common for a network to support several types of these listed communication networks. For example, it was well-known that UMTS is the third-generation network based on GSM (and Chitrapu discloses support for both) and uses the same network protocols as GSM, thereby allowing base stations and devices to support both network modes. Thus, a POSITA would understand that Chitrapu’s disclosure of implementation using “any type of wireless communication system” would include

well-known systems that supported both second generation GSM and, for example, third generation UMTS-FDD. *Id.*

F. Dependent Claim 7: “The method of claim 1, wherein the first network and the second network are the same network types, and wherein the at least one continuous use device is allowed access to the second beam based on an admission control parameter.”

81. In my opinion, Chitrapu discloses this limitation. Chitrapu discloses that “the present invention may be implemented in *any* type of wireless communication system,” including “UMTS-TDD, UMTS-FDD, CDMA2000, TDSCDMA, GSM, WLAN, WPAN, WMAN or any other type of wireless communication system.” Ex. 1005, ¶27. A POSITA would understand this teaching would include systems using a single type of network. Moreover, Chitrapu discloses that the omni-directional beam (*i.e., coverage by a second network*) provides “initial handshaking procedures” for the cover beam and center beam (*i.e., coverage by a first network*), indicating that they are of the same network type. Ex. 1005, ¶19.

82. Chitrapu further discloses that access to the center beam (*i.e., second beam*) is based on *admission control parameters*, such as “target signal-to-interference ratios” and “an acceptable level of QOS.” Ex. 1005, ¶21. Chitrapu discloses that, “when WTRUs change location,” “physical measurements” are determined, including “signal to noise ratio” and “channel quality factor.” *Id.* These measurements are used to “obtain advance information about wireless conditions” prior to deploying the center beam. *Id.*, ¶22. A POSITA would understand from these disclosures that if target SNR

or QOS is not obtainable given the conditions, then a center beam will not be deployed, thereby controlling access to the center beam, because the target SNR or target level of QOS cannot be met.

G. Dependent Claim 10: “The method of claim 1, wherein the at least one continuous use device is engaged in at least one of a voice call, a download, or a content streaming.”

83. In my opinion, Chitrapu discloses this limitation. Chitrapu discloses that the “center beam,” *i.e.*, ***beam that provides coverage to a continuous use device***, “is preferably used for transmission/reception of user data,” including data that requires “maximize[d] throughput.” Ex. 1005, ¶¶15, 4. A POSITA would understand that a ***download*** is the transmission of user data from the base station to the device, usually at a high throughput, as typically the downloading of data requires high throughput.

H. Dependent Claim 12: “The method of claim 1, wherein the second beam is narrower than the first beam in at least one of a horizontal plane or a vertical plane.”

84. Chitrapu discloses this limitation. Chitrapu discloses that the “cover beam [*i.e.*, ***first beam***] has a wider coverage area than the center beam [*i.e.*, ***second beam***],” and that both the cover and center beam “may be adjusted in the azimuth and/or elevation directions,” *i.e.*, ***horizontal or vertical plane***, respectively. Ex. 1005, ¶12. A POSITA would understand that the center beam is therefore narrower in both the horizontal and vertical plane.

85. Moreover, Chitrapu's various figures depict that the center beam 156 is narrower than the cover beam 154 in both the horizontal and vertical plane, including Figure 2.

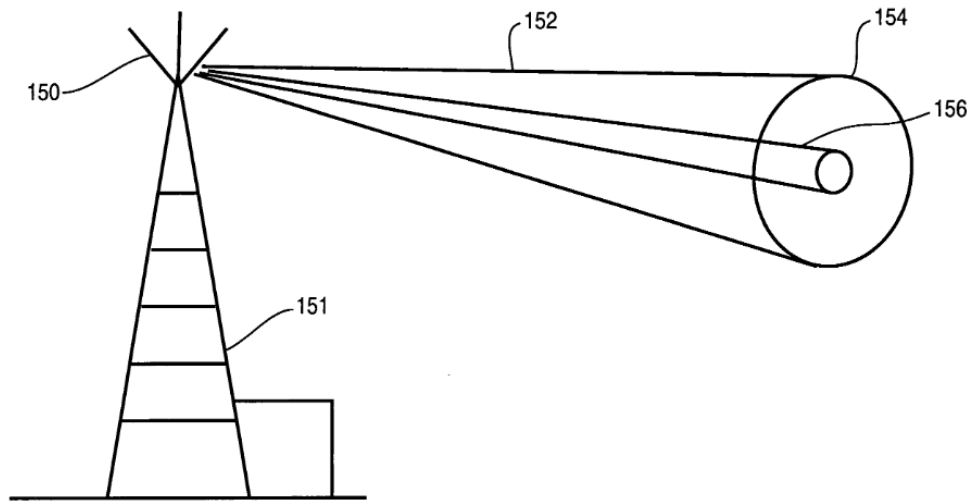


FIG. 2

86. Figures 3A and 3B depict that the center beams are narrower than the cover beams in at least the horizontal plane.

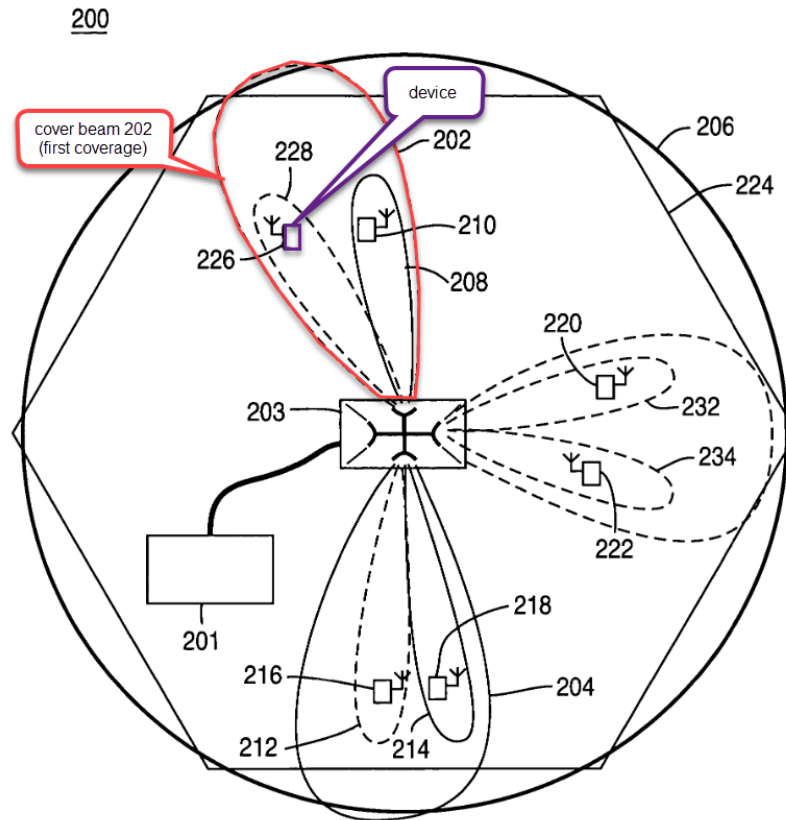


FIG. 3B

I. Independent Claim 14

14[pre]: A method for providing network coverage for a group of devices in an area comprising:

87. In my opinion, Chitrapu discloses and/or renders obvious this limitation.

88. I incorporate the discussion provided above with respect to claim element **1[pre]** of Claim 1.

14[a]: cycling over time through a coverage sequence that includes providing a first coverage configuration, providing a second coverage configuration, and providing a third coverage configuration, wherein:

89. In my opinion, Chitrapu discloses and/or renders obvious this limitation.

90. I incorporate the discussion provided above with respect to claim element **1[a]** of Claim 1.

91. As I discuss below, Chitrapu discloses a **first coverage configuration** that includes a cover beam providing coverage to multiple devices when they enter the coverage area, a **second coverage configuration** that includes a center beam providing coverage to a device, and a **third coverage configuration** that includes a different center beam providing coverage to a device. All three coverage configurations also include an omni-directional beam that provides second network coverage to the devices.

92. Chitrapu discloses **cycling over time** through these three coverage configurations. As I discussed above in claim element **1[a]**, Chitrapu discloses cycling from a cover beam coverage (which locates the device) to a center beam coverage (which provides high throughput transmissions) for a first device, such as device 218 in Figure 3B. This would include cycling from the **first coverage configuration** to the **second coverage configuration**.

93. Chitrapu further discloses that a device within the coverage of a cover beam will receive coverage of a center beam “as needed.” Ex. 1005, ¶20. Thus, when a second device that is covered by a cover beam needs transmission/reception of high throughput data, the system will steer or create a new center beam for that device, thus cycling to the ***third coverage configuration***.

94. Thus, a POSITA would understand that as multiple devices enter the coverage area and need center beam coverage, the system will ***cycle*** through these three coverage configurations. For example, if two nearby devices enter the coverage area at the same time, Chitrapu discloses that it will provide a cover beam for both devices (first coverage configuration), then deploy a center beam for one device (second coverage configuration), and another center beam for the other device (third coverage configuration). Chitrapu’s system will cycle through these three coverages over time as devices enter the coverage area.

14[b]: providing the first coverage configuration includes transmitting a first beam of a first network that is configured to provide coverage for a first set of the group of devices, and providing coverage by a second network to at least a second set of the group of devices;

95. In my opinion, Chitrapu discloses this limitation.

96. Chitrapu discloses a ***first coverage configuration*** that includes a “cover beam” (i.e., ***a first beam of a first network***) which provides coverage to ***a first set of the group of devices***. For example, in Figure 3A, cover beam 204 provides coverage for the devices 216 and 218 and any other devices within cover beam 204,

which is the **first set of devices**. *Id.* Moreover, in this coverage configuration, omni-directional beam 224 provides coverage to device 218, which is a **second set of the group of devices**, being a different set than the first set. *Id.* As I discussed above in limitation 1[d], the omni-directional beam is a different network than the center beam.

