

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BMW of North America LLC,

Petitioner,

v.

NorthStar Systems LLC,

Patent Owner.

U.S. Patent No. 6.898,432

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Case No. IPR2023-001190

DECLARATION OF SAMUEL P. PULLEN, PH.D.

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I. INTRODUCTION

1. My name is Samuel P. Pullen, Ph.D. I am currently a part-time Senior Research Engineer in the Department of Aeronautics and Astronautics at Stanford University as well as an independent technical consultant. I have been retained as an independent expert by BMW of North America LLC (“BMW NA”) in this proceeding.

2. I have been asked to provide my opinion as to whether claims 1-8 of U.S. Patent No. 6,898,432 are patentable. This report sets forth my opinions and the bases of my opinions.

3. All the opinions stated herein are based on my own personal knowledge, professional judgment, and my analysis of the materials and information I considered in preparing this report. The materials I reviewed in connection with preparing this report are listed below. I make the following statements based on my own personal knowledge and, if called as a witness, I could and would testify to the following. I am being paid for my work in this litigation at the rate of \$400.00 per hour, plus reimbursement of reasonable expenses. My compensation does not depend on the outcome of this proceeding, and I have no financial interest in that outcome.

II. QUALIFICATIONS

4. My qualifications for forming the opinions set forth in this report are summarized here and are addressed more fully in my CV, which is attached hereto as Exhibit 1004 with specific publications attached as Appendices.

Appendix	Description
A	“Ground Based Augmentation Systems,” Ch. 31 in Springer <i>Handbook of Global Navigation Satellite Systems</i> (2017)
B	“Differential GPS,” Ch. 4 of <i>GNSS Applications and Methods</i> (2009)
C	“Real-Time Ionospheric Threat Adaptation Using Space Weather Prediction for GNSS-Based Aircraft Landing Systems,” in <i>IEEE Transactions on ITS</i> , 2017)
D	“Guidance, Navigation, and Separation Assurance for Local-Area UAV Networks Putting the Pieces Together,” in <i>Proc. of ION PNT</i> (2013)
E	“Using Outage History to Exclude High-Risk Satellites from GBAS Corrections,” in <i>Navigation</i> (2012)
F	“Ionospheric Threat Mitigation by Geometry Screening in GBAS,” in <i>AIAA Journal of Aircraft</i> (2011)

5. Based on my education, research, and work experience, I am knowledgeable about the subject matter of the '432 patent and the related prior art. I am currently a part-time Senior Research Engineer in the Department of Aeronautics and Astronautics at Stanford University and am also an independent technical consultant.

6. At Stanford and as an independent consultant, I have worked with navigation system technology, such as GPS and GNSS (Global Navigation

Satellite System) navigation systems, inertial navigation systems, and test procedures to support such systems for more than 25 years. My experience includes requirements and specification development, system development, system implementation, and verification testing. I am familiar with the subject matter of this case and consider myself an expert in, among other things, the fundamentals of navigation systems, GNSS (satellite) and related navigation systems, the fusion of GNSS with other navigation technologies, and the application of those technologies to aircraft, ships, and land vehicles.

7. I received two Bachelor of Science degrees in Aeronautics and Astronautics and History from the Massachusetts Institute of Technology (“MIT”) in 1989. I received a Master of Science degree in Aeronautics and Astronautics, with an emphasis on guidance and control systems, from Stanford in 1990, and I received my Ph.D. in Aeronautics and Astronautics from Stanford in 1996. My Ph.D. thesis is entitled “Probabilistic Engineering Design Optimization: Applications to Spacecraft and Navigation Systems.”

8. From 1996 through the present, I have worked as a consultant (mostly self-employed and also for NavAstro of Los Gatos, California) on many projects involving navigation systems, including the conceptual development of GNSS systems, providing technical support for algorithm design, testing, and validation

for the Local Area Augmentation System (LAAS) and the Ground-based Augmentation System (GBAS), and for system architecture, algorithm design, and requirements assessment of the U.S. Navy's Joint Precision Approach and Landing System (JPALS). I have also worked on the GPS III Modernization efforts for the DOD GPS Joint Program Office.

9. In 1996, upon completing my Ph.D., I began working at the Hansen Experimental Physics Laboratory ("HEPL") at Stanford University. While at HEPL, I developed, installed, and validated the first LAAS ground system prototype that included all the real-time integrity verification algorithms needed to meet the LAAS safety requirements. I also provided research support to several projects, including the Wide Area Augmentation System (WAAS), Satellite-based Augmentation Systems, and JPALS integrity verification. I also taught a graduate-level course called "AA279 - Space Mechanics," and I am a guest lecturer for the "Global Positioning Systems" course and other courses in the Aeronautics and Astronautics department. In 2007, I moved to the Aeronautics and Astronautics Department and continued my work, expanding it to include the integrity of other GNSS and applications such as Precise Point Positioning (PPP) and the combination of GNSS with other sensors. I have been and remain the head of the GBAS/LAAS research project, where I oversee a small team of engineers and

graduate students working on algorithm research, safety assurance, prototype development, and test and validation.

10. I have been recognized for my contributions to the technology and development of navigation systems and have served on several professional committees in the industry. For example, I received the Institute of Navigation (ION) Early Achievement Award in 1999 and was honored with the ION GPS/GNSS Conference “Best Paper” Award four times—in 1999, 2000, 2001, and 2009. Also, I currently serve as a reviewer for industry journals such as IEEE, AIAA, and ION, and I was the Associate Editor for Navigation for IEEE Transactions on Aerospace and Electronic Systems from 2007 to 2015. I have also chaired several conferences for ION, IEEE, and others. I was elected as a Fellow of the ION in 2017.

11. In addition to my professional recognition, I am a co-inventor of U.S. Patent No. 6,667,713, entitled “Self-monitoring satellite system.” As shown in my CV (Exhibit 1004), I have also authored or co-authored more than 200 book chapters, reports, journal papers, industry magazine articles, and conference papers on various topics related to navigation systems, including GBAS, GNSS, GPS, and have been an invited speaker at more than 30 navigation-related conferences and seminars since 2003.

III. MATERIALS CONSIDERED

12. In forming my opinions, I have reviewed the following documents, and any other document cited in this declaration:

Exhibit	Description
Ex-1001	U.S. Patent No. 6,898,432 (“the ’432 patent”)
Ex-1002	Prosecution File History of U.S. Patent No. 6,898,432
Ex-1004	Curriculum Vitae of Samuel P. Pullen
Ex-1005	U.S. Patent No. 6,714,789 to Oh (“ <i>Oh</i> ”)
Ex-1006	U.S. Patent No. 6,845,246 to Steer (“ <i>Steer</i> ”)
Ex-1007	GB Patent No. 2,295,943 to Thomas (“ <i>Thomas</i> ”)
Ex-1008	U.S. Patent No. 5,732,350 to Marko (“ <i>Marko</i> ”)
Ex-1009	U.S. Patent No. 5,577,100 to McGregor (“ <i>McGregor</i> ”)
Ex-1010	U.S. Patent No. 6,611,687 to Clark (“ <i>Clark</i> ”)
Ex-1011	U.S. Patent No. 6,775,298 to Aggarwal (“ <i>Aggarwal</i> ”)

13. I have also relied on my education, experience, research, training, knowledge in the relevant art, and my understanding of the applicable legal principles described in this declaration.

14. All the 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 understanding of how a person of ordinary skill in the art (“POSITA”) would have understood the claims of the ’432 patent at the time of the alleged invention.

15. I reserve the right to supplement and amend any of my opinions in this declaration based on documents, testimony, and other information that becomes available to me after the date of this declaration.

IV. LEGAL PRINCIPLES

16. It is my understanding that there are two ways that prior art references can render a patent claim unpatentable: anticipation and obviousness. Counsel has informed me that the petitioner has the burden in an *inter partes* review to show unpatentability by a preponderance of the evidence.

17. I also understand that there is a set process as follows: (a) the claims of a patent are properly construed, (b) then, the claim language is compared to the prior art on a limitation-by-limitation basis. If the prior art reference contains all the elements of the claim language (explicitly or inherently), arranged as in the claims, then that is considered anticipation.

18. I understand that an invention is obvious when the differences between the subject matter sought to be patented 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 having ordinary skill in the art. For this reason, I have been asked to consider the level of ordinary skill in the field that someone would have had at the time of the claimed invention.

19. Counsel has also instructed me that in an obviousness determination, the factors to consider are (1) the scope and content of the prior art, (2) the differences between the prior art and the asserted claims, (3) the level of ordinary skill in the pertinent art, and (4) the existence of secondary considerations of non-obviousness. Secondary considerations include a long-felt need, commercial success, unexpected results, praise of the invention, licensing, copying, failure of others, and skepticism by experts.

20. Counsel has also instructed me that an obviousness inquiry may involve assessing the motivation of a person of ordinary skill to combine references. The prior art references themselves may provide a suggestion, motivation, or reason to combine, but other sources may also support a rationale for combining two or more prior art references.

21. It is also my understanding through counsel that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. It is further my understanding that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee.

22. I have been informed that, in this proceeding, claim terms in the '432 patent must be given the meaning that the term would have to a person of ordinary

skill in the art in question at the time of the invention in light of the patent specification.

23. I have been asked to assume that November 21, 2000, is the date of the purported invention, as that is the earliest date to which the '432 patent claims priority. I have not conducted a separate analysis to determine whether the challenged claims are entitled to this priority date, as I understand that the prior art references discussed below qualify as prior art even if all claims are deemed to be entitled to the November 21, 2000, date.

V. THE '432 PATENT

24. The '432 patent describes a method for selecting which of a plurality of wireless communication options will be used by a mobile communication device based on the location of the device on a route. Ex-1001, Abstract. The first independent claim, claim 1 of the '432 patent, is listed below:

	Claim Limitation
1pre	A method of selecting which of a plurality of wireless communication options will be used by a mobile communication device, comprising the steps of:
1A	(a) storing in a database information indicative of coverage areas for the wireless communication options along a route that the mobile communication device will be traversing, including storing boundary locations of the coverage areas for the wireless communication options along the route where the boundary

	locations stored are limited to boundary locations that are on streets of the route;¹
1B	(b) determining at the mobile communication device where on the route that the mobile communication device is at as it traverses the route;
1C	(c) accessing the database to obtain information regarding the communication options available along the route;
1D	(d) determining whether to switch from a first one of the wireless communication options presently being used to a second one of the wireless communication options when the mobile communication device approaches a boundary of a coverage area of one of the wireless communication options based on the wireless communication options available once the boundary is crossed and those that will be available further along the route;
1E	(e) switching from the first one of the wireless communication options to the second one of the wireless communication options if the determination was made to switch to that second one of the wireless communication options; and
1F(i)	(f) obtaining updated information concerning the coverage areas of the wireless communication options and updating the database with the updated information,
1F(ii)	wherein one of the plurality of wireless communication options is not using any wireless communication, and
1F(iii)	wherein the step of obtaining updated information concerning the coverage areas of the wireless communication options includes obtaining this information from providers of the wireless communication options.

¹ All colors, emphases, and annotations have been added to the text herein unless noted otherwise.

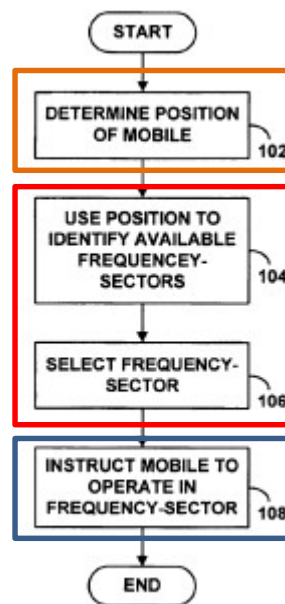
VI. OVERVIEW OF PRIOR ART

A. *Oh*

25. *Oh* is entitled “Method and System for Inter-Frequency Handoff and Capacity Enhancement in a Wireless Telecommunications Network.” Ex-1005. *Oh* discloses “[a] method and system for allocating air interface resources in a wireless telecommunications network. A control entity determines the current or projected location of a mobile station. Using the location, the control entity identifies the physical sectors and respective carrier frequencies available to serve the mobile station. The control entity then selects an optimal physical sector and respective carrier frequency and instructs the mobile station to operate in the selected physical sector using the selected carrier frequency.” *Oh*, Abstract.

26. *Oh* discloses “a network entity uses information about the location of a mobile station, *Oh*, 7:14-15, together with information about actual congestion on various carrier frequencies in areas of a wireless network,” like signal strength “to determine (i) when communications with a mobile station can be switched to a different carrier frequency, (ii) when communications with the mobile station should be switched to a different carrier frequency, and (iii) to which carrier frequency the communications should be switched.” *Id.*, 3:17-25, 7:15-18. Once

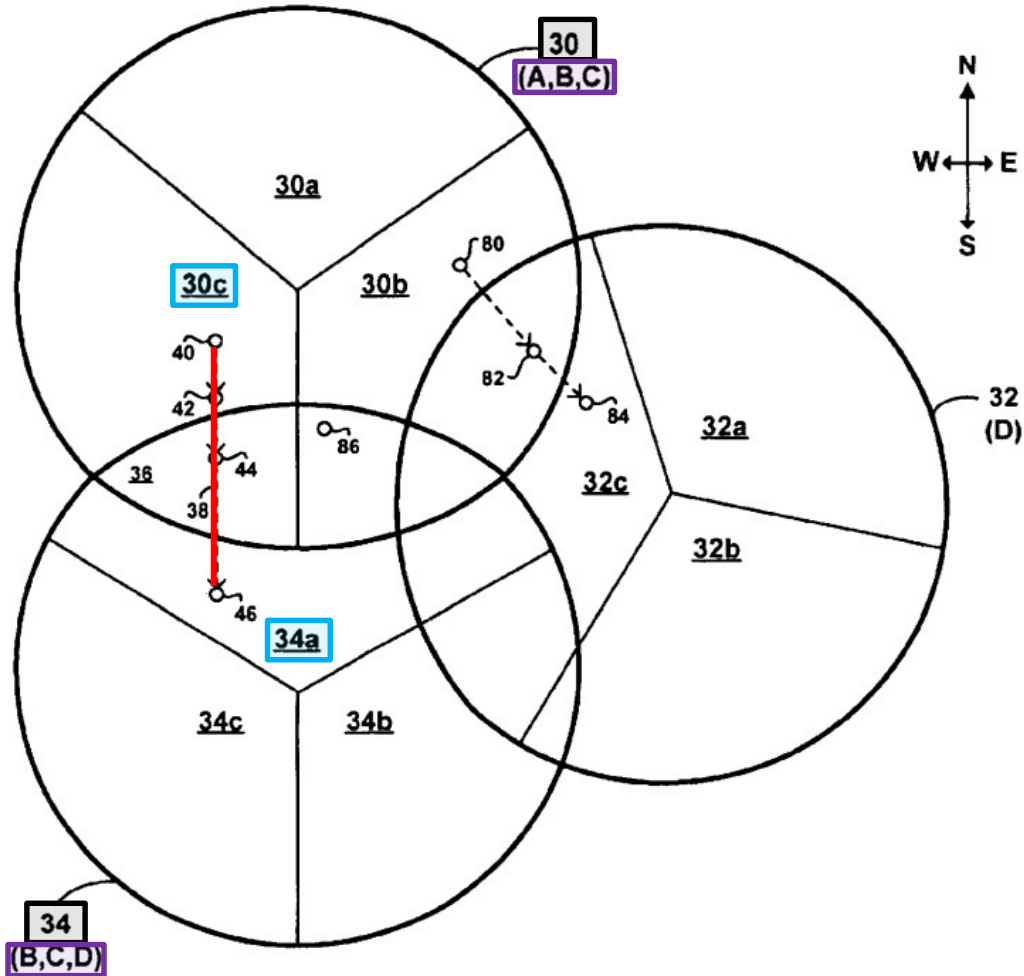
the selection of the frequencies is accomplished, the control entity instructs the station to operate in the selected frequency. *Id.*, 7:18-20, 11:51-60, 13:44-46.



Oh, FIG. 4.

27. *Oh* discloses “referring to FIG. 3, if the mobile station is at location 42, the MSC may determine by reference to the location log that the mobile station is on a trajectory along which the mobile station is about to head into area 36, which is an overlap of physical sectors 30c and 34a.” *Oh*, 12:32-36. *Oh* discloses “[w]ith a knowledge of the location to which the mobile station is headed, the [mobile switching center (MSC)] may then consult the sector-location table to determine which frequency-sector(s) will be available to possibly serve the mobile

station if and when the mobile station reaches the projected location.” *Oh*, 12:17-25.



Oh, FIG. 3.

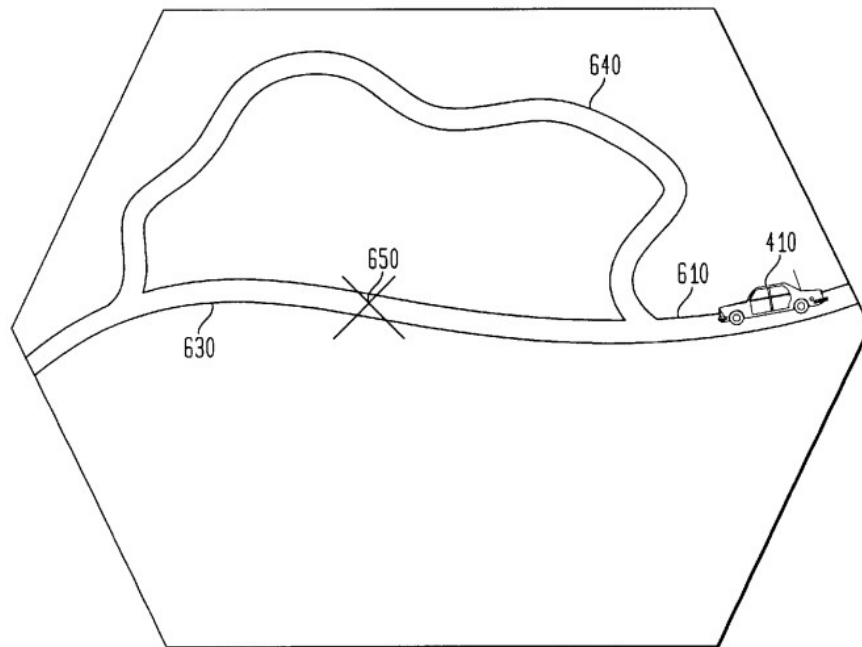
28. *Oh* also discloses updating a sector-table a number of different ways such as: (1) “the service provider may periodically load an updated sector-location table into each MSC or serving system” or (2) “new measurements of sector

coverage may need to be made, and the sector-location table may need to be updated accordingly.” *Oh*, 8:20-29.

B. *Clark*

29. *Clark* discloses a wireless telecommunication system capable of “(1) providing wireless telecommunication service to the wireless mobile unit 410 ...; (2) monitoring the movement ... of the wireless mobile unit 410 as it remotely travels; and (3) providing location-based or region-based information back to the wireless mobile unit 410 ... based on the observed changing location or entrance of the wireless mobile unit 410 into different cells or regions.” *Clark*, 3:44-62. This system allows users to “prepare for and potentially avoid problems within a region in which they are located or are approaching.” *Clark*, 3:38-43. *Clark* discloses that when “a wireless mobile unit 410 enter[s] a particular region, it can receive information relating to regions or cells neighboring the designated region separate from or along with information for the designated region.” *Clark*, 8:1-6. *Clark* discloses its system monitors the mobile unit 410 as it “chang[es] location from region to region or cell to cell,” and tracks the mobile unit 410 “traveling on a first road 610.” *Clark*, 3:56-57, 7:5-6. This is shown in FIG. 8 below.

FIG. 8



Clark, FIG. 8.

30. *Clark* also discloses storing and sending information “relating to a region neighboring the designated region.” *Clark*, 6:31-35. The information stored in *Clark*’s database includes “digitize maps of a plurality of geographic areas or cells, such as those served by wireless switching center 420.” *Clark*, 4:22-28.

C. *McGregor*

31. *McGregor* is entitled “Method and System for Inter-Frequency Handoff and Capacity Enhancement in a Wireless Telecommunications Network.” Ex-1005. *Oh* discloses “[a] method and system for allocating air interface resources in a wireless telecommunications network. A control entity determines

the current or projected location of a mobile station. Using the location, the control entity identifies the physical sectors and respective carrier frequencies available to serve the mobile station. The control entity then selects an optimal physical sector and respective carrier frequency and instructs the mobile station to operate in the selected physical sector using the selected carrier frequency.” *McGregor*, Abstract.

32. *McGregor* discloses “mobile debit phones ... **that will deactivate the phone unit if credit is exceeded or credit is not extended by the airway activation.**” *McGregor*, 2:39-43. *McGregor* discloses “accounting system includes a complex billing algorithm with a multiple factor accounting protocol to account for local charges, roaming charges when the mobile phone unit moves from one zone to another, long distance charges, international charges including country independent local charges, and surcharges which may be per call or rate based.” *McGregor*, 2:48-54. Further, “[t]he complex billing algorithm factors the multiple variables of a telephone call from a mobile phone into a billing [equation] that virtually mirrors the factors considered by public switched network providers and involved wireless service providers, (of which there may be more than one involved in a single call).” *McGregor*, 14:1-6.

D. *Steer*

33. *Steer* is entitled “Location Based Power Control for Mobile Communications Systems.” Ex-1006. *Steer* discloses “[a] method and apparatus for facilitating power control within mobile radio systems. The power control is a function of location of the mobile station. Power levels are mapped to a geographic grid and power levels are set based upon such pre-determined power levels.” *Steer*, Abstract.

34. *Steer* discloses “[s]ome of the signaling received at the base station may relate to updating of the power control map information. The mobile terminal may signal with its location and its (successful) power level and other modulation parameters. This information is passed to the power control map update process 40b. This process may adjust the power control map information 40c for the indicated location. This may mean adding a new entry in the table if the mobile terminal is at a previously non-surveyed location.” *Steer*, 10:14-24.

VII. LEVEL OF ORDINARY SKILL IN THE ART

35. In rendering the opinions set forth in this declaration, I have been asked to consider the ’432 patent’s claims and the prior art through the eyes of a person of ordinary skill in the art (“POSITA”). I considered factors such as the educational level and years of experience of those working in the pertinent art, the

types of problems encountered in the art, the teachings of the prior art, patents and publications of other persons or companies, and the sophistication of the technology.

36. I have been instructed to assume a person of ordinary skill in the art is not a specific real individual but rather a hypothetical individual having the qualities reflected by the factors discussed above.

37. Taking these factors into consideration, it is my opinion that a POSITA at the time of the purported invention that a POSITA at the time of the purported invention would have had at least a bachelor's degree in Computer or Electrical Engineering (or equivalent engineering discipline) and approximately three years of experience in navigation or geolocation systems along with knowledge of RF (radio frequency) communications (from coursework or other experience). Additional education could substitute for professional experience, and significant work experience could substitute for formal education.

38. By November 21, 2000, as evidenced by my qualifications outlined in Section II, I was at least a person of ordinary skill in the art. In this declaration, and for all my opinions herein, I have applied the knowledge of a person of ordinary skill in the art as of November 21, 2000. In forming my opinions, I have also relied on my education and experience.

VIII. CLAIM CONSTRUCTION

39. I understand that in *inter partes* review, the U.S. Patent and Trademark Office construes terms according to their plain and ordinary meaning, in view of the specification, as would have been understood by a person of ordinary skill in the art. I understand that no terms have been proposed for construction in any case. Based on my review of the claims and my personal knowledge and experience, I have considered and applied the plain and ordinary meaning of all terms of the '432 patent as they would have been understood by one skilled in the art in view of the specification as of November 21, 2000.

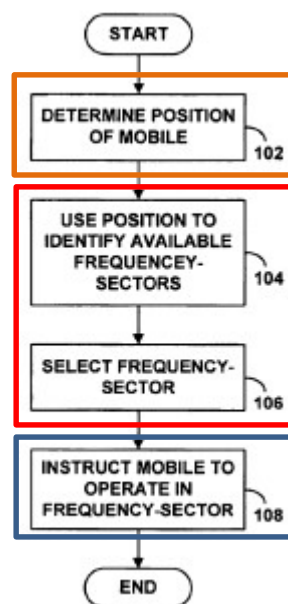
IX. SUMMARY OF OPINIONS

40. In my opinion, claims 1-8 of the '432 patent are rendered obvious under the following grounds:

Ground	Reference(s)	Claims
1	<i>Oh, Clark, McGregor</i>	1, 2
2	<i>Oh, Clark, McGregor, Steer</i>	3-6
3	<i>Oh, Clark, Steer</i>	7, 8

41. *Oh* discloses or renders obvious all limitations of the independent claims and many of the dependent claims of the '432 patent (**Ground 1**). *Oh* discloses “a network entity uses information about the location of a mobile station,

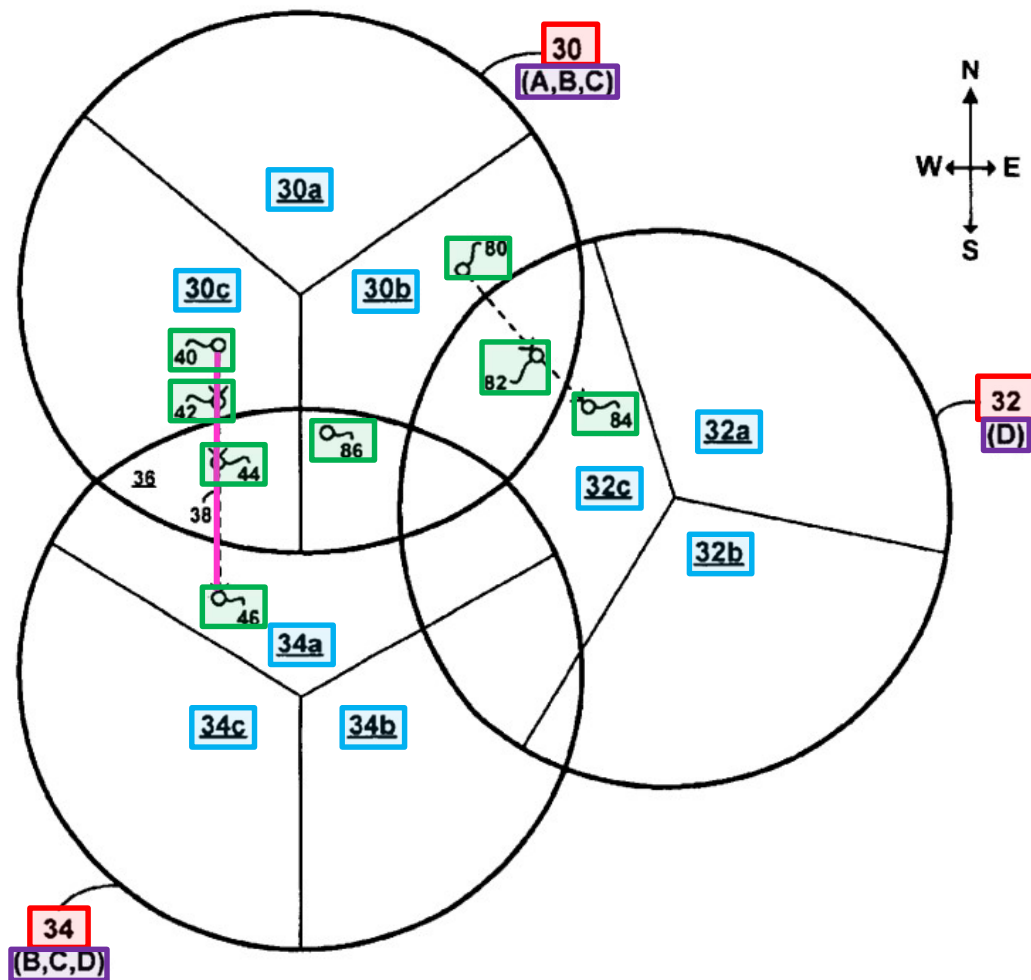
together with information about actual congestion on various carrier frequencies in areas of a wireless network, to determine (i) when communications with a mobile station can be switched to a different carrier frequency, (ii) when communications with the mobile station should be switched to a different carrier frequency, and (iii) to which carrier frequency the communications should be switched.” *Oh*, 3:17-25. This is reflected in FIG. 4, which includes steps of determining “a position of the mobile station” 102, using the position to “identify a number of frequency-sectors that are available to serve the mobile station” 104, selecting “a preferred frequency-sector” 106, and instructing the mobile station “to operate in the preferred frequency-sector” 108. *Id.*, 7:14-22. FIG. 4, below, shows exemplary functions.