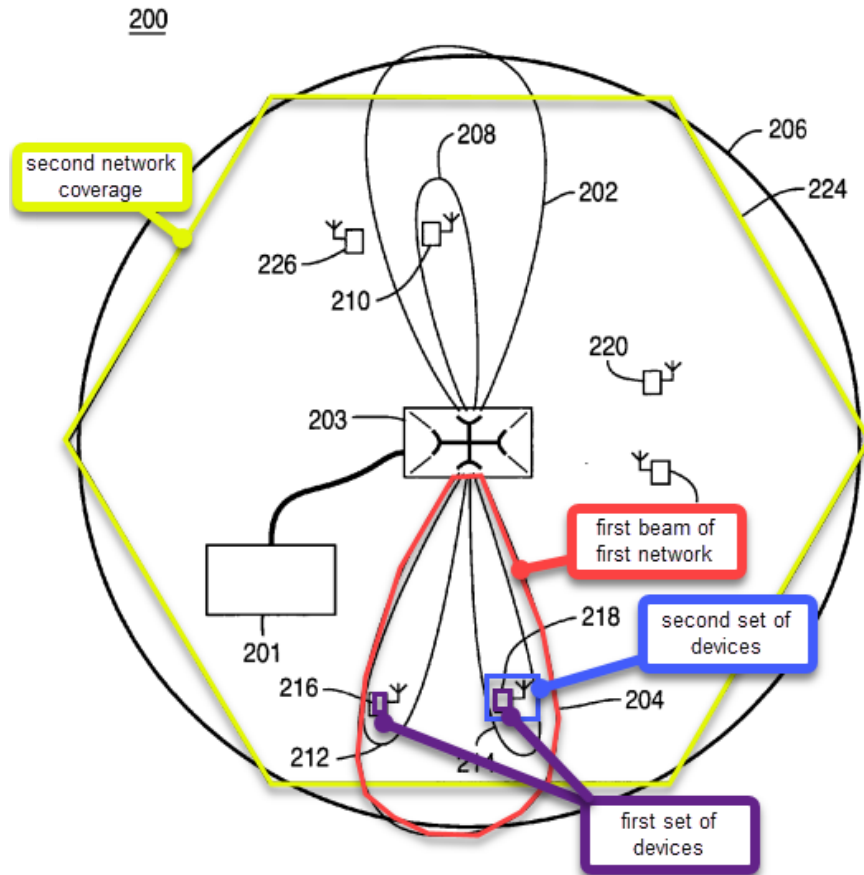


FIG. 3A

14[c]: providing the second coverage configuration includes transmitting a second beam of the first network that is configured to provide coverage for the second set of the group of devices, and providing coverage by the second network to at least the first set of the group of devices; and

97. In my opinion, Chitrapu discloses this limitation.

98. Chitrapu discloses a ***second coverage configuration*** that includes a “center beam” (*i.e.*, ***a second beam of a first network***) which provides coverage to ***the second set of the group of devices***. As I discussed above in limitation 1[c], a cover and center beam are part of the same first network. For example, in Figure 3B, center beam 214 provides coverage for the device 218, which as discussed in claim element 14[b] is the ***second set of devices***. Moreover, in this coverage configuration, omni-directional beam 224 provides coverage to devices 216 and 218 and any other devices within cover beam 204, which as discussed in limitation 14[b] is the ***first set of devices***. As I discussed above in limitation 1[d], the omni-directional beam is a different network than the center beam.

Diagram illustrating a network architecture. A central node (203) is connected to a server (201). The central node (203) is also connected to multiple devices (204, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228). The diagram shows two overlapping coverage areas: a first network (202) and a second network (206). A yellow line indicates the second network coverage, and a green line indicates the first network coverage. A red line indicates the second beam of the first network. A blue line indicates the second set of devices, and a purple line indicates the first set of devices.

FIG. 3B

14[d]: providing the third coverage configuration includes transmitting a third beam of the first network that is narrower than the first beam and is configured to provide coverage to at least one continuous use device of the group of devices, the at least one continuous use device being actively involved in a substantially continuous service with the network,

99. In my opinion, Chitrapu discloses this limitation.

100. Chitrapu discloses a ***third coverage configuration*** that includes a “center beam” (*i.e.*, ***a third beam of the first network***) which provides coverage to a ***continuous use device***. As I discussed above in claim element 1[c], a center beam is narrower than a cover beam. For example, in Figure 3B, center beam 212 (which is narrower than cover beam 204) provides coverage for the device 216, which is among

the **group of devices**. *Id.* As I also discussed above for claim element 1[c], Chitrapu discloses that device 216 is a continuous use device when provided center beam coverage. *Id.*

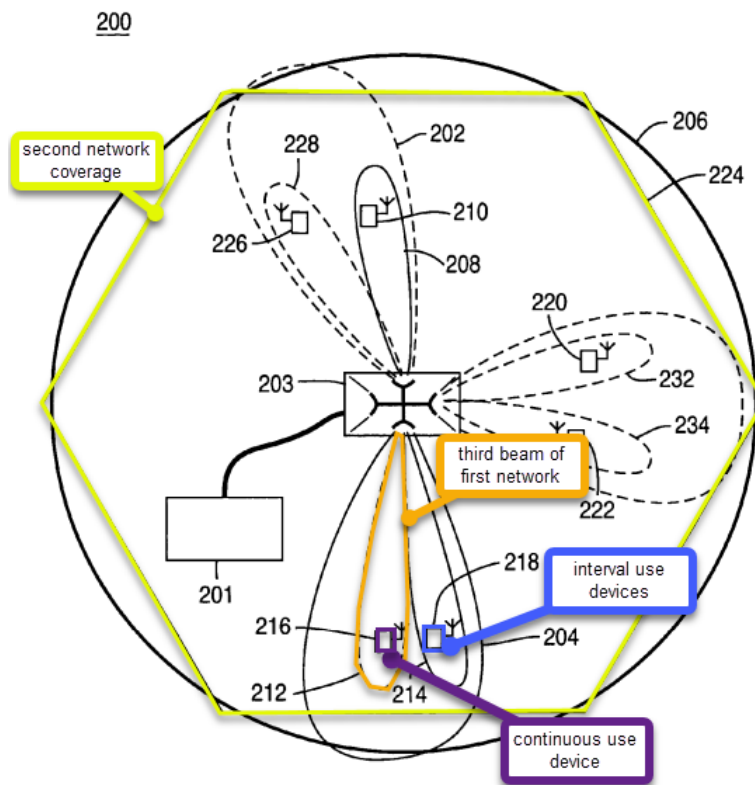


FIG. 3B

14[e]: and providing coverage by the second network to at least a plurality of interval use devices of the group.

101. In my opinion, Chitrapu discloses this limitation.

102. The **third coverage configuration** includes an omni-directional beam 224 which provides coverage to interval use devices of the group of devices, including any devices within cover beam 204, whether or not they are covered by a center beam.

As I discussed above for claim element 1[d], Chitrapu discloses that devices are *interval use devices* when covered by an omni-directional beam. *Id.*

J. Independent Claim 17

17[pre]: A machine readable non-transitory medium having stored therein instructions that, when executed, cause a device to provide a network coverage by:

103. Chitrapu discloses and/or renders obvious this limitation.

104. I incorporate the discussion provided above with respect to claim element **1[pre]** of Claim 1.

105. Furthermore, Chitrapu discloses that “a base station includes but is not limited to a Node-B, a site controller, an access point or any other type of interfacing device in a wireless environment,” which are *devices*. Ex. 1005, ¶11. A POSITA would understand that a Node-B base station comprises a processor and a machine-readable medium for storing instructions executed by that processor, as such components were well-known and readily available and, indeed, necessary for a base station to perform any functions. *See, e.g.*, Ex. 1007, 15:63-66, 10:30-33.

17[a]: cycling over time through a coverage sequence that includes providing a first coverage configuration and providing a second coverage configuration, wherein:

106. Chitrapu discloses and/or renders obvious this limitation.

107. I incorporate the discussion provided above with respect to claim element **1[a]** of Claim 1.

17[b]: providing the first coverage configuration includes transmitting a first beam of a first network that is configured to provide coverage for the group of devices; and

1108. Chitrapu discloses and/or renders obvious this limitation.

1109. I incorporate the discussion provided above with respect to claim element **1[b]** of Claim 1.

17[c]: providing the second coverage configuration includes transmitting a second beam of the first network that is narrower than the first beam and configured to provide coverage to at least one continuous use device of the group of devices, the at least one continuous use device being actively involved in a substantially continuous service with the network,

1110. Chitrapu discloses and/or renders obvious this limitation.

1111. I incorporate the discussion provided above with respect to claim element **1[c]** of Claim 1.

17[d]: and providing coverage by a second network to a plurality of interval use devices of the group of devices.

1112. Chitrapu discloses and/or renders obvious this limitation.

1113. I incorporate the discussion provided above with respect to claim element **1[d]** of Claim 1.

K. Dependent Claim 18: “The machine readable non-transitory medium of claim 17, wherein the first network and the second network are the same network types, and wherein the at least one active device is allowed access to the second beam based on an admission control parameter.”

1114. In my opinion, Chitrapu discloses this limitation.

1115. I incorporate the discussion provided above with respect to Claim 7.

L. Independent Claim 20

20[pre]: A device comprising: a machine readable medium having stored therein instructions that, when executed, cause the device to provide network coverage by:

116. Chitrapu discloses and/or renders obvious this limitation.

117. I incorporate the discussion provided above with respect to claim element **1[pre]** of Claim 1 and **17[pre]** of Claim 17.