Oh, FIG. 4.

42. *Oh* discloses “[a] telecommunications service provider may store the sector-location table in a central repository for reference through out-of-band signaling by various [mobile switching centers (MSCs)] in the service provider's network.” *Oh*, 8:16-18. *Oh* explains “sectors (which can be visualized ideally as pie pieces) can be referred to as ‘physical sectors,’ since they are physical areas of a cell site.” *Oh*, 1:40-43. Referring to FIG. 3, *Oh* discloses “if a mobile station is physically at location 40, the MSC may query the sector-location table and thereby determine that the frequency-sectors available to serve the mobile station are: A30c, B30c and C30c.” *Oh*, 10:31-35. The mobile station can move to locations 42, 44, 46 or 80, 82, 84, 86 where other coverage options are available. *Oh*, 10:31-43, 12:32-36, 12:42-45, 12:52-13:5, 13:7-11. In FIG. 3, cells 30, 32, and 34 each contain three sectors, e.g., 30a, 30b, 30c, and have one or more carriers A, B, C, and D. *Oh*, 6:18-28. *Oh* discloses “referring to FIG. 3, if the mobile station is at location 42, the MSC may determine by reference to the location log that the mobile station is on a trajectory along which the mobile station is about to head into area 36, which is an overlap of physical sectors 30c and 34a.” *Oh*, 12:32-36. *Oh* discloses “[w]ith a knowledge of the location to which the mobile station is headed, the [mobile switching center (MSC)] may then consult the sector-location

table to determine which frequency-sector(s) will be available to possibly serve the mobile station if and when the mobile station reaches the projected location.” *Oh*, 12:17-25.



Oh, FIG. 3.

43. Certain claim limitations of the '432 patent further require wireless communication options where one of the wireless communication options “is not

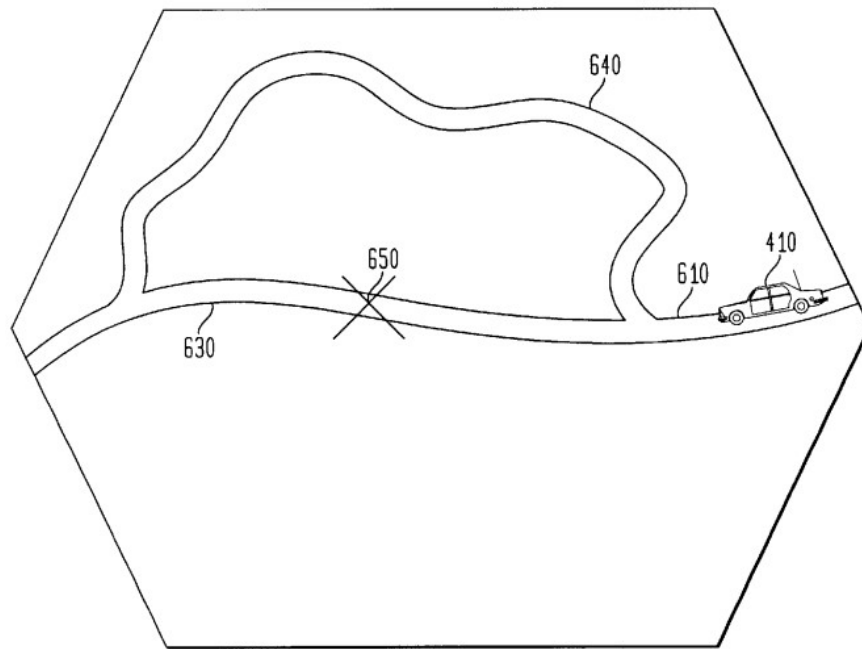
using any wireless communication,” (claims 1, 2, **Ground 1**). While *Oh* discloses that a carrier frequency may not be available due to low signal strength (i.e., when a call drops), it does not expressly disclose that one of the wireless communication options is not using any wireless communication options, but *McGregor* does.

McGregor discloses “mobile debit phones ... that will deactivate the phone unit if credit is exceeded or credit is not extended by the airway activation.” *McGregor*, 2:39-43. *McGregor* discloses “accounting system includes a complex billing algorithm with a multiple factor accounting protocol to account for local charges, roaming charges when the mobile phone unit moves from one zone to another, long distance charges, international charges including country independent local charges, and surcharges which may be per call or rate based.” *McGregor*, 2:48-54. Further, “[t]he complex billing algorithm factors the multiple variables of a telephone call from a mobile phone into a billing [equation] that virtually mirrors the factors considered by public switched network providers and involved wireless service providers, (of which there may be more than one involved in a single call).” *McGregor*, 14:1-6.

44. Certain claim limitations of the ’432 patent further require “boundary locations that are on streets of the route” (claims 1, 2, **Ground 1**, claims 7, 8, **Ground 3**). While *Oh* discloses that a sector-location table information is stored, it

does not expressly disclose “boundary locations that are on streets of the route,” but *Clark* does. *Clark* discloses a wireless telecommunication system capable of “(1) providing wireless telecommunication service to the wireless mobile unit 410 ...; (2) monitoring the movement ... of the wireless mobile unit 410 as it remotely travels; and (3) providing location-based or region-based information back to the wireless mobile unit 410 ... based on the observed changing location or entrance of the wireless mobile unit 410 into different cells or regions.” *Clark*, 3:44-62. This system allows users to “prepare for and potentially avoid problems within a region in which they are located or are approaching.” *Clark*, 3:38-43. *Clark* discloses that when “a wireless mobile unit 410 enter[s] a particular region, it can receive information relating to regions or cells neighboring the designated region separate from or along with information for the designated region.” *Clark*, 8:1-6. *Clark* discloses its system monitors the mobile unit 410 as it “chang[es] location from region to region or cell to cell,” and tracks the mobile unit 410 “traveling on a first road 610.” *Clark*, 3:56-57, 7:5-6. This is shown in FIG. 8 below.

FIG. 8



Clark, FIG. 8.

45. *Clark* also discloses storing and sending information “relating to a region neighboring the designated region.” *Clark*, 6:31-35. The information stored in *Clark*’s database includes “digitize[d] maps of a plurality of geographic areas or cells, such as those served by wireless switching center 420.” *Clark*, 4:22-28.

“Using GPS or assisted GPS information, speed and direction of travel of the wireless mobile unit 410, and time of travel can be determined to be used in alternate route selection. These map matching techniques are known to those of ordinary skill in the art and can function, when message server data base 540 is a

[Geographic Information System (GIS)] which further includes GIS processing software that enables geographic functions. They can be used to determine and define a new route using route matching/route determining techniques. Further, previous positions can be used to determine[] the exact road that a person is on.” *Id.*, 7:17-27.

46. Certain claim limitations of the ’432 patent further require (1) determining whether a database has updated information and related limitations, (claims 3-6, **Ground 2**; claims 7, 8, **Ground 3**) and (2) steps of updating information (claims 3-6, **Ground 2**). *Oh* does not expressly disclose these limitations, but *Steer* does. *Steer* discloses “[s]ome of the signaling received at the base station may relate to updating of the power control map information. The mobile terminal may signal with its location and its (successful) power level and other modulation parameters. This information is passed to the power control map update process 40b. This process may adjust the power control map information 40c for the indicated location. This may mean adding a new entry in the table if the mobile terminal is at a previously non-surveyed location.” *Steer*, 10:14-24.

47. Accordingly, because the challenged claims of the ’432 patent were known in the art prior to its earliest priority date, it is my opinion that the challenged claims are unpatentable.

**X. GROUND 1: CLAIMS 1 AND 2 ARE RENDERED OBVIOUS BY OH
IN VIEW OF CLARK AND MCGREGOR**

A. Motivation to Combine *Oh*, *Clark*, and *McGregor*

48. As explained in Section IX, claims 1 and 2 require wireless communication options where one of the wireless communication options “is not using any wireless communication,” while suggested by *Oh*, are not expressly disclosed. A POSITA, however, would have been motivated to implement *McGregor*’s deactivation of a phone into *Oh*’s mobile device because, as *McGregor* explains “the service provider can expand its customer base by providing mobile debit phones to its customers with a pre-paid phone credit or with a preapproved credit limit that will deactivate the phone unit if credit is exceeded or credit is not extended by the airway activation and credit transfer procedures that form a part of this mobile phone system. In this manner, the credit risk is limited to an acceptable predefined level.” *McGregor*, 2:38-45. *McGregor* provides further reason to deactivate a phone unit because it “eliminat[es] an accounting session with a service provider for each call made,” and allows for “prepayment of service and call charges, and where credit is extended permits the credit to be provided by an entity other than the service provider.” *McGregor*, 1:45-56. *McGregor* provides a way to alleviate these problems by “real time calculation of phone charges ... to limit phone use.” *McGregor*, 2:23-28. In

particular, *McGregor* discloses an “accounting protocol [that] enables internal tracking of phone usage with activation and deactivation of the phone unit to [e]nsure unauthorized usage is prevented.” *McGregor*, 3:9-12.

49. As also explained in Section IX, claims 1 and 2 require wireless communication options where one of the wireless communication options “where the boundary locations stored are limited to boundary locations that are on streets of the route,” and “determining at the mobile communication device where on the route that the mobile communication device is at as it traverses the route” while suggested by *Oh*, are not expressly disclosed. A POSITA, however, would have been motivated to implement *Clark*’s map matching techniques and storage techniques in its telecommunications system into *Oh*’s wireless telecommunications systems. Similar to *Oh*’s system that determines a mobile device’s position, *Clark*’s map matching and storage techniques allow it to “determine[] that the wireless mobile unit has entered a designated region and information, such as traffic information or information relating to problems within the region, is output for the wireless mobile unit.” *Clark*, 3:22-28. *Clark* further discloses “advances in location-based technology which more and more accurately identify the location or position of a user are utilized in a timely manner to allow users to prepare for and potentially avoid problems within a region in which they

are located or are approaching; or provide users with more information about the region itself.” *Clark*, 3:38-43, 7:17-24. *Clark*’s system meets *Oh*’s goal of avoiding problems by “a controller us[ing] information about the location of a mobile station, together with other information such as the extent of congestion on various carrier frequencies in areas of the network,” to which the mobile phone moves. *Oh*, 7:5-11. Thus, a POSITA would have been motivated to combine *Oh* and *Clark* to avoid problems in a region or cell, like congestion, and to determine and use an available frequency with a good signal strength.

50. In my opinion, a POSITA would have had reasonable expectations of success combining *Clark*, *McGregor*, and *Oh* because *McGregor* discloses “[i]t is to be understood that the mobile phone unit with internal accounting can be implemented into existing wireless communication networks without substantial modification to the network and can be implemented into most existing mobile communication devices with minimal modification, primarily by internal reprogramming of the device.” *McGregor*, 2:62-67. *McGregor*, *Clark*, and *Oh* disclose basic mobile phones with internal logic stored on memory within the mobile phone that would have been able to implement *McGregor*’s internal accounting and *Clark*’s locating and map matching abilities. *McGregor*, 2:62-67, 5:18-28; *Clark*, 5:64-6:2; *Oh*, 9:18-27. *Clark* and *Oh* also disclose similar

switching networks that are capable of communicating with mobile devices and switching mobile phone carriers and can store information related to sectors or cells on memory. *Clark*, 4:22-32; *Oh*, 1:18-32, 3:14-25, 6:47-52.

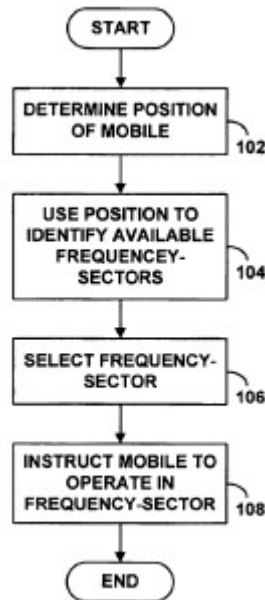
B. Claim 1

51. *Oh* in view of *Clark* and *McGregor* renders obvious claim 1.

1. **[1pre] “A method of selecting which of a plurality of wireless communication options will be used by a mobile communication device, comprising the steps of:”**

52. *Oh* renders obvious [1pre] because *Oh* discloses “a network entity uses information about the location of a mobile station, together with information about actual congestion on various carrier frequencies in areas of a wireless network, to determine (i) when communications with a mobile station can be switched to a different carrier frequency, (ii) when communications with the mobile station should be switched to a different carrier frequency, and (iii) to which carrier frequency the communications should be switched.” *Oh*, 3:17-25.

FIG. 4, below, shows exemplary functions.



Oh, FIG. 4.

53. *Oh* discloses “a method” consistent with the above description. *Oh*, Abstract, 13:36-39.