20[a]: cycling over time through a coverage sequence that includes providing a first coverage configuration and providing a second coverage configuration, wherein:

118. Chitrapu discloses and/or renders obvious this limitation.

119. I incorporate the discussion provided above with respect to claim element **1[a]** of Claim 1.

20[b]: providing the first coverage configuration includes transmitting a first beam of a first network that is configured to provide coverage for the group of devices; and

120. Chitrapu discloses and/or renders obvious this limitation.

121. I incorporate the discussion provided above with respect to claim element **1[b]** of Claim 1.

20[c]: providing the second coverage configuration includes transmitting a second beam of the first network that is narrower than the first beam and configured to provide coverage to at least one continuous use device of the group of devices, the at least one continuous use device being actively involved in a substantially continuous service with the network,

122. Chitrapu discloses and/or renders obvious this limitation.

123. I incorporate the discussion provided above with respect to claim element **1[c]** of Claim 1.

20[d]: and providing coverage by a second network to a plurality of interval use devices of the group of devices;

124. Chitrapu discloses and/or renders obvious this limitation.

125. I incorporate the discussion provided above with respect to claim element **1[d]** of Claim 1.

20[e]: a processor coupled to the machine readable medium to execute the instructions; and

126. Chitrapu discloses and/or renders obvious this limitation.

127. I incorporate the discussion provided above with respect to claim element **20[pre]** of Claim 20.

20[f]: an adaptive antenna configured to transmit the first beam and the second beam.

128. Chitrapu discloses and/or renders obvious this limitation.

129. I incorporate the discussion provided above with respect to claim element **20[pre]** of Claim 20.

130. In my opinion, Chitrapu discloses this limitation. Chitrapu discloses that an “adaptive antenna[]” will radiate a nested beam that includes a “cover beam” and a “center beam,” i.e., ***the first and second beams***. Ex. 1005, ¶¶11-12.

M. Dependent Claim 21: “The device of claim 20, wherein the first network and the second network are the same network types, the at least one active device is allowed access to the second beam

based on an admission control parameter, and the adaptive antenna is further configured to transmit a third beam of the second network.”

131. In my opinion, Chitrapu discloses this limitation.

132. I incorporate the discussion provided above with respect to Claim 7 and claim element **20[f]** from Claim 20.

133. Chitrapu also discloses that the antenna will radiate an “omni-directional beam,” *i.e.*, ***a third beam of the second network***. Ex. 1005, ¶18.

IX. GROUND 2: CHITRAPU IN VIEW OF WONG RENDER OBVIOUS CLAIMS 1-5, 7, 8, 12, 14, 17, 18, 20, AND 21

134. As I discussed above for Ground 1, Chitrapu alone renders obvious claims 1-5, 7, 12, 14, 17, 18, 20, and 21. In this Ground, I provide an additional obviousness theory, wherein it is my opinion that Chitrapu in further view of Wong provides an alternative theory for why claim element 1[a] (and similar elements), which requires cycling through coverage configurations over time, is rendered obvious by Wong’s antenna pattern scheduler. Wong also provides disclosure that its beam patterns can be for different types of networks (as claimed in Claim 5) and can be for varying durations (as claimed in Claim 8).

135. I begin my explaining why a POSITA would be motivated to combine Chitrapu with Wong.

A. Rationale to Combine Chitrapu with Wong

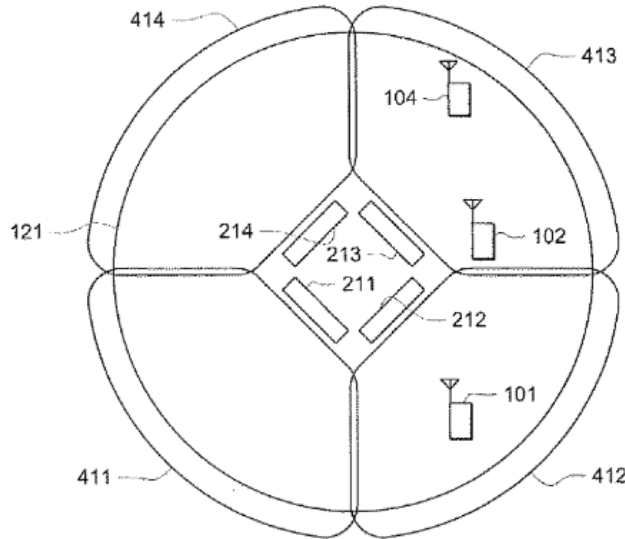
136. In my opinion, a POSITA would have found it obvious to modify Chitrapu's system for omni-directional, cover, and center beam coverage configurations (which I described above in Ground 1) by incorporating Wong's teachings of an antenna pattern scheduler to cycle between coverage configurations.

137. A POSITA would have been motivated to incorporate Chitrapu and Wong in this manner because of the well-known benefits of Wong's scheduler. For example, Wong explains that, through use of the scheduler, it allows for "illumination time of one or more portions of a service area associated with higher/lower traffic [to be] greater/less than the illumination times of other portions of the service area." Ex. 1006, 9:53-56. This allows for better quality of service for the devices. *Id.*, 10:21-22. Wong further explains that the scheduler would allow the activation of "a particular subscriber station's best antenna pattern when data packets directed to that subscriber station are being transmitted." *Id.*, 9:36-38. Thus, Wong allows for more flexibility in the distribution of its beams to provide better quality of service.

138. The specific teachings of Wong that a POSITA would be motivated to incorporate into Chitrapu are as follows. Wong teaches a system where "various narrow and/or wide antenna patterns may be selected ... for directing to particular portions of [a] service area ... and the initial scheduling plan invoked by scheduler 242 may be adapted." Ex. 1006, 8:51-54. In a "highly simplified representation," Figure

4 of Wong depicts “4 substantially 90° antenna patterns [411-414]”, which together “provide illumination of service area 121.” *Id.*, 8:56-67.

FIG. 4



139. A POSITA would have been motivated to include Wong’s teachings of a “[s]cheduler” that “implements antenna pattern scanning and traffic timing by controlling the succession, of antenna patterns, active times of antenna patterns, periodicity or repetition of particular antenna patterns, etcetera.” Ex. 1006, 9:18-22. This would further include “controlling ... beam former 220 to active an appropriate antenna pattern at the appropriate time.” *Id.*, 9:29-31. The scheduler may also take into account “high/low QoS [that] is desired” by devices when scheduling the antenna patterns. *Id.*, 9:51.

140. A POSITA would have also been motivated to incorporate Wong’s teachings into Chitrapu by using Wong’s scheduler to control the formation and

positioning of cover beams and center beams. For example, Wong's scheduler could be used to schedule one of Chitrapu's cover beams at a particular area and particular time, with subsequent center beams being formed for any devices that the cover beam detects.

141. While Chitrapu discloses that cover beams can be deployed by locating devices within an omni-directional beam, Wong's scheduler would still provide improvements. Chitrapu teaches locating a device using "direction of arrival," which requires time and processing, and may not be accurate. *Id.*; Ex. 1005, ¶20. The use of Wong's scheduler could forego reliance on locating the devices if it is known in advance which areas tend to have higher or lower traffic, so that the scheduler can schedule antenna patterns to accommodate for such typical traffic uses. A scheduler may provide better quality of service over locating devices—or at least give the base station the option to choose which method performs better. *Id.*

142. A POSITA would further be motivated because Chitrapu already discloses a cruder form of scheduling where "if no omni-directional beam 206 is provided, the cover beams 202, 204 may be swept through the coverage area 224 to pick up new users so that existing cover beams may be adjusted or additional cover beams may be deployed." Ex. 1005, ¶25. Thus, Chitrapu discloses that the formation of beams is compatible with scheduling.

143. A POSITA would have reasonably expected the proposed Chitrapu and Wong combination to succeed. Wong provides implementation details for its scheduler, specifically that it is part of the base station and coupled to a database containing antenna patterns. Ex. 1006, 9:18-67; Fig. 3. Incorporating Wong’s teachings into Chitrapu would be a straightforward change to Chitrapu’s base station and well within the capabilities of a POSITA. A POSITA would know that a scheduler and database could be implemented in software without any special hardware.

144. It is also my understanding that references cannot be combined as obvious unless they are analogous art to the challenged patent. In my opinion, Chitrapu, Wong, and the ’196 patent are analogous art, as they are all directed to wireless systems that use beams for coverage. See Ex. 1001, Abstract (“[P]roviding network coverage by cycling through beam shape coverage configurations”); Ex. 1005, ¶2 (“The present invention is related to wireless communication systems [and] smart antennas for generating nested beams.”); Ex. 1006, Abstract (“Systems and methods which utilize antenna pattern or antenna beam scanning techniques to provide communication of payload traffic”).

B. Claim elements 1[a], 14[a], 17[a], and 20[a]: “cycling over time through a coverage sequence”

145. In my opinion, Chitrapu in view of Wong render obvious these limitations.

146. Wong discloses a “[s]cheduler” that “implements antenna pattern scanning and traffic timing by **controlling the succession**, of antenna patterns, active times of antenna patterns, **periodicity or repetition** of particular antenna patterns, etcetera.” Ex. 1006, 9:18-22. In other words, Wong discloses that its scheduler can **cycle over time through a coverage sequence** of various antenna patterns, including successive patterns that are repeated over time.

147. As I discussed above in Ground 1, Chitrapu discloses various **coverage configurations** that use cover and center beams. In the Chitrapu-Wong combination, Wong’s scheduler is used to schedule the location and times of Chitrapu’s cover and center beams. Thus, the Chitrapu-Wong combination renders obvious **cycling over time through a coverage sequence** of cover and center beams constituting coverage configurations.

C. Dependent Claim 5: “The method of claim 1, wherein the first network and the second network are different network types.”