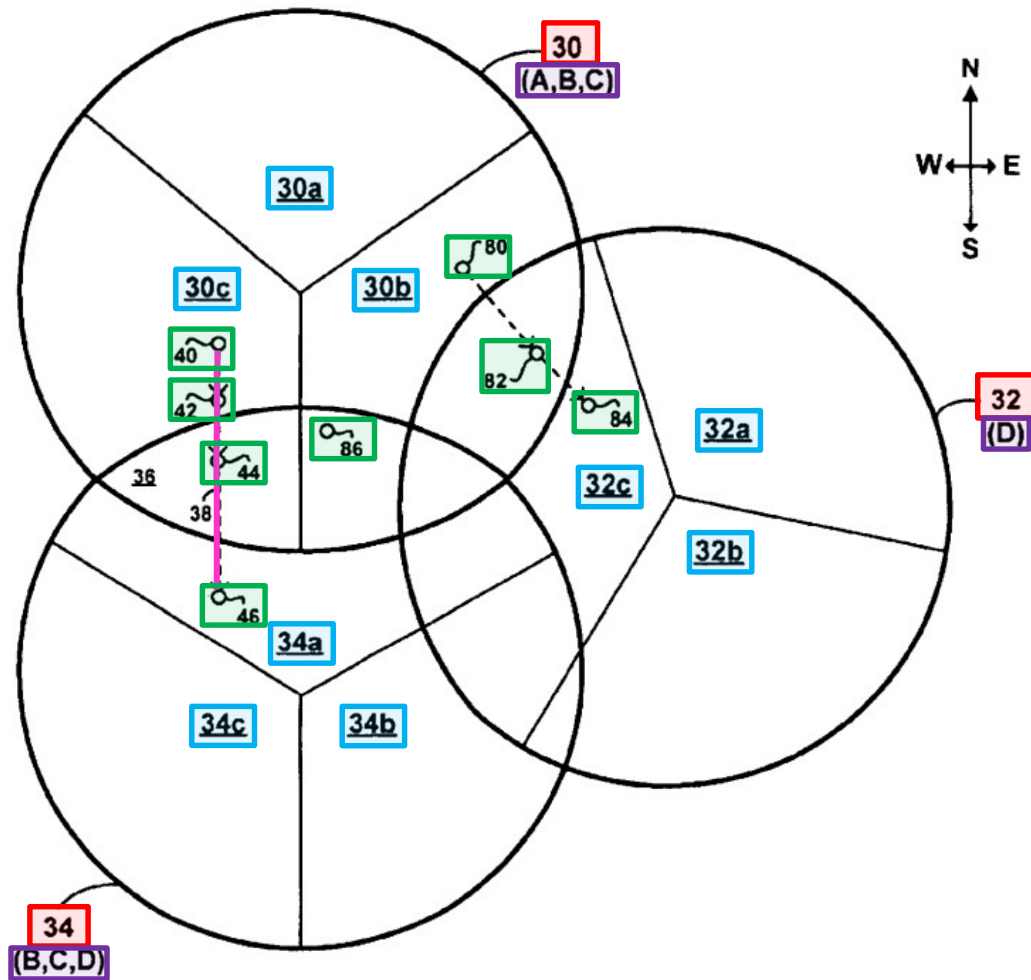
2. **[1A(i)] “(a) storing in a database information indicative of coverage areas for the wireless communication options along a route that the mobile communication device will be traversing,”**

54. *Oh* renders obvious [1A(i)] because *Oh* discloses storing sector information including related latitude/longitude coordinates and the carrier frequencies employed in the sector (information indicative of coverage areas for the wireless communication options along a route that the mobile communication device will be traversing) stored in a sector-location table (database).

55. *Oh* discloses “[t]he data in the sector-location table can be derived manually or with computer assistance by mapping out the locations of the physical sectors in the serving area, associating latitude/longitude coordinates with the boundaries of the physical sectors, and associating with each physical sector the carrier frequencies employed in the sector.” *Oh*, 8:11-16. The data in the sector-location table of coordinates, boundaries, and carrier frequencies corresponds to the claimed “information indicative of coverage areas for the wireless communication options.”

56. *Oh* explains “sectors (which can be visualized ideally as pie pieces) can be referred to as ‘physical sectors,’ since they are physical areas of a cell site.” *Oh*, 1:40-43. Referring to FIG. 3, *Oh* discloses “if a mobile station is physically at location 40, the MSC may query the sector-location table and thereby determine that the frequency-sectors available to serve the mobile station are: A30c, B30c and C30c.” *Oh*, 10:31-35. The mobile station can move to locations 42, 44, 46 or 80, 82, 84, 86 where other coverage options are available. *Oh*, 10:31-43, 12:32-36, 12:42-45, 12:52-13:5, 13:7-11. In FIG. 3, cells 30, 32, and 34 each contain three sectors, e.g., 30a, 30b, 30c, and have one or more carriers A, B, C, and D. *Oh*, 6:18-28.

57. *Oh* discloses “referring to FIG. 3, if the mobile station is at location 42, the MSC may determine by reference to the location log that the mobile station is on a trajectory along which the mobile station is about to head into area 36, which is an overlap of physical sectors 30c and 34a.” *Oh*, 12:32-36. *Oh* discloses “[w]ith a knowledge of the location to which the mobile station is headed, the [mobile switching center (MSC)] may then consult the sector-location table to determine which frequency-sector(s) will be available to possibly serve the mobile station if and when the mobile station reaches the projected location.” *Oh*, 12:17-25. Thus, the data in the sector-location table, including coordinates, boundaries, and carrier frequencies, is used to locate frequencies along a trajectory of the mobile station, which corresponds to the claimed “the wireless communication options along a route that the mobile communication device will be traversing.”



Oh, FIG. 3.

58. *Oh*'s sector-location table (database) is stored in data storage medium 62 of mobile switching center (MSC) 18 and related instructions are provided to cellular telephones. *Oh*, 6:55-58, 7:18-20, 7:58-67, FIGS. 5, 6. A POSITA would have understood these instructions would be saved in memory. Ex-1011, 1:39-41, 4:42-47, 6:25-32, 7:61-63 (stating that packets received by a mobile device are stored in "memory").

3. **[1A(ii)] “including storing boundary locations of the coverage areas for the wireless communication options alone² the route where the boundary locations stored are limited to boundary locations that are on streets of the route;”**

59. *Oh* in view of *Clark* renders obvious [1A(ii)] because *Oh* discloses storing sector information including related latitude/longitude coordinates and the carrier frequencies employed in the sector (storing boundary locations of the coverage areas for the wireless communication options along the route) and *Clark* discloses storing such information specific to roads in a region the mobile unit is traveling on (where the boundary locations stored are limited to boundary locations that are on streets of the route).

60. *Oh* discloses “[w]ith a knowledge of the location to which the mobile station is headed, the [mobile switching center (MSC)] may then consult the sector-location table to determine which frequency-sector(s) will be available to

² The undersigned understands “alone” here and each time it is used in claims 1-8 to be a typographical error and interprets this term to mean “along.” This error is repeated seven more times in [1C], [1D], [2A(ii)], [4A(i)], [7(pre)], [8(pre)], and [8A].

possibly serve the mobile station if and when the mobile station reaches the projected location.” *Oh*, 12:17-22.

61. *Oh*’s sectors correspond to the claimed “boundary locations” because *Oh* discloses “associating latitude/longitude coordinates with the boundaries of the physical sectors” and storing the information in its sector-location table. *Oh*, 8:11-16. *Oh* explains “sectors (which can be visualized ideally as pie pieces) can be referred to as ‘physical sectors,’ since they are physical areas of a cell site.” *Oh*, 1:40-43. Accordingly, *Oh*’s sectors are used within a physical area with physical limitations or boundaries.

62. The ’432 specification includes discussion similar to, but not exactly the same as, the term “boundary locations that are on streets of the route.” The ’432 specification states “[n]etwork boundary locations are the locations on particular street sections where boundaries for the wireless networks lies.” Ex-1001, 7:8-12. For example, a mobile device moves along a street in one boundary area at one location to another boundary area at another location on the street.

63. To the extent *Oh* does not explicitly disclose the claimed “where the boundary locations stored are limited to boundary locations that are on streets of the route,” *Clark* does. *Clark* discloses a wireless telecommunication system capable of “(1) providing wireless telecommunication service to the wireless

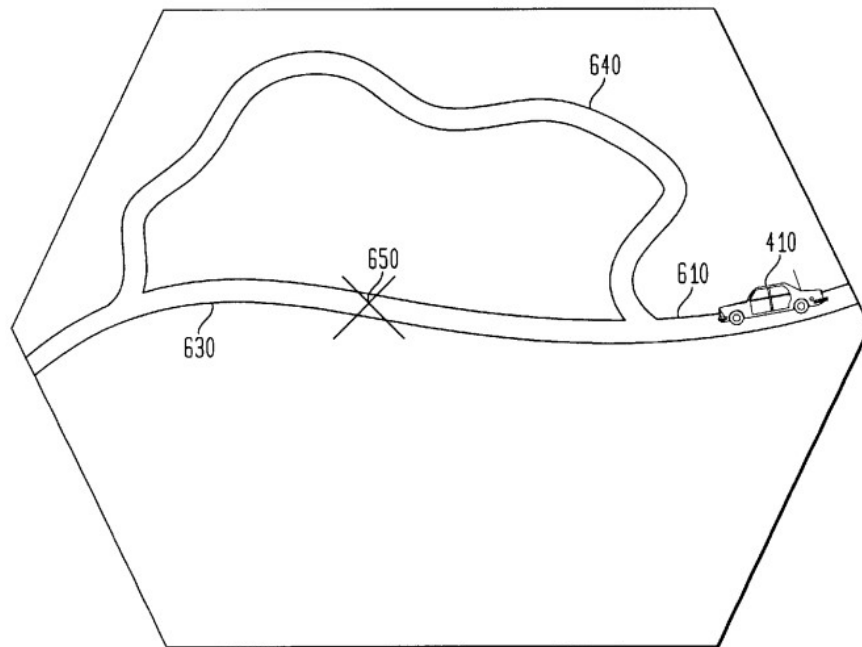
mobile unit 410 ...; (2) monitoring the movement ... of the wireless mobile unit 410 as it remotely travels; and (3) providing location-based or region-based information back to the wireless mobile unit 410 ... based on the observed changing location or entrance of the wireless mobile unit 410 into different cells or regions.” *Clark*, 3:44-62. This system allows users to “prepare for and potentially avoid problems within a region in which they are located or are approaching.” *Clark*, 3:38-43. *Clark* discloses that when “a wireless mobile unit 410 enter[s] a particular region, it can receive information relating to regions or cells neighboring the designated region separate from or along with information for the designated region.” *Clark*, 8:1-6. *Clark* discloses its system monitors the mobile unit 410 as it “chang[es] location from region to region or cell to cell,” and tracks the mobile unit 410 “traveling on a first road 610.” *Id.*, 3:50-62, 7:5-17.

64. In my opinion, a POSITA would have understood that the tracking of the change of one region or cell to another is a determination of a “boundary.” *Clark* discloses that its cells are “spatially distinct areas.” *Clark*, 1:32-34. In addition, the maps used by *Clark* keep track of cells and mobile units through “digitized maps of a plurality of geographic areas or cells.” *Id.*, 4:21-27. Further, *Clark*’s controller 520 compares “a current location of wireless mobile unit 410 to determine whether or not the wireless mobile unit 410 is within a specific

geographic region, or is within a region neighboring a particular geographic region.” *Id.*, 4:27-31. *Clark* thus renders obvious storing “boundary locations” because its controller 520 determines whether a mobile unit is within one cell or a different cell by storing geographic bounds of the cells. Because *Clark*’s controller determines map areas that relate only to cells that the mobile device is in or in a neighboring cell, and *Oh* discloses determining cell information based on a trajectory of a mobile device, a POSITA would have found it obvious to store information for the cells the mobile device is within or moving to. Thus, the only cell boundaries within this information would be for the cells the mobile device is within or moving to.

65. For example, *Clark* discloses that it provides information for the mobile unit 410 based on the regions or cells through which mobile unit 410 is or will be traveling on a road (e.g., road 610) and for an alternative road 640. *Clark*, 7:13-20. This is shown in FIG. 8.

FIG. 8



Clark, FIG. 8.

Clark also discloses the stored information for cells or neighboring cells can relate to “particular roads or regions frequently used by [the] user of wireless mobile unit 410.” *Clark*, 4:54-62.

66. A POSITA would have found it obvious that determining *Oh*’s trajectory of a mobile device would be along *Clark*’s road or an alternative road. A POSITA would have understood that a road (e.g., such as *Clark*’s route 610) is an obvious axis for a trajectory of a user of a mobile device. For example, U.S. Patent No. 5,732,350 to *Marko* (Ex-1008) discloses “[e]ach mobile station carried down

the street must register with the base station serving each newly-entered service area.” *Marko*, 2:63-65. *Marko* similarly discloses “a user carrying a mobile station along a generally straight path through a series of service areas, such as along a street....” Similarly, GB Patent No. 2,295,943 to *Thomas* (Ex-1007) discloses service cells, which can be switched between to handle a user’s call, include smaller microcells where “microcells might typically be 200 to 500m in extent along a street.” *Thomas*, 1:24-31.

67. *Oh* in view of *Clark* renders obvious “storing boundary locations” because *Clark* discloses storing information in maps “relating to a region neighboring the designated region,” *Clark*, 6:31-35, and *Clark*’s controller can determine when the mobile unit is within one cell versus another cell. *Clark*’s map information is stored in message server data base 540 so that message server 450 can send the information to wireless mobile unit 410 through WSC 420 and base-stations 403-1 through 403-4 shown in FIG. 4. *Clark*, 3:66-4:11.

68. To the extent Patent Owner argues that the “storing” step occurs at a switch, *Clark* discloses “customer or user profiles for users of wireless mobile units can be stored in message server database 540.” *Clark*, 8:16-18. *Clark* further discloses “personal preferences” such as “particular roads or regions frequently used by a user of wireless mobile unit 410” are stored in message server data base

540. *Clark*, 4:54-62. A POSITA would have found it obvious that such information could be limited for each profile to the “frequently used” roads because the frequently used roads are the most likely to be used, along with the cells and regions associated with those roads, for example, so controller 520 would determine which cell the mobile unit is in and which cells are neighboring. *Clark*, 4:27-31, 4:54-62, 7:5-10.

69. To the extent Patent Owner argues the “storing” step occurs at the mobile device, *Oh* renders obvious that the information provided to a mobile device includes “instructing the mobile station to switch to [the] carrier frequency of the [selected] frequency sector.” *Oh*, 11:19-24. Thus, a POSITA would have found it obvious, based on movement of a mobile device on a road, to send information to the mobile device of possible neighboring frequency sectors so that “the mobile station may responsively switch to communicate ... on the designated frequency.” *Clark*, 11:48-51. *Clark* similarly discloses that “upon a wireless mobile unit 410 entering a particular region, it can receive information relating to regions or cells neighboring the designated region separate from or along with information for the designated region.” *Clark*, 8:1-5. Thus, *Oh* in view of *Clark* renders obvious that information sent and stored on a mobile device would include only the information for cells or regions along the trajectory of the mobile device,

including the geographic bounds of those cells, so that the mobile device “responsively” switches to communicate on the next expected frequency.

70. A POSITA would have understood that information sent to *Oh* or *Clark*’s mobile devices would be stored in flash memory, Random Access Memory (RAM), or in long-term memory. See Ex-1011, 1:39-41, 4:42-47, 6:25-32, 7:61-63 (stating that packets received by a mobile device are stored in “memory”).