148. As I discussed above in Ground 1, Chitrapu alone renders obvious this limitation. However, in my opinion, Chitrapu in view of Wong also render obvious this limitation. Along with the disclosures in Chitrapu that the networks can be different network types, Wong also provides similar disclosures. For example, Wong describes that its transceiver “provides communication according to **one or more** standardized protocols,” such as providing “simultaneous ... communications ... using a plurality of antenna patterns and a multiple access protocol (e.g., WiFi, WiMAX,

WiBro, etcetera).” Ex. 1006, 6:34-53. Thus, in the Chitrapu-Wong combination, a POSITA would have found it obvious that Chitrapu’s beam coverage could use different types of networks.

D. Dependent Claim 8: “The method of claim 1, wherein the first coverage configuration is provided for a first time duration and the second coverage configuration is provided for a second time duration that is longer than the first time duration.”

149. In my opinion, Chitrapu in view of Wong render obvious this limitation.

150. For example, Wong teaches that its scheduler “implements antenna pattern scanning and traffic timing by controlling the ... *active times of antenna patterns*.” Ex. 1006, 9:18-21. Specifically, the scheduler may allow “one or more antenna patterns [be] implemented ... for a longer/shorter illumination time period,” including that “quality of service (QoS) provided with respect to various subscriber stations may be controlled by scheduler 242 through more/less frequent scheduling of an antenna pattern determined to be best with respect to the station for which a high/low QoS is desired.” *Id.*, 9:48-51. In Chitrapu, the center beam provides higher QoS, and thus in the Chitrapu-Wong combination, the scheduler can assign Chitrapu’s center beam with a higher time period than the cover beam.

X. GROUND 3: DINAN IN VIEW OF WONG RENDER OBVIOUS CLAIMS 1-5, 8, 10, 12, 14, 17, AND 20

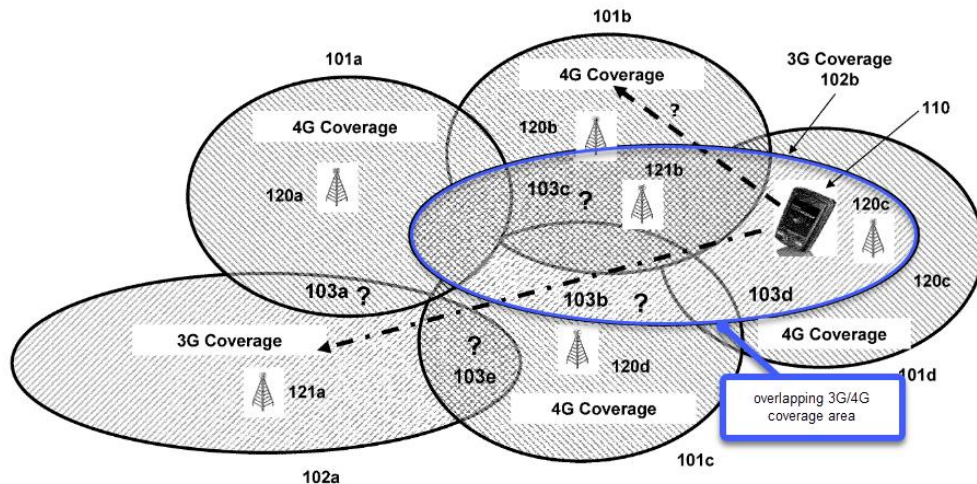
151. Dinan in view of Wong render obvious claims 1-5, 8, 10, 12, 14, 17, and 20. In particular, Dinan teaches providing simultaneous 3G and 4G coverage, whereas Wong teaches cycling of coverage using narrow and wide beams within a network.

152. I begin my explaining why a POSITA would be motivated to combine Dinan with Wong.

A. Rationale to Combine Dinan with Wong

153. A POSITA would have found it obvious to modify Dinan's system for providing simultaneous 3G/4G coverage by incorporating Wong's teachings of providing coverage using an antenna pattern scheduler to cycle between coverage configurations.

154. I first describe the proposed Dinan and Wong combination. Dinan teaches a "operating a dual-mode 3G/4G communications device capable of operating in either a 3G or 4G network when in an area with overlapping 3G and 4G coverage." Ex. 1007, 7:19-22. Thus, as depicted in Figure 1, "dual-mode device 110 is in a coverage overlap area with acceptable 3G and 4G network access." *Id.*, 12:45-46.



155. Dinan further describes an algorithm for determining whether a device is assigned 3G or 4G service. In particular, Dinan uses “QoS categories” to “assign relatively higher or lower priority to various application types.” Ex. 1007, 11:48-49. For example, “streaming of high definition (HD) video, video conferencing, and voice (e.g., VoIP) may be assigned a highest QoS category, i.e., category ‘C1’, while applications of lesser relative importance or with less stringent data latency requirements may be assigned lower QoS categories ‘C2’ or ‘C3’.” *Id.*, 11:49-54. A higher QoS category will be given priority to 4G service, whereas a lower QoS category will often be assigned 3G service. *Id.*, 15:3-38.

156. A POSITA would have been motivated to modify Dinan’s provision of 4G service to incorporate Wong’s teachings of using antenna patterns for providing wireless services. A POSITA would have been motivated to incorporate Dinan and Wong in this manner because of the well-known benefits of Wong’s scheduler. As an

initial matter, a POSITA would understand that Dinan's system is compatible with Wong's system. *Id.* In particular, Dinan's provision of 4G service uses "4G Base Transceiver Stations" that provide "WiMAX ... coverage areas." Ex. 1007, 10:16-19. And Wong teaches that its system is implemented using a base station "operable to provide communications according to the IEEE ... 802.16 (commonly referred to as WiMAX ...) standard[]." Ex. 1006, 6:37-40. Thus, a POSITA would understand that Wong's teachings are fully applicable and compatible with the 4G provision in Dinan's system, and indeed, provide an implementation of the 4G system disclosed in Dinan.

157. A POSITA would have been motivated to combine Dinan and Wong in this manner because of the well-known benefits of Wong's scheduler and antenna patterns. For example, Wong explains that, through use of the scheduler, it allows for "illumination time of one or more portions of a service area associated with higher/lower traffic [to be] greater/less than the illumination times of other portions of the service area." Ex. 1006, 9:53-56. This allows for better quality of service for the devices. *Id.*, 10:21-22. Wong further explains that the scheduler would allow the activation of "a particular subscriber station's best antenna pattern when data packets directed to that subscriber station are being transmitted." *Id.*, 9:36-38. Thus, Wong allows for more flexibility in the distribution of its beams to provide better quality of service. A system that provides a device's required level of QoS is particularly important in Dinan's system, because Dinan's algorithm is more likely to assign devices that

require high QoS to 4G service as they are “assigned a highest QoS category.” Ex. 1007, 11:51.

158. A POSITA would have reasonably expected the proposed Dinan and Wong combination to succeed. Wong provides implementation details for its scheduler and beamformer that forms antenna patterns, specifically that they are part of the base station and coupled to a database containing antenna patterns. Ex. 1006, 9:18-67; Fig. 3. Incorporating Wong’s teachings (and particularly a scheduler, beamformer, and database) into Dinan would be a straightforward change to Dinan’s base station and well within the capabilities of a POSITA.

159. As I discussed above, Wong and the ’196 patent are analogous art, as they are both directed to wireless systems that provide wireless service coverage. In my opinion, Dinan is also directed to the same field of endeavor. Ex. 1007, Abstract (“Systems and methods of operating multimode 3G/4G communications devices in an overlapping 3G/4G coverage area”).

B. Independent Claim 1

1[pre]: A method for providing network coverage for a group of devices in an area comprising:

160. To the extent the preamble is limiting, in my opinion, Dinan in view of Wong render obvious this limitation. Dinan discloses “Systems and methods of operating multimode 3G/4G communications devices in an overlapping 3G/4G coverage area.” Ex. 1006, Abstract.

1[a]: cycling over time through a coverage sequence that includes providing a first coverage configuration and providing a second coverage configuration, wherein:

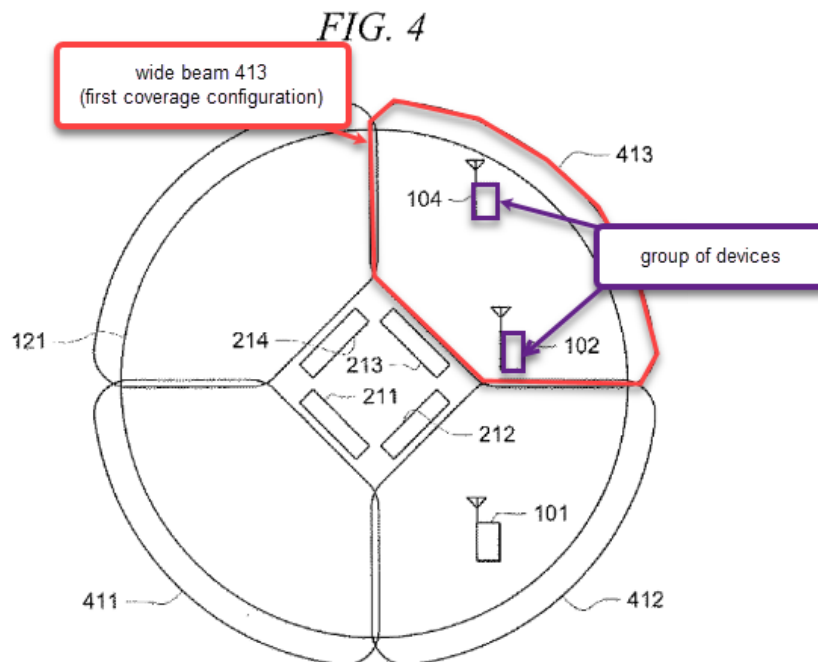
161. In my opinion, Dinan in view of Wong renders obvious this limitation.