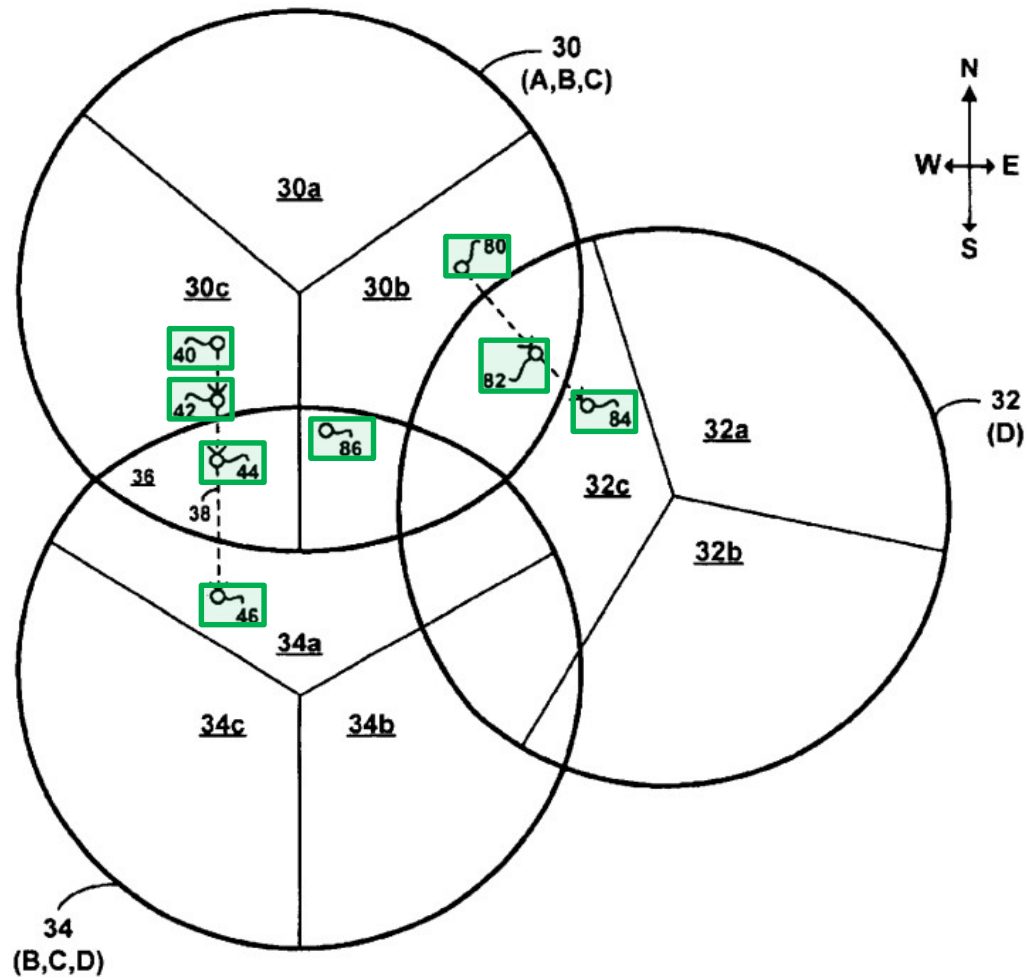
71. In my opinion, a POSITA would have found it obvious to combine *Oh* and *Clark* for the reasons discussed above in Section X.A.

4. [1B] “(b) determining at the mobile communication device where on the route that the mobile communication device is at as it traverses the route;

72. *Oh* in view of *Clark* renders obvious [1B] because *Oh* discloses that its mobile station collects and monitors its location via GPS as it traverses the route (determining at the mobile communication device where on the route that the mobile communication device is at as it traverses the route).

73. *Oh* discloses “information about the location of a mobile station may be collected and monitored. The information can be regularly collected by the mobile station, for instance, through use of a GPS (global positioning system) receiver or other technology, and the mobile station can regularly provide the information to a controller in the network.” *Oh*, 3:26-32. In my opinion, a POSITA

would have found it obvious that *Oh*'s mobile station would regularly collect and report its position, for example, as it moves among and between locations 42, 44, 46 or 80, 82, 84, 86 as shown in FIG. 3 below.



Oh, FIG. 3.

74. To the extent Patent Owner argues *Oh* does not disclose this limitation, *Clark* does. *Clark* discloses “[u]sing GPS or assisted GPS information, speed and direction of travel of the wireless mobile unit 410, and time of travel can

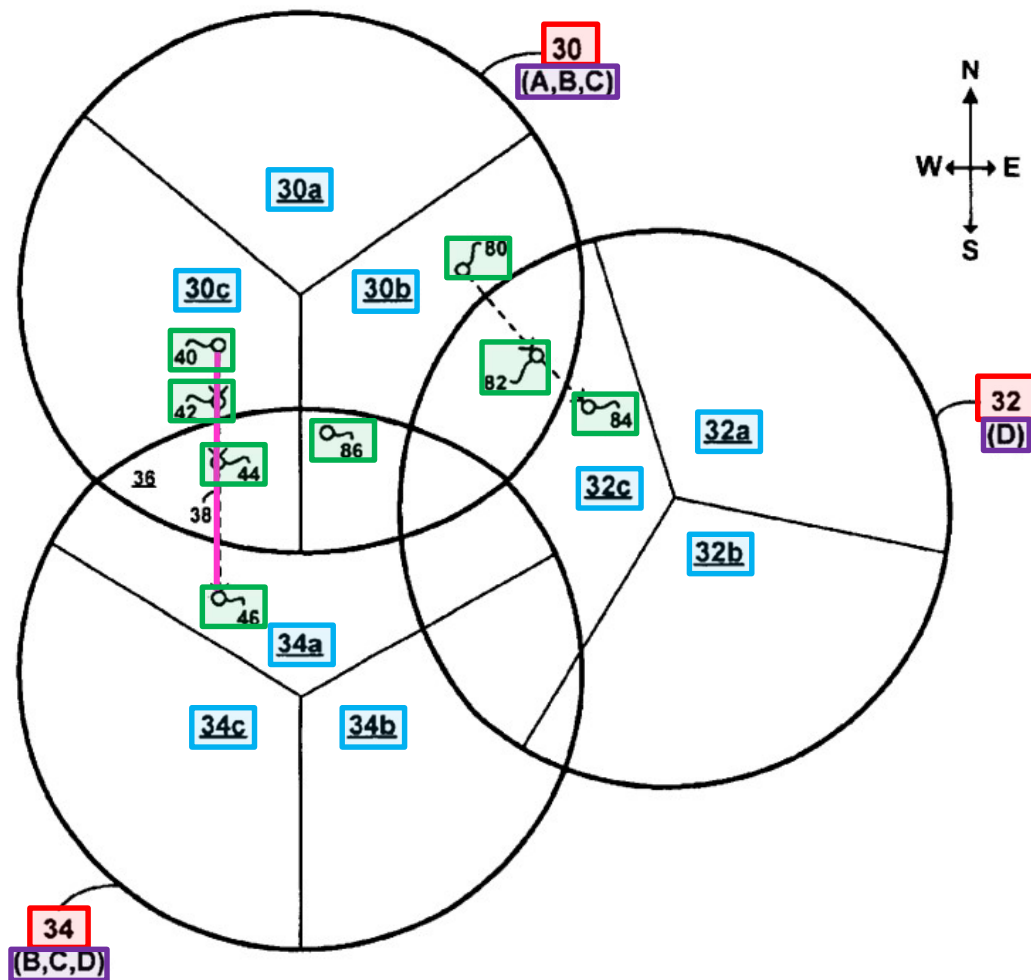
be determined.” *Clark*, 7:17-19. *Clark* discloses these “map matching techniques are known to those of ordinary skill in the art” and “previous positions can be used to determine the exact road that a person is on.” *Clark*, 7:17-27. A POSITA would have found it obvious that the information mobile unit 410 sends to message server 450 can include such location information, including the position of mobile unit 410, as it travels along a route or road. *Clark*, 7:33-36, FIG. 8. *Clark* discloses that GPS at the time was “cheap to implement” and forecast they “may soon be prevalent in wireless mobile units to determine the precise location thereof.” *Clark*, 2:15-18. A POSITA would have been motivated to combine *Oh* and *Clark* for the reasons discussed above in Section X.A.

5. [1C] “(c) accessing the database to obtain information regarding the communication options available along the route;”

75. *Oh* renders obvious [1C] because *Oh*’s MSC accesses the stored sector-location table (database) to retrieve the various frequency sectors available for the device along the route (information regarding the communication options available along the route).

76. *Oh* discloses “[g]iven the current location of a mobile station, the MSC may refer to the sector-location table to determine what frequency-sectors are available to serve the mobile station.” 10:19-21. For example, *Oh* discloses “if a

mobile station is physically at location 40, the MSC may query the sector-location table and thereby determine that the frequency-sectors available to serve the mobile station are: A30c, B30c and C30c.” Oh, 10:31-35. Oh also provides examples for locations 42, 44, 46, 80, 82, 84, and 86.



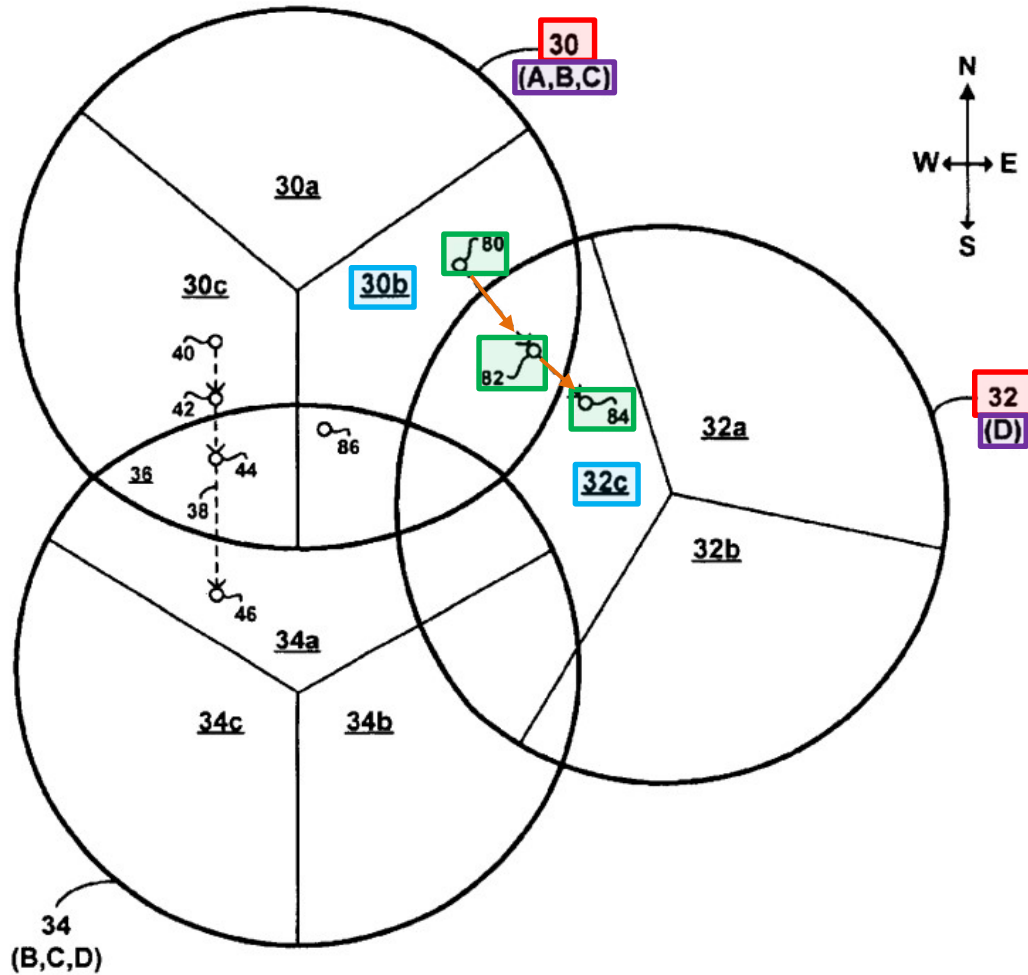
Oh, FIG. 3.

6. [1D] “(d) determining whether to switch from a first one of the wireless communication options presently being used to a second one of the wireless communication options when the mobile communication device approaches a boundary of a coverage area of one of the wireless communication options based on the wireless communication options available once the boundary is crossed and those that will be available further along the route;”

77. *Oh* renders obvious [1D] because *Oh*’s MSC determines an appropriate carrier frequency (wireless communication option) to switch or handoff communication to (determine whether to switch) when its mobile station moves to a different physical sector (coverage area) based on the carrier frequencies available at the different physical sector (the wireless communication options available once the boundary is crossed) and the carriers that will be available at a projected location based on a trajectory of travel of the mobile station (those that will be available further along the route).

78. *Oh* discloses “as the mobile station travels from [location 80](#) to [location 82](#) and onward, in the area of overlap of physical sectors [30b](#) and [32c](#), the MSC may compile a location history indicating a trajectory of travel that will lead the mobile station to a projected [location 84](#) that is fully in physical sector [32c](#). Based on that projected location, the MSC may find that the only available frequency-sector is [D32c](#).” *Oh*, 6:44-51.

79. In my opinion, a POSITA would have found it obvious that *Oh*'s selection of the frequency-sector is based on the location of the mobile station, **location 82** after it has passed the boundary of **cell 32**, and the future **location 84**, and so the logical choice is to "conveniently orchestrate a handoff of the mobile station to frequency-sector **D32c**" and not the other options available at **location 82**, which would be **carrier frequencies A, B, or C** in **sector 30b**. *Oh*, 13:2-5.



Oh, FIG. 3.

7. **[1E] “(e) switching from the first one of the wireless communication options to the second one of the wireless communication options if the determination was made to switch to that second one of the wireless communication options; and”**

80. *Oh* renders obvious [1E] because *Oh*’s control entity, or MSC, orchestrates a handoff from one frequency-sector to the next based on the determination discussed for [1D]. *Oh* discloses “the MSC may conveniently orchestrate a handoff of the mobile station to frequency-sector D32c, i.e., to carrier frequency D, as the mobile station enters sector 32c,” *Oh*, 13:2-5; which can occur through instructions sent to the mobile device to change frequency sector. *Id.*, 7:18-20, 11:51-60, 13:44-46.