162. In the Dinan-Wong combination, the system provides overlapping 3G/4G coverage as taught by Dinan, where 4G coverage uses Wong's scheduling of antenna patterns. Thus, as discussed below, the Dinan-Wong combination renders obvious a **first coverage configuration** that provides 4G coverage using a wide beam and renders obvious a **second coverage configuration** that provides 4G coverage to a continuous use device using a narrow beam, as well as 3G coverage to interval use devices.

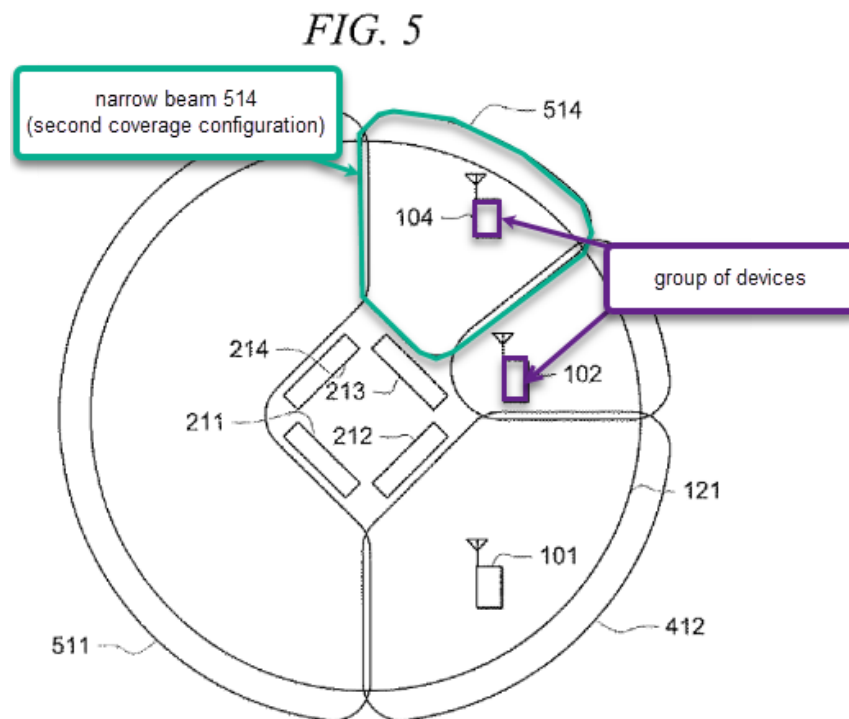
163. The Dinan-Wong combination renders obvious **cycling over time** through these two coverage configurations. For example, Wong discloses a "[s]cheduler" that "implements antenna pattern scanning and traffic timing by **controlling the succession**, of antenna patterns, active times of antenna patterns, **periodicity or repetition** of particular antenna patterns, etcetera." Ex. 1006, 9:18-22. Antenna patterns are formed by obtaining "phase shift and signal weighting information for signal paths of **beam former 220** suitable for forming particular antenna patterns." *Id.*, 8:61-63. In other words, Wong discloses that its scheduler, which a POSITA would find obvious to combine with Dinan, cycles through the antenna patterns over time, including successive patterns that are repeated.

164. Wong further discloses that the aforementioned antenna patterns include both wide beam and narrow beam patterns, such as those used in the ***first and second coverage configurations***. Wong teaches that “antenna beams have various attributes (e.g., wide beams and narrow beams, beams having different azimuthal orientations, etcetera).” Ex. 1006, 11:15-17. Wong further teaches that “wide beam antenna patterns are utilized in combination with narrow beam antenna patterns.” *Id.*, 11:25-26.

165. For example, Wong depicts in Figure 4 (annotated below) that “antenna pattern 413 ... has the greatest subscriber station activity,” specifically that it includes devices 102 and 104. Ex. 1006, 12:46-47. This is the ***first coverage configuration***.



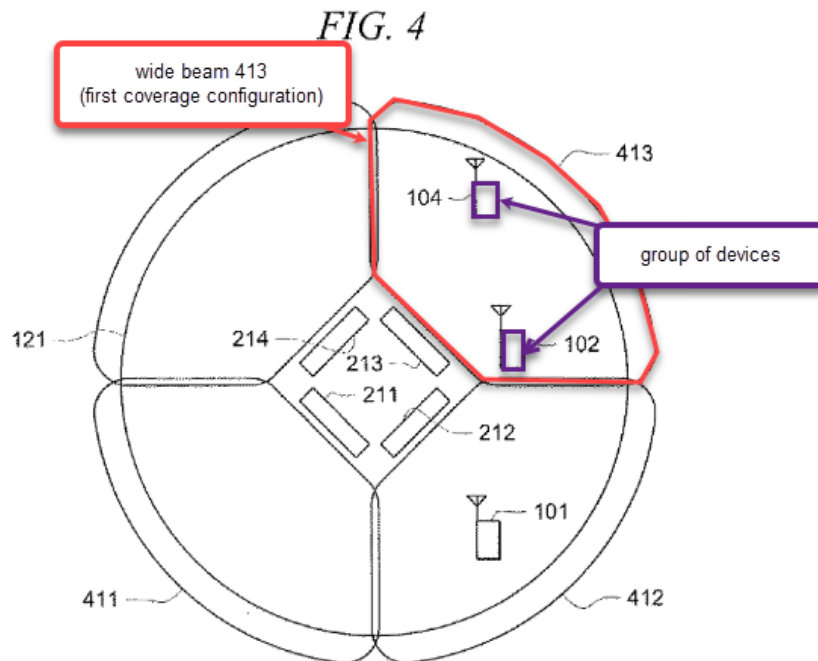
166. Wong teaches that the scheduler could cycle to another coverage configuration which uses narrow beams by selecting antenna patterns depicted in Figure 5 (annotated below), where “antenna pattern 413 has been **replaced with** antenna patterns 513 and 514,” both of which are narrower than the beam in antenna pattern 413. Ex. 1006, 12:58-59. In particular, “[a]ntenna pattern 514 provides a more **narrow beam** antenna pattern consistent with the higher utilization of the corresponding portion of service area 121.” *Id.*, 12:64-67. Antenna pattern 514, along with 3G coverage described in Dinan, constitutes the **second coverage configuration**.



1[b]: providing the first coverage configuration includes transmitting a first beam of a first network that is configured to provide coverage for the group of devices; and

167. In my opinion, Dinan in view of Wong render obvious this limitation.

168. Wong discloses a **first coverage configuration** that includes a beam antenna pattern (i.e., **first beam of a first network**) which provides coverage for a group of devices. For example, in Figure 4 (annotated below), antenna pattern 413, which uses a 90 degree beam, provides coverage for devices 102 and 104 and other devices which may be in that area. As I discussed above, a POSITA would find it obvious to incorporate Wong's teachings of cycling through antenna patterns into Dinan.

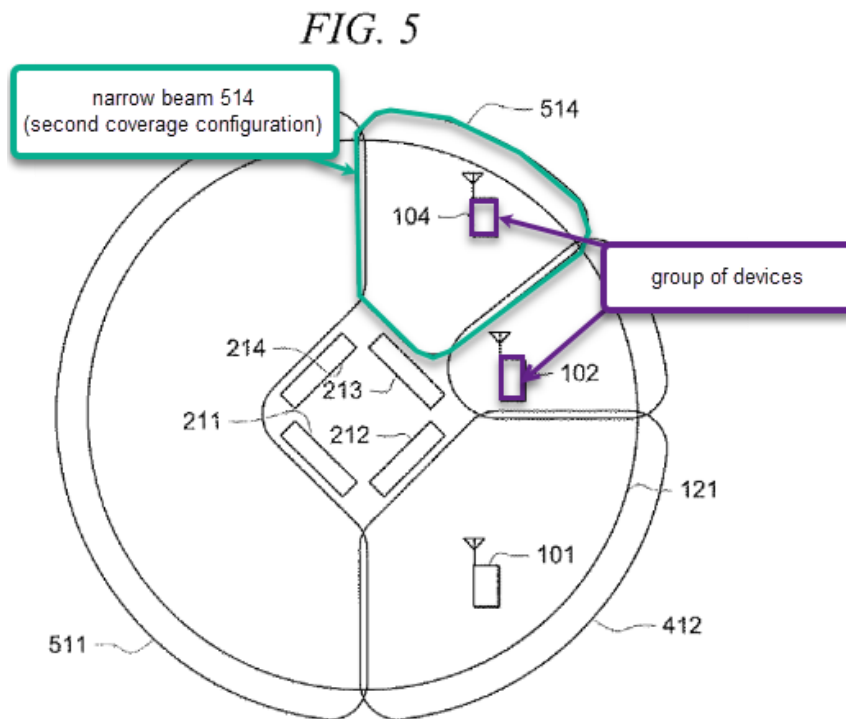


1[c]: providing the second coverage configuration includes transmitting a second beam of the first network that is narrower than the first beam and configured to provide coverage to at least one continuous use device of the group of devices, the at least one continuous use device being actively involved in a substantially continuous service with the network,

169. In my opinion, Dinan in view of Wong render obvious this limitation.

170. Wong discloses a **second coverage configuration** that includes a **narrow beam** antenna pattern (i.e., **second beam of a first network**) which provides

coverage for a **continuous use device**. For example, in Figure 5 (annotated below), antenna pattern 514 provides coverage for device 104. As I discussed above, a POSITA would find it obvious to incorporate Wong’s teachings of cycling through antenna patterns into Dinan.



171. Wong discloses that antenna pattern 514 is a **second beam of the first network** because it “provides a **more narrow beam** antenna pattern” compared to antenna pattern 413 from Figure 4 (i.e., **the first beam of the first network**). Ex. 1006, 12:64-66. Moreover, in the Dinan-Wong combination, Wong’s antenna patterns are used to provide 4G (e.g., WiMAX) coverage, and therefore both beams are of the same, first network. Ex. 1006, 6:36-40 (“Transceiver 230 [of the base station] may comprise

a radio or radio chip set operable to provide communications according to the ... 802.16 (commonly referred to as WiMAX and WiBro) standards.”).

172. Both Dinan and Wong disclose that the 4G coverage using Wong’s antenna patterns is ***configured to provide coverage to a continuous use device***. Wong teaches that “narrow beam antenna patterns [can] be used in providing communications with subscriber stations having ... frequent communications,” *i.e.*, a device ***involved in a substantially continuous service with the network***. Ex. 1006, 11:63-67. Wong also teaches that “narrow beam antenna pattern[s]” are used with devices “having a high quality of service requirement.” *Id.*, 13:1-3. Dinan further teaches that devices needing “streaming of high definition (HD) video, video conferencing, and voice (e.g., VoIP) may be assigned a highest QoS category,” where the system will prioritize such devices for 4G service. Ex. 1007, 11:49-51, 15:8-10 (“[H]igher application categories ... device ... is handed off to 4G”). Dinan also “summarizes the various WiMAX data service types” in Table 1 (reproduced below), including “Streaming audio & video” and “File transfers.” Ex. 1007, col. 2. A POSITA would understand that devices that stream data, transfer files, and generally need high QoS are ***continuous use devices*** that are ***actively involved in a substantially continuous service***.

TABLE I

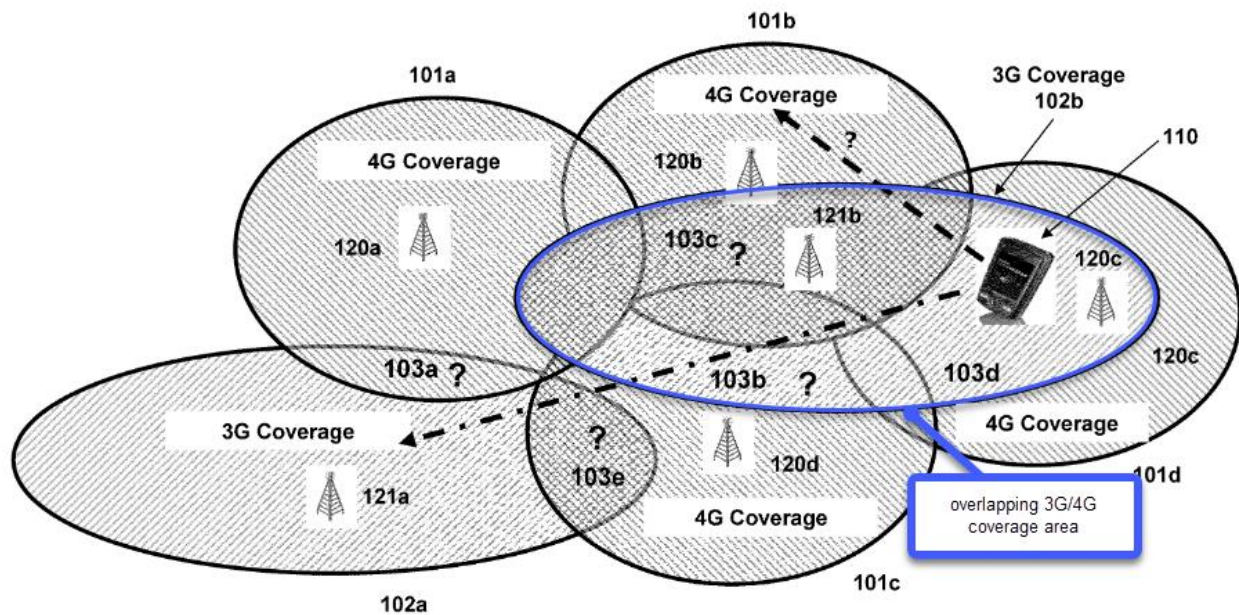
WiMAX Data Delivery Services		
DL data delivery service	UL scheduling service	Targeted traffic
Unsolicited grant service (UGS)	Unsolicited grant service (UGS)	Constant bit rate (CBR) services, TDM services
Extended real-time Variable Rate (ERT-VR)	Extended real-time polled service (ertPS)	VoIP with silence suppression/activity detection
Real-time Variable Rate (RT-VR)	Real-time polled service (rtPS)	Streaming audio & video
Non-real-time Variable Rate (NRT-VR)	Non-real-time polled service (nrtPS)	File transfers
Best Effort (BE)	Best Effort (BE)	Web browsing, e-mail, etc.

1[d]: and providing coverage by a second network to a plurality of interval use devices of the group of devices.

173. In my opinion, Dinan in view of Wong render obvious this limitation.

174. As discussed above, the **second coverage configuration** constitutes Wong's 4G narrow beam antenna pattern and Dinan's 3G coverage.

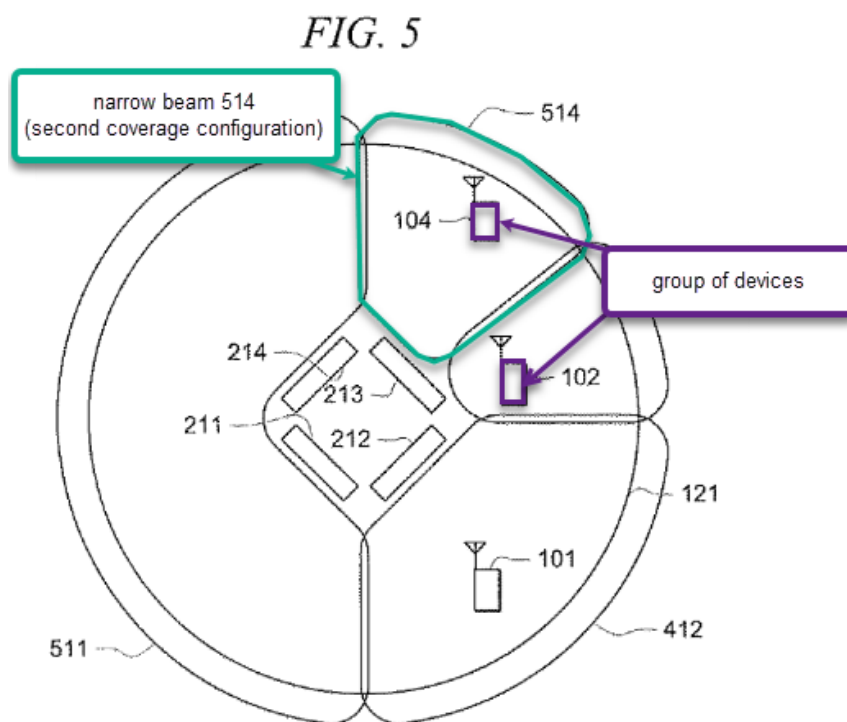
175. Dinan discloses "operating a dual-mode 3G/4G communications device capable of operating in either a 3G or 4G network when in an area with **overlapping 3G and 4G coverage.**" Ex. 1007, 7:19-22. Thus, as depicted in Figure 1, "dual-mode device 110 is in a **coverage overlap area** with acceptable 3G and 4G network access." *Id.*, 12:45-46.



176. Thus, in the Dinan-Wong combination, when the system provides 4G coverage to a device in the coverage area using Wong’s narrow beam antenna pattern of the **second coverage configuration**, it provides 3G coverage to other devices within the coverage area as taught by Dinan. The 4G coverage and 3G coverage are different network types and therefore different networks, *i.e.*, **a first and second network**, respectively.

177. Dinan discloses that the 3G coverage provides service to **interval use devices**. Dinan discloses that “applications of lesser relative importance or with less stringent data latency requirements may be assigned lower QoS categories ‘C2’ or ‘C3,’” with devices using application category C3 being assigned 3G service if 4G service is loaded. Ex. 1007, 11:49-54; 15:28-38. Figure 7 provides an “exemplary mapping of application type to an arbitrarily assignable QoS Category,” including

“Email” being assigned to C3. *Id.*, Fig. 7. The ’196 patent describes that “email” is an example of an “interval service[,]” which if used by a device makes the device an ***interval use device***. Ex. 1001, 4:9-12. Thus, Dinan discloses that 3G coverage is used to provide service to devices using email, *i.e.*, ***interval use devices***. For example, in the ***second coverage configuration***, device 102 in Wong is not covered by narrow beam 514 (*i.e.*, ***second beam of the first network***) because it does not need high QoS services—thus, per Dinan, this device is provided 3G service (*i.e.* ***coverage by a second network***) for interval services such as email.



- C. **Dependent Claim 2: “The method of claim 1, wherein the providing the second coverage configuration comprises determining a direction of transmission for the second beam**

based at least in part on a location of the at least one continuous use device.”

178. In my opinion, Dinan in view of Wong render obvious this limitation.

179. Wong discloses that “controller 240 of base station 111 may utilize information with respect to ... the direction of movement of the subscriber station [and] the location of the subscriber stations ... in identifying, a best antenna pattern for use with respect to any particular subscriber station.” Ex. 1006, 11:53-59. Wong further discloses that “narrow ... antenna patterns may be selected ... for *directing* to particular portions of service area 121.” *Id.*, 8:51-53. Thus, in the ***second coverage configuration***, when focusing a narrow beam on a continuous use device per Wong, the base station uses the location and movement of the device. A POSITA would understand that directing the narrow beam on a device involves pointing the beam in the direction of the device’s location. For example, in Figure 5, beams 513 and 514 are pointed in the direction of devices 102 and 104, respectively.

D. Dependent Claim 3: “The method of claim 1, wherein the second beam of the first network is further configured to provide coverage to a second continuous use device of the group of devices.”