8. **[1F(i)] “obtaining updated information concerning the coverage areas of the wireless communication options and updating the database with the updated information,”**

81. *Oh* renders obvious [1F(i)] because *Oh* discloses periodically updating sector coverage measurements based on topography and signal strength (updated information concerning the coverage areas of the wireless communication options) stored the sector-location table (database).

82. *Oh* discloses “the service provider may periodically load an updated sector-location table into each MSC or serving system. In general, the physical sectors and frequency assignments (and therefore the frequency-sectors) of a given

serving area will remain substantially constant over time. However, with changes in topography and signal strength, new measurements of sector coverage may need to be made, and the sector-location table may need to be updated accordingly.” *Oh*, 8:20-29.

9. [1F(ii)] “wherein one of the plurality of wireless communication options is not using any wireless communication, and”

83. The Applicant stated during prosecution that “this claim recites that one option, among the plurality of communication options, is to simply choose to not engage in wireless communication if, in accordance with the method of the present invention, such a choice is the preferred option.” Ex-1002, 293-294.

84. *Oh* does not explicitly disclose this limitation, but *McGregor* does. *McGregor* renders obvious [1F(ii)] because *McGregor* discloses deactivation based on unauthorized usage or insufficient funds.

85. *McGregor* discloses an “accounting protocol [that] enables internal tracking of phone usage with activation and deactivation of the phone unit to [ensure] unauthorized usage is prevented.” *McGregor*, 3:9-12. *McGregor* discloses “mobile debit phones ... that will deactivate the phone unit if credit is exceeded or credit is not extended by the airway activation.” *McGregor*, 2:39-43. *McGregor* discloses “accounting system includes a complex billing algorithm with a multiple

factor accounting protocol to account for local charges, roaming charges when the mobile phone unit moves from one zone to another, long distance charges, international charges including country independent local charges, and surcharges which may be per call or rate based.” *McGregor*, 2:48-54.

86. Further, “[t]he complex billing algorithm factors the multiple variables of a telephone call from a mobile phone into a billing [equation] that virtually mirrors the factors considered by public switched network providers and involved wireless service providers, (of which there may be more than one involved in a single call).” *McGregor*, 14:1-6. A POSITA would thus have found it obvious that the mobile phone would be deactivated if the cost of a call, for example in a new zone where charges change based on service providers, is too high, and usage would be prevented. In my opinion, a POSITA would have been motivated to combine *Oh* and *McGregor* for the reasons discussed above in Section X.A.

10. [1F(iii)] “wherein the step of obtaining updated information concerning the coverage areas of the wireless communication options includes obtaining this information from providers of the wireless communication options.”

87. *Oh* renders obvious [1F(iii)] because *Oh* discloses that the updated information, as explained for [1F(i)], may be determined and received from the service provider (providers of the wireless communication options).

88. *Oh* discloses “[t]he data in the sector-location table can be derived manually or with computer assistance by mapping out the locations of the physical sectors in the serving area, associating latitude/longitude coordinates with the boundaries of the physical sectors, and associating with each physical sector the carrier frequencies employed in the sector Alternatively, the service provider may periodically load an updated sector-location table into each MSC or serving system.” *Oh*, 8:11-22.

C. Claim 2

1. [2pre]-[2F(ii)]

89. *Oh* renders obvious [2pre]-[2F(ii)] as discussed above in Sections X.B.1-X.B.9 for [1pre]-[1F(ii)] because [2pre]-[2F(ii)] are identical to the corresponding limitations of [1pre]-[1F(ii)].

2. [2F(iii)] “wherein the step of obtaining updated information concerning the coverage areas of the wireless communication options includes the mobile communication device monitoring signal strengths of the wireless communication options as it passes through the coverage areas for the wireless communication options and”

90. *Oh* renders obvious [2F(iii)] because *Oh* discloses that its mobile station monitors its signal strength in each sector (the mobile communication device monitoring signal strengths of the wireless communication options as it passes through the coverage areas for the wireless communication options).

91. *Oh* discloses that “a mobile station may monitor the strength of signals coming from the sector in which it is operating and coming from neighboring sectors, and a network entity (such as a switch or the mobile station itself) may maintain a neighbor list indicating which sectors have signals strengths high enough that the sectors are able to serve the mobile station.” *Oh*, 5:54-60. *Oh* discloses its mobile station passes through different sectors of different areas. *Oh*, 10:31-43, 12:32-36, 12:42-45, 12:52-13:5, 13:7-11, FIG. 3. Thus, in my opinion, a POSITA would have found it obvious that *Oh*’s mobile station monitors the strength of signals it receives as it passes through physical sectors.

3. [2F(iv)] “developing updated information concerning coverage areas for the wireless communication options based on the monitored signal strengths of the wireless communication options.”

92. *Oh* renders obvious [2F(iv)] because *Oh* discloses that its signal strengths generated for updates of its sector-location table (updated information concerning coverage areas for the wireless communication options based on the monitored signal strengths of the wireless communication options).

93. *Oh* discloses that “with changes in topography and signal strength, new measurements of sector coverage may need to be made, and the sector-location table may need to be updated accordingly.” *Oh*, 8:26-29. *Oh* discloses that these measurements are made by mobile stations. *Oh*, 5:54-60. In my opinion, a

POSITA would have found it obvious that *Oh*'s neighbor list contains information from the mobile station that includes signal strengths from sectors, and these monitored signals are "updates" when older information is replaced because the information is "maintain[ed]." *Oh*, 5:54-60.

XI. GROUND 2: CLAIMS 3-6 ARE RENDERED OBVIOUS BY OH IN VIEW OF CLARK, MCGREGOR, AND STEER

A. Motivation to Combine *Oh*, *Clark*, *McGregor*, and *Steer*

94. In my opinion, a POSITA would have been motivated to combine *Steer*'s updating techniques and the *Oh-Clark-McGregor* telecommunication system for the reasons discussed above in Section X.A.

95. As explained in Section IX, claims 3-6 require limitations of (1) determining whether a database has an entry and creating a new entry if not or updating an existing entry if not, and (2) steps of updating information by shifting stored information or through a running average method that are not expressly disclosed by *Oh*. A POSITA, however, would have been motivated to implement *Steer*'s power control map information into *Oh*'s mobile device system because, as *Steer* explains, "[i]n traditional systems, the transmitter and the receiver exchange signaling messages to adjust the power level to the minimum needed for the desired error ratio. ... This signaling involves a two-way flow of information between the base station and mobile station in order to send the power control

messages. However, this two-way flow is not always possible, particularly during call set-up and for one-way data flows prevalent in data transfer and signaling. In these latter cases, it would be advantageous to have another means of adjusting the power to the optimum level” *Steer*, 2:19-36.

96. *Steer* provides an answer to these issues by “setting power control in a mobile communications system. The present invention proposes a technique of setting the power based on the location of the mobile station. Such location based power control may be done with significantly reduced or eliminated need for the traditional feedback control loop processes.” *Steer*, 2:40-47. *Steer* accomplishes this by generating a map or table throughout a coverage area. *Steer*, 5:7-35. *Steer*’s method of forming a power control map is consistent with *Oh*’s goal of tracking “topography and signal strength” and thus making “new measurements of sector coverage” and updating *Oh*’s sector-location table. *Oh*, 8:26-29. *Oh* also discloses requesting a handoff based on signal strength measurements. *Oh*, 5:52-54, 6:52-54.

97. In my opinion, a POSITA would have had reasonable expectations of success combining *Oh*, *McGregor*, and *Steer* because all three rely on basic, readily available phone devices including memory storing logic. *Steer*, 6:3-15, 7:44-55, 8:11-16, FIGS. 1, 2; *McGregor*, 2:62-67, 5:18-28. *Oh*, 9:18-27. The base or transmission stations providing service to the devices over coverage areas are

also readily available and include standard hardware and software components. *Steer*, 6:36-63, FIG. 3; *McGregor*, 4:18-35. *Oh*, 1:14-31, 4:63-5:5. Further, as *McGregor* explains, logic “can be implemented into most existing mobile communication devices with minimal modification, primarily by internal reprogramming of the device.” *McGregor*, 2:62-67. A POSITA thus would have had reasonable expectations of success in implementing the logic of *McGregor* and *Steer*’s systems into *Oh*’s mobile communication system.

B. Claim 3

1. **[3pre] “The method of claim 2 wherein the step of updating the database with the updated information includes determining whether the updated information is for a location presently in the database,”**

98. *Oh* in view of *McGregor*, *Clark*, and *Steer* renders obvious [3pre] because *Steer* discloses determining whether a location is new or not and updating or creating a location as needed (updating the database with the updated information includes determining whether the updated information is for a location presently in the database).

99. *Steer* discloses “[s]ome of the signaling received at the base station may relate to updating of the power control map information. The mobile terminal may signal with its location and its (successful) power level and other modulation parameters. This information is passed to the power control map update process

40b. This process may adjust the power control map information 40c for the indicated location. This may mean adding a new entry in the table if the mobile terminal is at a previously non-surveyed location.” *Steer*, 10:14-24. Accordingly, in my opinion, a POSITA would have found it obvious that the process only adjusts the information for the indicated location if it already exists and creates a new entry for a non-surveyed location if not. Thus the process determines whether the location is new or not. In my opinion, a POSITA would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XI.A.

2. **[3A] “(a) if the updated information is for a location not presently in the database, then storing the updated information in the database for the location;”**

100. *Oh* in view of *Steer* renders obvious [3A] because *Steer* discloses adding a new entry (if the updated information is for a location not presently in the database, then storing the updated information in the database for the location). *Steer* discloses “adding a new entry in the table if the mobile terminal is at a previously non-surveyed location.” *Steer*, 10:21-24. In my opinion, a POSITA would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XI.A.

3. **[3B] “(b) if the updated information is for a location presently in the database, comparing the updated information with the information stored in the database for the location and updating the stored information if updated information is different from the stored information.”**

101. *Oh* in view of *Steer* renders obvious [3B] because *Steer* discloses comparing the received signal strength to that of the strength in its power control map (if the updated information is for a location presently in the database, comparing the updated information with the information stored in the database for the location) and adjusting the map if it is different from the measured amount (updating the stored information if updated information is different from the stored information).

102. *Steer* discloses “[t]he mobile terminal may signal with its location and its (successful) power level and other modulation parameters. This information is passed to the power control map update process 40b. This process may adjust the power control map information 40c for the indicated location.” *Steer*, 10:14-20. *Steer* further discloses that “[t]he power control values retrieved from the power control map corresponding to the mobile's given location may also be corrected for the fading or shadowing conditions at the time of operation. To do this, the received signal strength may be compared with that in the map. The difference between these two values may then be used to adjust the transmitter power.” *Steer*,

9:2-5. A POSITA would have understood that “adjust[ing]” the power control map information by finding a difference between these two values (one from the map and the other from the received signal strength) means that older information is replaced with newer information after a comparison of the two, thus rendering obvious the claimed “comparing” and “updating” steps. In my opinion, a POSITA would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XI.A.

C. Claim 4

1. [4pre]-[4F(ii)]

103. *Oh* renders obvious [4pre]-[4F(ii)] as discussed above in Sections X.B.1-X.B.7 for [1pre]-[1F(ii)] because [4pre]-[4F(ii)] are identical to the corresponding limitations of [1pre]-[1F(ii)].

[4F(iii)] “wherein the step of updating the database with the updated information includes determining whether the updated information is for a location for which information is presently stored in the database,”

104. *Oh* in view of *Steer* renders obvious [4F(iii)] because *Steer* discloses adding a new entry (if the updated information is for a location not presently in the database, then storing the updated information in the database for the location).

105. *Oh* in view of *Steer* renders obvious [4F(iii)] because *Steer* discloses that “[s]ome of the signaling received at the base station may relate to updating of

the power control map information. The mobile terminal may signal with its location and its (successful) power level and other modulation parameters. This information is passed to the power control map update process 40b. This process may adjust the power control map information 40c for the indicated location. This may mean adding a new entry in the table if the mobile terminal is at a previously non-surveyed location.” *Steer*, 10:14-24. Accordingly, in my opinion, a POSITA would have found it obvious that the process only adjusts the information for the indicated location if it already exists and creates a new entry for a non-surveyed location if not. Thus the process determines whether the location is new or not. In my opinion, a POSITA would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XI.A.

[4F(iv)] “(a) if the updated information is for a location not presently in the database, then storing the updated information in the database for the location;”

106. *Oh* in view of *Steer* renders obvious [4F(iv)] because *Steer* discloses adding a new entry (if the updated information is for a location not presently in the database, then storing the updated information in the database for the location).

107. *Oh* in view of *Steer* renders obvious [4F(iv)] because *Steer* discloses that “[t]his may mean adding a new entry in the table if the mobile terminal is at a previously non-surveyed location.” *Steer*, 10:21-24. In my opinion, a POSITA

would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XI.A.

[4F(v)] “(b) if the updated information is for a location presently in the database, comparing the updated information with the information stored in the database for the location and updating the stored information if updated information is different from the stored information.”

108. *Oh* in view of *Steer* renders obvious [4F(v)] because *Steer* discloses comparing the received signal strength to that of the strength in its power control map (if the updated information is for a location presently in the database, comparing the updated information with the information stored in the database for the location) and adjusting the map if it is different from the measured amount (updating the stored information if updated information is different from the stored information).

109. *Steer* discloses “[t]he mobile terminal may signal with its location and its (successful) power level and other modulation parameters. This information is passed to the power control map update process 40b. This process may adjust the power control map information 40c for the indicated location.” *Steer*, 10:14-20. *Steer* further discloses that “[t]he power control values retrieved from the power control map corresponding to the mobile's given location may also be corrected for the fading or shadowing conditions at the time of operation. To do this, the

received signal strength may be compared with that in the map. The difference between these two values may then be used to adjust the transmitter power.” *Steer*, 9:2-5. A POSITA would have understood that “adjust[ing]” the power control map information by finding a difference between (one from the map and the other from the received signal strength) means that older information is replaced with newer information after a comparison of the two, thus rendering obvious the claimed “comparing” and “updating” steps. In my opinion, a POSITA would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XI.A.

D. Claim 5 “The method of claim 4, wherein the step of updating stored information comprises shifting the stored information toward the updated information by a parameter and replacing the stored information with the shifted stored information.”

110. *Oh* in view of *McGregor*, *Clark*, and *Steer* renders obvious claim 5 because *Steer* discloses discarding the previous stored average (“stored information”), determining a new average including the new measurement (shifting the stored information toward the updated information by a parameter), and storing the new average (replacing the stored information with the shifted stored information).