180. In my opinion, Dinan in view of Wong render obvious this limitation.

181. Wong discloses that antenna patterns in general may provide coverage for “one or more subscriber stations.” *See, e.g.*, Ex. 1006, 10:32-34. Wong also discloses that “[a]ntenna pattern 514 provides a more narrow beam antenna pattern

consistent with the **higher utilization** of the corresponding portion of service area 121.” *Id.*, 12:64-67. This antenna pattern is used “where the number of subscriber stations is large.” *Id.*, 12:25-26. Thus, a POSITA would understand that antenna pattern 514 provides coverage to multiple devices that together generate higher utilization for that portion of the service area.

E. Dependent Claim 4: “The method of claim 1, wherein a subsequent iteration of providing the second coverage configuration includes transmitting the second beam of the first network configured to provide coverage to a second continuous use device, and wherein the at least one continuous use device has transitioned to being an interval use device.”

182. In my opinion, Dinan in view of Wong render obvious this limitation.

183. Wong discloses that “a same antenna pattern may be shared as a ‘best’ antenna pattern for a plurality of subscriber stations.” *Id.*, 10:34-36. Thus, Wong contemplates that the narrow beam antenna pattern used in the **second coverage configuration**, may in a **subsequent iteration**, be used for a second continuous use device. If the first continuous use device no longer requires the quality of service or throughput of the “best” antenna pattern, it can be transitioned to an interval use device using 3G service, per Dinan as discussed limitation 1[d].

F. Dependent Claim 5: “The method of claim 1, wherein the first network and the second network are different network types.”

184. In my opinion, Dinan in view of Wong render obvious this limitation.

185. In the Dinan-Wong combination, the system provides overlapping 3G/4G coverage as taught in Dinan, where the 4G coverage uses scheduled antenna patterns per Wong. *Id.* As discussed above in claim 1, the ***first network*** is a 4G (e.g., WiMAX) network and the ***second network*** is a 3G network, which are different network types. *Id.*

G. Dependent Claim 8: “The method of claim 1, wherein the first coverage configuration is provided for a first time duration and the second coverage configuration is provided for a second time duration that is longer than the first time duration.”

186. In my opinion, Dinan in view of Wong render obvious this limitation. I incorporate the discussion provided above in Ground 2 with respect to Claim 8.

H. Dependent Claim 10: “The method of claim 1, wherein the at least one continuous use device is engaged in at least one of a voice call, a download, or a content streaming.”

187. In my opinion, Dinan in view of Wong render obvious this limitation.

188. As I discussed above in claim element 1[c], in the Dinan-Wong combination, the ***continuous use device*** is assigned 4G service because it is engaged in “streaming of high definition (HD) video, video conferencing, and voice (e.g., VoIP).” Ex. 1007, 11:49-50.

I. Dependent Claim 12: “The method of claim 1, wherein the second beam is narrower than the first beam in at least one of a horizontal plane or a vertical plane.”

189. In my opinion, Dinan in view of Wong render obvious this limitation.

190. Wong discloses that its narrow beam antenna patterns (*i.e.*, ***second beam***) is at least narrower on the horizontal plane than the wide beam antenna patterns (*i.e.*, ***first beam***). *Id.* For example, Figure 5 depicts antenna pattern 514 as horizontally narrower than Figure 4's antenna pattern 413. *Id.* Wong also discloses that narrow beams have a "more narrow beam width," *i.e.*, narrower on the horizontal plane. Ex. 1006, 11:33.

J. Independent Claim 14

14[pre]: A method for providing network coverage for a group of devices in an area comprising:

191. In my opinion, Dinan in view of Wong render obvious this limitation.

192. I incorporate the discussion provided above with respect to claim element **1[pre]** of Claim 1.

14[a]: cycling over time through a coverage sequence that includes providing a first coverage configuration, providing a second coverage configuration, and providing a third coverage configuration, wherein:

193. In my opinion, Dinan in view of Wong render obvious this limitation.

194. I incorporate the discussion provided above with respect to claim element **1[a]** of Claim 1.

195. As discussed below, the Dinan-Wong combination renders obvious a ***first coverage configuration*** that provides 4G coverage using a wide beam antenna pattern as taught by Wong, a ***second coverage configuration*** that provides 4G coverage using a narrow beam antenna pattern as taught by Wong, and a ***third coverage***

configuration that provides 4G coverage using a different narrow beam antenna pattern as taught by Wong. All three coverage configurations also provide 3G coverage as taught by Dinan.

196. As I discussed above in claim element 1[a], Wong discloses cycling through antenna patterns, including a cycle where wide beam “antenna pattern 413 has been replaced with [narrow beam] antenna patterns 513 and 514,” as depicted in Figures 4 and 5. Ex. 1006, 12:58-59.

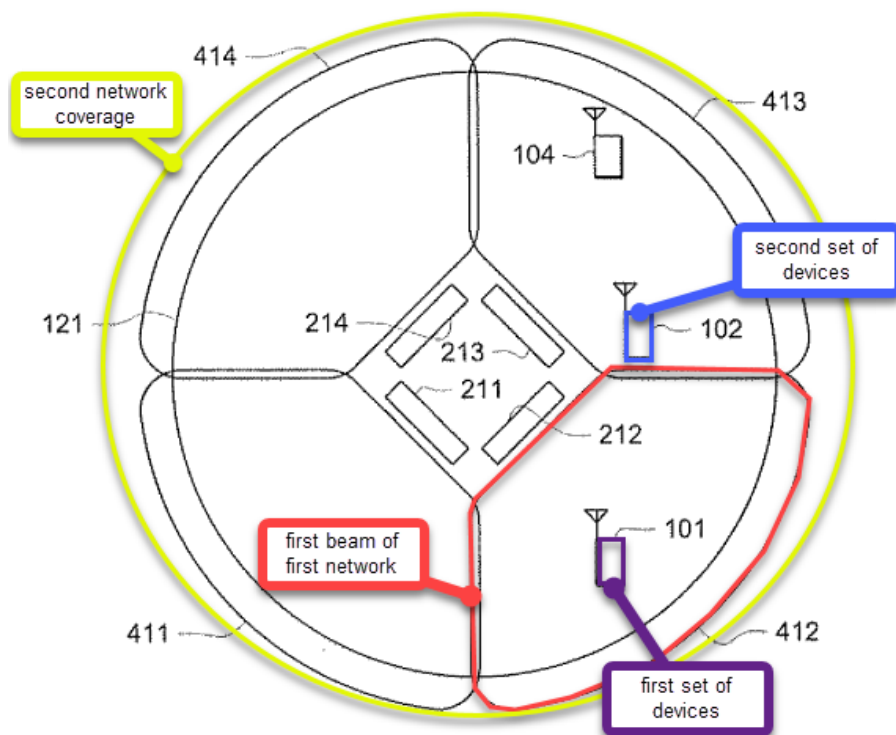
14[b]: providing the first coverage configuration includes transmitting a first beam of a first network that is configured to provide coverage for a first set of the group of devices, and providing coverage by a second network to at least a second set of the group of devices;

197. In my opinion, Dinan in view of Wong render obvious this limitation.

198. Wong discloses a ***first coverage configuration*** that includes a wide beam “antenna pattern” (i.e., ***first beam of a first network***) which provides coverage to a ***first set of the group of devices***. For example, in Figure 4 of Wong, antenna pattern 412 provides coverage for device 101 and any other devices within that antenna pattern, which is the ***first set of devices***. Moreover, in the Dinan-Wong combination, when the system provides 4G coverage using an antenna pattern, it simultaneously provides 3G coverage to other devices, as taught by Dinan and as discussed above in limitation 1[d]. For example, 3G coverage may be provided to device 102 and nearby devices in Figure 4 of Wong (i.e., ***second set of devices***) if they are using “applications

of lesser relative importance or with less stringent data latency requirements.” Ex. 1007, 11:52-53.

FIG. 4



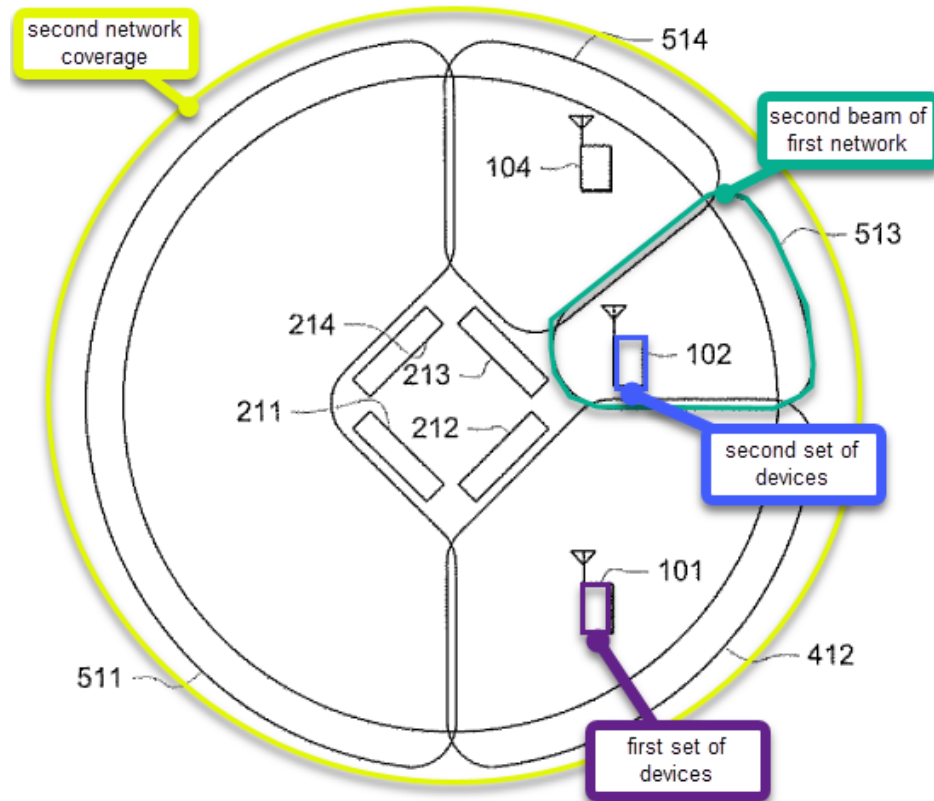
14[c]: providing the second coverage configuration includes transmitting a second beam of the first network that is configured to provide coverage for the second set of the group of devices, and providing coverage by the second network to at least the first set of the group of devices; and

199. In my opinion, Dinan in view of Wong render obvious this limitation.

200. Wong discloses a **second coverage configuration** that includes a narrow beam “antenna pattern” (i.e., **second beam of a first network**) which provides to the **second set of the group of devices**. For example in Figure 5, antenna pattern 513 provides coverage for 102 and any other devices within that antenna pattern, which

is the **second set of devices** that had 3G coverage in the first coverage configuration. And 3G coverage (i.e., **coverage by the second network**) is provided to device 101 (i.e., **first set of devices**) if they are using lower priority applications.

FIG. 5



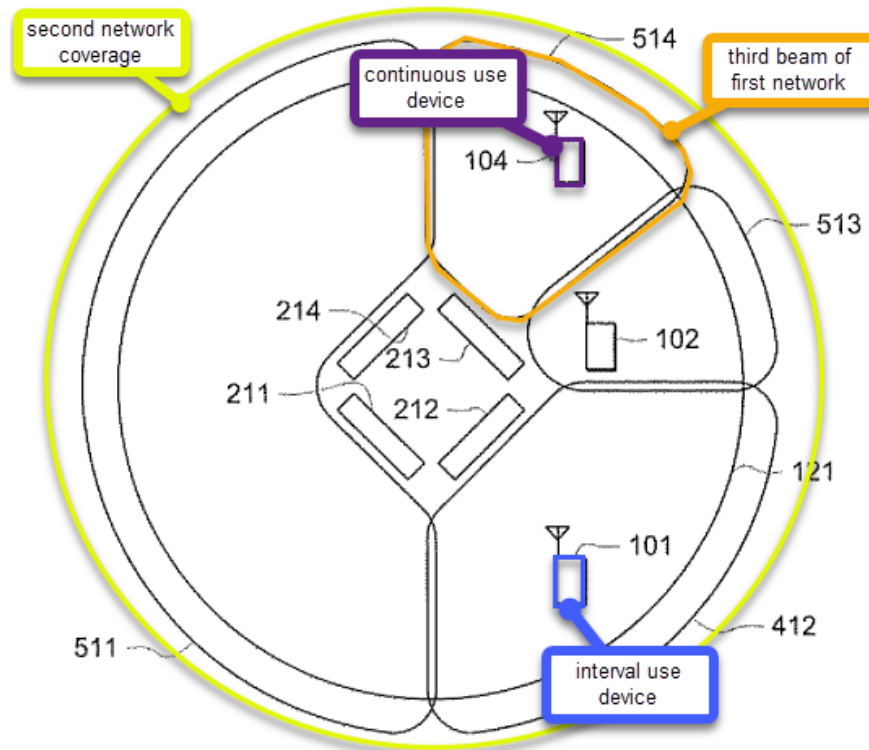
14[d]: providing the third coverage configuration includes transmitting a third beam of the first network that is narrower than the first beam and is configured to provide coverage to at least one continuous use device of the group of devices, the at least one continuous use device being actively involved in a substantially continuous service with the network,

201. In my opinion, Dinan in view of Wong render obvious this limitation.

202. Wong discloses a **third coverage configuration** that includes another narrow beam “antenna pattern” (i.e., **a third beam of the first network**) which, as I

explained in claim element1[c], is narrower than the first beam and provides coverage to a continuous use device. For example, in Figure 5, narrow beam antenna pattern 514 provides coverage for device 104.

FIG. 5



14[e]: and providing coverage by the second network to at least a plurality of interval use devices of the group.

203. In my opinion, Dinan in view of Wong render obvious this limitation.

204. The **third coverage configuration** includes 3G coverage as taught by Dinan. *Id.* As explained above in limitation 1[e], in the Dinan-Wong combination, devices that are not covered by narrow beam “antenna patterns,” such as device 101 and other devices in that area as depicted in Figure 5, are **interval use devices** which

are provided 3G coverage (*i.e. coverage by a second network*) for interval services like email. *Id.*

K. Independent Claim 17

17[pre]: A machine readable non-transitory medium having stored therein instructions that, when executed, cause a device to provide a network coverage by:

205. Dinan in view of Wong render obvious this limitation.

206. I incorporate the discussion provided above with respect to claim element **1[pre]** of Claim 1.

207. Furthermore, Dinan discloses that its disclosures may “be implemented as instructions stored on a machine-readable medium, which may be read and executed by one or more processors.” Ex. 1007, 15:63-66. Dinan specifically discloses that its 3G and 4G base stations “contain various processors and memory devices ... which may be used to carry out ... the functionality described herein.” *Id.*, 10:30-33.

208. Similarly, Wong describes that its beams are formed at a base station using a beam former, which could be “a processor-based system operable under control of an instruction set to provide processing of digital signals, to provide digital beam forming.” Ex. 1006, 5:51-53. Wong’s base station also has a controller which may also “comprise a processor-based system operating under control of an instruction set.” *Id.*, 6:22-23. A POSITA would understand that in order for a processor to execute

instructions, there would necessarily be a machine-readable medium for storing said instructions.

17[a]: cycling over time through a coverage sequence that includes providing a first coverage configuration and providing a second coverage configuration, wherein:

209. In my opinion, Dinan in view of Wong render obvious this limitation.

210. I incorporate the discussion provided above with respect to claim element **1[a]** of Claim 1.

17[b]: providing the first coverage configuration includes transmitting a first beam of a first network that is configured to provide coverage for the group of devices; and

211. In my opinion, Dinan in view of Wong render obvious this limitation.

212. I incorporate the discussion provided above with respect to claim element **1[b]** of Claim 1.

17[c]: providing the second coverage configuration includes transmitting a second beam of the first network that is narrower than the first beam and configured to provide coverage to at least one continuous use device of the group of devices, the at least one continuous use device being actively involved in a substantially continuous service with the network,

213. In my opinion, Dinan in view of Wong render obvious this limitation.

214. I incorporate the discussion provided above with respect to claim element **1[c]** of Claim 1.

17[d]: and providing coverage by a second network to a plurality of interval use devices of the group of devices.

215. In my opinion, Dinan in view of Wong render obvious this limitation.

216. I incorporate the discussion provided above with respect to claim element **1[d]** of Claim 1.

L. Independent Claim 20

20[pre]: A device comprising: a machine readable medium having stored therein instructions that, when executed, cause the device to provide network coverage by:

217. In my opinion, Dinan in view of Wong render obvious this limitation.

218. I incorporate the discussion provided above with respect to claim element **1[pre]** of Claim 1 and **17[pre]** of Claim 17.

20[a]: cycling over time through a coverage sequence that includes providing a first coverage configuration and providing a second coverage configuration, wherein:

219. In my opinion, Dinan in view of Wong render obvious this limitation.

220. I incorporate the discussion provided above with respect to claim element **1[a]** of Claim 1.

20[b]: providing the first coverage configuration includes transmitting a first beam of a first network that is configured to provide coverage for the group of devices; and

221. In my opinion, Dinan in view of Wong render obvious this limitation.

222. I incorporate the discussion provided above with respect to claim element **1[b]** of Claim 1.

20[c]: providing the second coverage configuration includes transmitting a second beam of the first network that is narrower than the first beam and configured to provide coverage to at least one continuous use device of the

group of devices, the at least one continuous use device being actively involved in a substantially continuous service with the network,

223. In my opinion, Dinan in view of Wong render obvious this limitation.

224. I incorporate the discussion provided above with respect to claim element **1[c]** of Claim 1.

20[d]: and providing coverage by a second network to a plurality of interval use devices of the group of devices;

225. In my opinion, Dinan in view of Wong render obvious this limitation.

226. I incorporate the discussion provided above with respect to claim element **1[d]** of Claim 1.

20[e]: a processor coupled to the machine readable medium to execute the instructions; and

227. In my opinion, Dinan in view of Wong render obvious this limitation.

228. I incorporate the discussion provided above with respect to claim element **20[pre]** of Claim 20.

20[f]: an adaptive antenna configured to transmit the first beam and the second beam.

229. In my opinion, Dinan in view of Wong render obvious this limitation.

230. I incorporate the discussion provided above with respect to claim element **20[pre]** of Claim 20.

231. Wong discloses that its beam antenna patterns (*i.e., first and second beams*) are transmitted by an “antenna array 210 coupled to transceiver 230 through

beam former 220.” Ex. 1006, 5:11-12. Wong teaches that the purpose of its invention is to “facilitate ***adaptively forming*** ideal antenna patterns for communications” with devices. Ex. 1006, 12:9-11; *see also* 13:4-10 (“[A]ntenna patterns, adjusted over time according to embodiments of the present invention, are expected to provide a very good approximation of the use of antenna patterns ***uniquely optimized*** for particular subscriber stations.”). Thus, the antenna array in Wong is an ***adaptive antenna*** because it adapts to changing conditions to provide more optimal communications with devices.

XI. CONCLUSION

232. I hereby declare that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare 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 the Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this proceeding.

Executed on this December 18, 2023 by:



Kevin C. Almeroth, Ph. D.