111. *Steer* discloses “[w]hen a new measurement is received, the oldest measurement is discarded and the previous four and the new measurements are averaged to form the table entry.” *Steer*, 10:38-40. In my opinion, a POSITA

would have found it obvious that the number of measurements could be changed, for example to increase or decrease responsiveness to new measurements. In my opinion, a POSITA would have found it obvious that using an average with a new measurement results in “shifting” the previous average (“stored information”) toward the new measurement. In my opinion, a POSITA would have found it obvious that the new average would be different by a “parameter” than the previous average. The following equation applies: $\text{new average} = \text{previous average} + \text{a parameter}$. Accordingly, *Steer*’s new average is different from the previous average by a parameter. In my opinion, a POSITA would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XI.A.

E. Claim 6 “The method of claim 5, wherein the step of updating the stored information comprises doing so with a running average method wherein the stored information is the running average of initial information and subsequent update information.”

112. *Oh* in view of *Steer* renders obvious claim 6 because *Steer* discloses discarding the old measurement, determining a new average including the new measurement (the running average of initial information and subsequent update information), and storing the new average.

113. *Steer* discloses “[w]hen a new measurement is received, the oldest measurement is discarded and the previous four and the new measurements are

averaged to form the table entry.” *Steer*, 10:38-40. In my opinion, a POSITA would have found it obvious that using an updated average containing a new measurement (and discarding the oldest measurement) results in “shifting” the previous average (“stored information”) toward the new measurement. In my opinion, a POSITA would have found it obvious that the new average would be based on a new measurement that replaces an older measurement corresponds to the claimed “running average method wherein the stored information is the running average of initial information and subsequent update information.” Further, it is my opinion that a POSITA would have found it obvious to use a combination of previous measurements and new measurements based on *Steer*’s disclosure to find a new average based on the desired responsiveness to new measurements. In my opinion, a POSITA would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XI.A.

XII. GROUND 3: CLAIMS 7 AND 8 ARE RENDERED OBVIOUS BY OH IN VIEW OF CLARK AND STEER

A. Motivation to Combine *Oh*, *Clark*, and *Steer*

114. As explained in Section IX, claims 7 and 8 require limitations of determining whether a database has updated information and related limitations that are not expressly disclosed by *Oh*. In my opinion, a POSITA would have been motivated to combine *Oh* and *Clark* as discussed above in Section VI.A, and the

omission of *McGregor* for ground 3 would not affect the reasons for combining *Oh* and *Clark*. A POSITA, however, would have been motivated to implement *Steer*'s power control map information into *Oh*'s mobile device system because, as *Steer* explains, “[i]n traditional systems, the transmitter and the receiver exchange signaling messages to adjust the power level to the minimum needed for the desired error ratio. ... This signaling involves a two-way flow of information between the base station and mobile station in order to send the power control messages. However, this two-way flow is not always possible, particularly during call set-up and for one-way data flows prevalent in data transfer and signaling. In these latter cases, it would be advantageous to have another means of adjusting the power to the optimum level” *Steer*, 2:19-36. *Steer* provides an answer to these issues by “setting power control in a mobile communications system. The present invention proposes a technique of setting the power based on the location of the mobile station. Such location based power control may be done with significantly reduced or eliminated need for the traditional feedback control loop processes.” *Steer*, 2:40-47. *Steer* accomplishes this by generating a map or table throughout a coverage area. *Steer*, 5:7-35. *Steer*'s method of forming a power control map is consistent with *Oh*'s goal of tracking “topography and signal strength” and thus making “new measurements of sector coverage” and updating *Oh*'s sector-location

table. *Oh*, 8:26-29. *Oh* also discloses requesting a handoff based on signal strength measurements. *Oh*, 5:52-54, 6:52-54.

115. In my opinion, a POSITA would have had reasonable expectations of success combining *Oh*, *Clark*, and *Steer* because they both rely on basic, readily available phone devices, including memory storing logic. *Steer*, 6:3-15, 7:44-55, 8:11-16, FIGS. 1, 2; *Oh*, 9:18-27. The base or transmission stations providing service to the devices over coverage areas are also readily available and include standard hardware and software components. *Steer*, 6:36-63, FIG. 3; *Clark*, 5:64-6:2; *Oh*, 1:14-31, 4:63-5:5. A POSITA thus would have had reasonable expectations of success of implementing the logic of *Steer*'s systems into *Oh*'s mobile communication system. *Clark* and *Oh* also disclose similar switching networks that are capable of communicating with mobile devices and switching mobile phone carrier frequencies and can store information related to sectors or cells on memory. *Clark*, 4:22-32; *Oh*, 1:18-32, 3:14-25, 6:47-52.

B. Claim 7

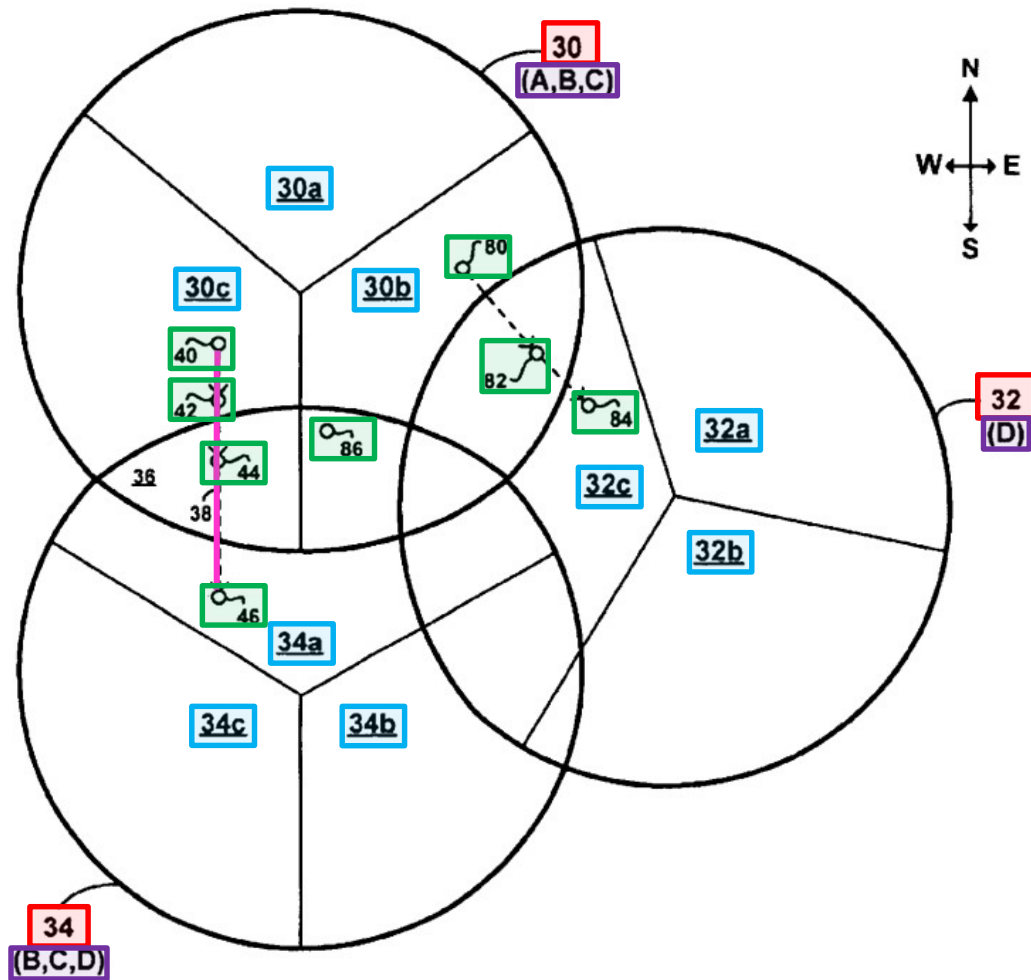
116. *Oh* in view of *Clark* and *Steer* renders obvious claim 7.

1. **[7pre] “A method of storing data in a database that is indicative of coverage areas for wireless communication options along a route that a mobile communication device is traversing, comprising the steps of”**

117. *Oh* renders obvious [7pre] because *Oh* discloses storing sector information including related latitude/longitude coordinates with the boundaries of the physical sectors and the carrier frequencies employed in the sector that the mobile station is moving through (storing data in a database that is indicative of coverage areas for wireless communication options along a route that a mobile communication device is traversing).

118. *Oh* discloses “[a] telecommunications service provider may store the sector-location table in a central repository for reference through out-of-band signaling by various [mobile switching centers (MSCs)] in the service provider's network.” *Oh*, 8:16-18. *Oh* explains that “sectors (which can be visualized ideally as pie pieces) can be referred to as ‘physical sectors,’ since they are physical areas of a cell site.” *Oh*, 1:40-43. Referring to FIG. 3, *Oh* discloses that “if a mobile station is physically at location 40, the MSC may query the sector-location table and thereby determine that the frequency-sectors available to serve the mobile station are: A30c, B30c and C30c.” *Oh*, 10:31-35. The mobile station can move to locations 42, 44, 46 or 80, 82, 84, 86, where other coverage options are available. *Oh*, 10:31-43, 12:32-36, 12:42-45, 12:52-13:5, 13:7-11. In FIG. 3, cells 30, 32, and

34 each contain three sectors, e.g., 30a, 30b, 30c, and have one or more carriers A, B, C, and D. *Oh*, 6:18-28. *Oh* discloses “referring to FIG. 3, if the mobile station is at location 42, the MSC may determine by reference to the location log that the mobile station is on a trajectory along which the mobile station is about to head into area 36, which is an overlap of physical sectors 30c and 34a.” *Oh*, 12:32-36. *Oh* discloses “[w]ith a knowledge of the location to which the mobile station is headed, the [mobile switching center (MSC)] may then consult the sector-location table to determine which frequency-sector(s) will be available to possibly serve the mobile station if and when the mobile station reaches the projected location.” *Oh*, 12:17-25.



Oh, FIG. 3.

2. [7A] “(a) storing boundary locations of the coverage areas for the wireless communication options along the route in the database where the boundary locations are boundary locations on streets of the route;”

119. *Oh* in view of *Clark* renders obvious [7A] because *Oh* discloses storing sector information including related latitude/longitude coordinates with the boundaries of the physical sectors and the carrier frequencies employed in the

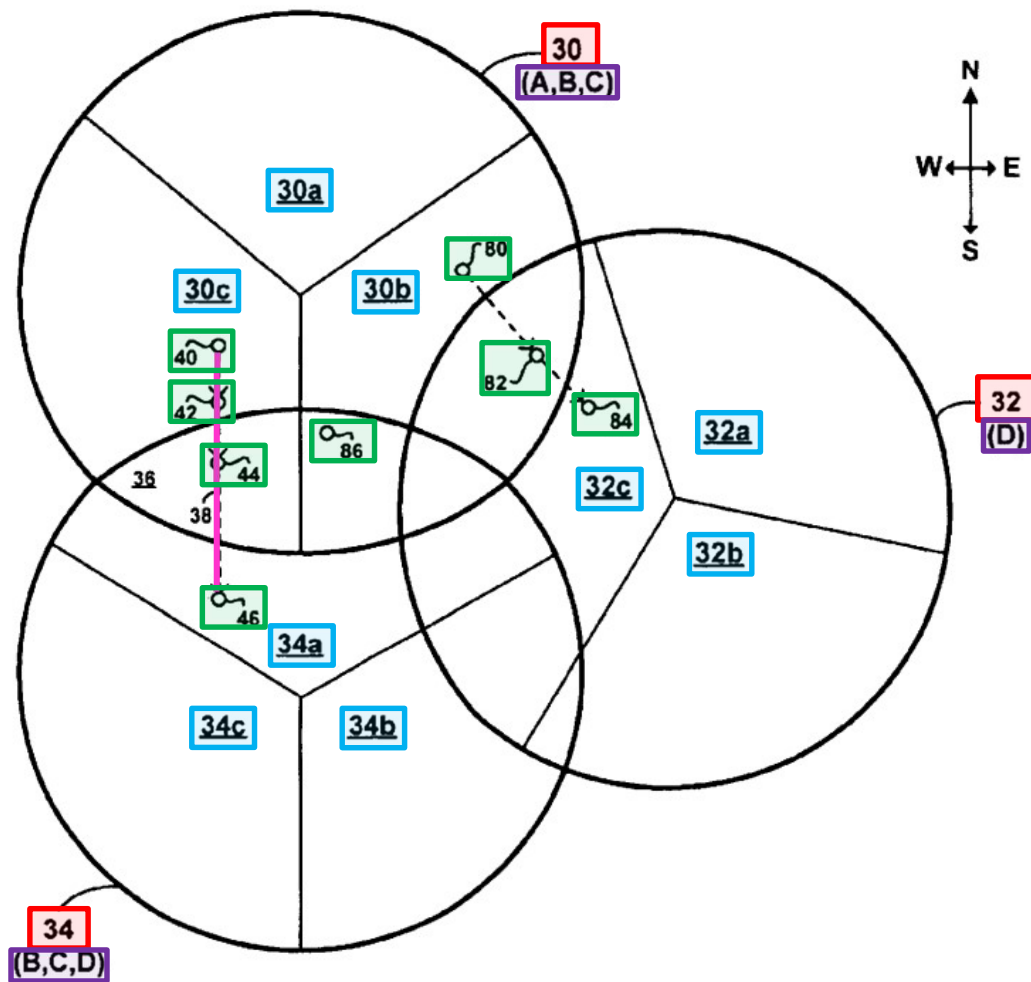
sectors (storing boundary locations of the coverage areas for the wireless communication options along the route in the database), and *Clark* discloses storing such information specific to roads in a region the mobile unit is traveling on (where the boundary locations stored are boundary locations on streets of the route).

120. *Oh* discloses that “[a] telecommunications service provider may store the sector-location table in a central repository for reference through out-of-band signaling by various [mobile switching centers (MSCs)] in the service provider’s network.” *Oh*, 8:16-18. *Oh* discloses “[w]ith a knowledge of the location to which the mobile station is headed, the [mobile switching center (MSC)] may then consult the sector-location table to determine which frequency-sector(s) will be available to possibly serve the mobile station if and when the mobile station reaches the projected location.” *Oh*, 12:17-25.

121. *Oh* explains “sectors (which can be visualized ideally as pie pieces) can be referred to as ‘physical sectors,’ since they are physical areas of a cell site.” *Oh*, 1:40-43. Referring to FIG. 3, *Oh* discloses “if a mobile station is physically at location 40, the MSC may query the sector-location table and thereby determine that the frequency-sectors available to serve the mobile station are: A30c, B30c and C30c.” *Oh*, 10:31-35. The mobile station can move to locations 42, 44, 46 or

80, 82, 84, 86 where other coverage options are available. *Oh*, 10:31-43, 12:32-36, 12:42-45, 12:52-13:5, 13:7-11. In FIG. 3, cells 30, 32, and 34 each contain three sectors, e.g., 30a, 30b, 30c, and have one or more carriers A, B, C, and D. *Oh*, 6:18-28.

122. *Oh* discloses “referring to FIG. 3, if the mobile station is at location 42, the MSC may determine by reference to the location log that the mobile station is on a trajectory along which the mobile station is about to head into area 36, which is an overlap of physical sectors 30c and 34a.” *Oh*, 12:32-36. This is shown in FIG. 3 below.



Oh, FIG. 3.

123. *Oh*'s sector-location table (database) is stored in data storage medium 62 of mobile switching center (MSC) 18 and related instructions are provided to cellular telephones. *Oh*, 6:55-58, 7:18-20, 7:58-67, FIGS. 5, 6. A POSITA would have understood these instructions would be saved in memory. Ex-1011, 3:20-28.

124. To the extent *Oh* does not explicitly disclose the claimed "where the boundary locations are boundary locations on streets of the route," *Clark* does.

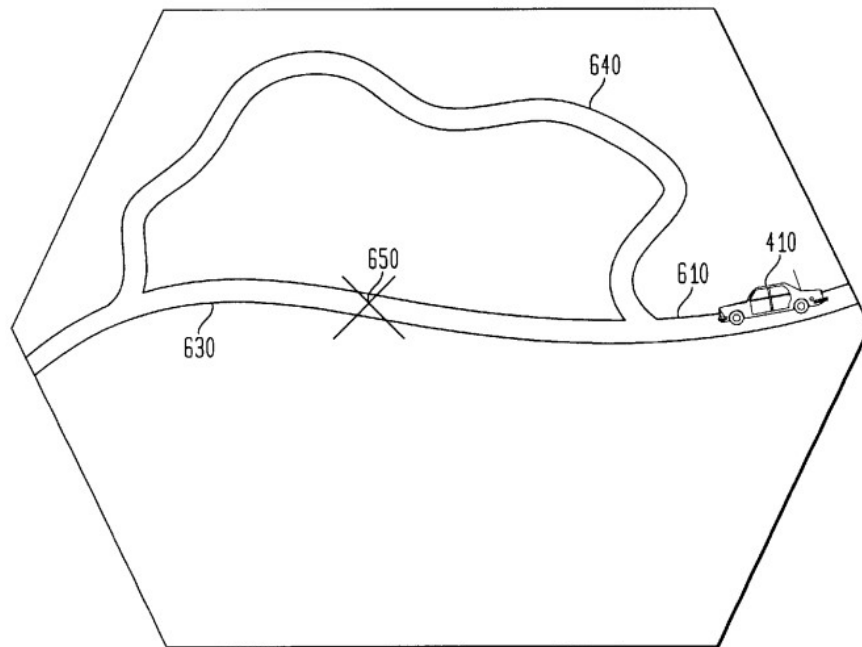
Clark discloses a wireless telecommunication system capable of “(1) providing wireless telecommunication service to the wireless mobile unit 410 ...; (2) monitoring the movement ... of the wireless mobile unit 410 as it remotely travels; and (3) providing location-based or region-based information back to the wireless mobile unit 410 ... based on the observed changing location or entrance of the wireless mobile unit 410 into different cells or regions.” *Clark*, 3:44-62. This system allows users to “prepare for and potentially avoid problems within a region in which they are located or are approaching.” *Clark*, 3:38-43. *Clark* discloses that when “a wireless mobile unit 410 enter[s] a particular region, it can receive information relating to regions or cells neighboring the designated region separate from or along with information for the designated region.” *Clark*, 8:1-6. *Clark* discloses its system monitors the mobile unit 410 as it “chang[es] location from region to region or cell to cell,” and tracks the mobile unit 410 “traveling on a first road 610.” *Id.*, 3:50-62, 7:5-17.

125. In my opinion, a POSITA would have understood that the tracking of the change of one region or cell to another is a determination of a “boundary.” *Clark* discloses that its cells are “spatially distinct areas.” *Clark*, 1:32-34. In addition, the maps used by *Clark* keep track of cells and mobile units through “digitized maps of a plurality of geographic areas or cells.” *Id.*, 4:21-27. Further,

Clark's controller 520 compares "a current location of wireless mobile unit 410 to determine whether or not the wireless mobile unit 410 is within a specific geographic region, or is within a region neighboring a particular geographic region." *Id.*, 4:27-31. *Clark* thus renders obvious storing "boundary locations" because its controller 520 determines whether a mobile unit is within one cell or a different cell by storing geographic bounds of the cells. Because *Clark*'s controller determines map areas that relate only to cells that the mobile device is in or in a neighboring cell, and *Oh* discloses determining cell information based on a trajectory of a mobile device, a POSITA would have found it obvious to store information for the cells the mobile device is within or moving to. Thus, the only cell boundaries included in this information would be for the cells the mobile device is within or moving to.

126. For example, *Clark* discloses that it provides information for the mobile unit 410 based on the regions or cells through which mobile unit 410 is or will be traveling on a road (e.g., road 610) and for an alternative road 640. *Clark*, 7:5-17. This is shown in FIG. 8.

FIG. 8



Clark, FIG. 8.

Clark also discloses the stored information for cells or neighboring cells can relate to “particular roads or regions frequently used by [the] user of wireless mobile unit 410.” *Clark*, 4:54-62.

127. A POSITA would have found it obvious that determining *Oh*’s trajectory of a mobile device would be along *Clark*’s road or an alternative road. A POSITA would have understood that a road (e.g., such as *Clark*’s route 610) is an obvious axis for a trajectory of a user of a mobile device. For example, U.S. Patent No. 5,732,350 to *Marko* (Ex-1008) discloses “[e]ach mobile station carried down

the street must register with the base station serving each newly-entered service area.” *Marko*, 2:63-65. *Marko* similarly discloses “a user carrying a mobile station along a generally straight path through a series of service areas, such as along a street....” Similarly, GB Patent No. 2,295,943 to *Thomas* (Ex-1007) discloses service cells, which can be switched between to handle a user’s call, include smaller microcells where “microcells might typically be 200 to 500m in extent along a street.” *Thomas*, 1:24-31.

128. *Oh* in view of *Clark* renders obvious “storing boundary locations” because *Clark* discloses storing information in maps “relating to a region neighboring the designated region,” *Clark*, 6:31-35, and *Clark*’s controller can determine when the mobile unit is within one cell versus another cell. *Clark*’s map information is stored in message server data base 540 so that message server 450 can send the information to wireless mobile unit 410 through WSC 420 and base-stations 403-1 through 403-4 shown in FIG. 4. *Clark*, 3:66-4:11.

129. In my opinion, a POSITA would have been motivated to combine *Oh* and *Clark* as disclosed above in Section XII.A.

3. **[7B] “(b) periodically obtaining updated information at the location of the mobile communication device concerning the coverage areas of the wireless communication options as the mobile communication device traverses the route; and”**

130. *Oh* renders obvious [7B] because *Oh* discloses periodically updating sector coverage measurements based on topography and signal strength (updated information concerning the coverage areas of the wireless communication options) stored in the sector-location table (database) based on measurements from a mobile device (at the location of the mobile communication device as the mobile communication device traverses the route).

131. *Oh* discloses “the service provider may periodically load an updated sector-location table into each MSC or serving system. In general, the physical sectors and frequency assignments (and therefore the frequency-sectors) of a given serving area will remain substantially constant over time. However, with changes in topography and signal strength, new measurements of sector coverage may need to be made, and the sector-location table may need to be updated accordingly.” *Oh*, 8:20-29. *Oh* discloses that “a mobile station may monitor the strength of signals coming from the sector in which it is operating and coming from neighboring sectors, and a network entity (such as a switch or the mobile station itself) may maintain a neighbor list indicating which sectors have signals strengths high

enough that the sectors are able to serve the mobile station.” *Oh*, 5:54-60. *Oh* discloses its mobile station passes through different sectors of different areas. *Oh*, 10:31-43, 12:32-36, 12:42-45, 12:52-13:5, 13:7-11, FIG. 3.

4. [7C] “(c) updating the database with the updated information,”

132. *Oh* renders obvious [7C] because *Oh* discloses that its sector-location table is updated because of signal strengths measured by its mobile stations (updating the database with the updated information).

133. *Oh* discloses that “the sector-location table may need to be updated accordingly.” *Oh*, 8:28-29. In my opinion, a POSITA would thus have found it obvious to update the sector-location table with the updated information collected by *Oh*’s MSC or its mobile device. *Oh*, 8:20-29.

5. [7D(i)] “wherein the step of updating the database with the undated³ information includes determining whether the updated information is for a location for which information is presently stored in the database,”

134. *Oh* in view of *Steer* renders obvious [7D(i)] because *Steer* discloses determining whether a location is new or not and updating or creating a location as needed (updating the database with the updated information includes determining whether the updated information is for a location presently in the database).

135. *Steer* discloses that “[s]ome of the signaling received at the base station may relate to updating of the power control map information. The mobile terminal may signal with its location and its (successful) power level and other modulation parameters. This information is passed to the power control map update process 40b. This process may adjust the power control map information 40c for the indicated location. This may mean adding a new entry in the table if the mobile terminal is at a previously non-surveyed location.” *Steer*, 10:14-24.

³ The undersigned understands “undated” here and each time it is used in claims 7 and 8 to be a typographical error and interprets this term to mean “updated.” This error is repeated nine times in [7D(i)] (twice), [7D(ii)], [7D(iii)] (twice), [8C], [8D(ii)], and [8D(iii)] (twice).

Accordingly, in my opinion, a POSITA would have found it obvious that the process only adjusts the information for the indicated location if it already exists and creates a new entry for a non-surveyed location if not. Thus, the process determines whether the location is new or not. In my opinion, a POSITA would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XII.A.

6. [7D(ii)] “(a) if the updated information is for a location not presently in the database, then storing the undated information in the database for the location;”

136. *Oh* in view of *Steer* renders obvious [7D(ii)] because *Steer* discloses adding a new entry (if the updated information is for a location not presently in the database, then storing the updated information in the database for the location).

137. *Steer* discloses “[t]his may mean adding a new entry in the table if the mobile terminal is at a previously non-surveyed location.” *Steer*, 10:21-24. In my opinion, a POSITA would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XII.A.

7. [7D(iii)] “(b) if the undated information is for a location presently in the database, comparing the undated information with the information stored in the database for the location and updating the stored information if updated information is different from the stored information, and”

138. *Oh* in view of *Steer* renders obvious [7D(iii)] because *Steer* discloses comparing the received signal strength to that of the strength in its power control

map (if the updated information is for a location presently in the database, comparing the updated information with the information stored in the database for the location) and adjusting the map if it is different from the measured amount (updating the stored information if updated information is different from the stored information).

139. *Steer* discloses “[t]he mobile terminal may signal with its location and its (successful) power level and other modulation parameters. This information is passed to the power control map update process 40b. This process may adjust the power control map information 40c for the indicated location.” *Steer*, 10:14-20. In my opinion, a POSITA would have found it obvious that *Steer*’s “adjust[ing]” would replace older information with new information. In my opinion, a POSITA would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XII.A.

8. **[7D(iv)] “wherein the step of updating stored information comprises shifting the stored information toward the updated information by a parameter and replacing the stored information with the shifted stored information.”**

140. *Oh* in view of *Steer* renders obvious [7D(iv)] because *Steer* discloses discarding the old average, determining a new average including the new measurement (shifting the stored information toward the updated information by a

parameter), and storing the new average (replacing the stored information with the shifted stored information).

141. *Steer* discloses that “[w]hen a new measurement is received, the oldest measurement is discarded and the previous four and the new measurements are averaged to form the table entry.” *Steer*, 10:38-4. In my opinion, a POSITA would have found it obvious that using an average with a new measurement results in “shifting” the previous measurement toward the “shifted” new measurement. In my opinion, a POSITA would have found it obvious that the new average would be different by some “parameter” than the old average. The following equation applies: $\text{new average} = \text{previous average} + \text{a parameter}$. Accordingly, *Steer*’s new average is different from the previous average by a parameter. In my opinion, a POSITA would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XII.A.

C. Claim 8

1. [8pre]-[8D(iii)]

142. *Oh* in view of *Steer* renders obvious [8pre]-[8D(iii)] as discussed above in Section XII.B.1-XII.B.7 for [7pre]-[7D(iii)] because [8pre]-[8D(iii)] is identical to [7pre]-[7D(iii)].

2. **[8D(iv)] “wherein the step of updating the stored information comprises doing so with a running average method wherein the stored information is the running average of initial information and subsequent update information.”**

143. *Oh* in view of *Steer* renders obvious [8D(iv)] because *Steer* discloses discarding the old average, determining a new average including the new measurement (the running average of previous measurements and subsequent updated measurements), and storing the new average.

144. *Steer* discloses that “[w]hen a new measurement is received, the oldest measurement is discarded and the previous four and the new measurements are averaged to form the table entry.” *Steer*, 10:38-40. In my opinion, a POSITA would have found it obvious that using an average with a new measurement results in “shifting” the updated measurement toward the “shifted” new measurement. It is further my opinion that a POSITA would have found it obvious that the new average based on a new measurement that replaces an older measurement corresponds to the claimed “running average method wherein the stored information is the running average of initial information and subsequent update information.” Further, it my opinion that a POSITA would have found it obvious to use a combination of previous measurements and new measurements based on *Steer*’s disclosure to find a new average based on the desired responsiveness to

new measurements. A POSITA would have been motivated to combine *Oh* and *Steer* as disclosed above in Section XII.A.

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

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

Executed this __18th__ day of July 2023, in _Stanford, California__.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read "Sam Puller", is written over a horizontal line.