

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner

IPR2025-01259
U.S. Patent No. 10,009,720

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

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I, Michael Buehrer, Ph.D., do hereby declare as follows:

I. INTRODUCTION

1. I am making this declaration at the request of Apple Inc. in the matter of the *Inter Partes* Review of U.S. Patent No. 10,009,720 (“the ’720 patent”) to Pérez LaFuente.

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

3. I have been asked to provide my opinions regarding whether the subject matter of claims 1-2, 4-7, 9-12, and 14-16 (“the Challenged Claims”) of the ’720 patent would have been obvious to a person having ordinary skill in the art (“POSITA”) at the time of the alleged invention, in light of the prior art. It is my opinion that the Challenged Claims would have been obvious to a POSITA.

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

- the ’720 patent, Ex.1001;
- the prosecution history of the ’720 patent (“’720 File History”), Ex.1002;
- U.S. Patent No. 5,295,180 to Vendetti et al. (“Vendetti”), Ex.1009;

- U.S. Patent Publication No. 6,122,510 to Granberg (“Granberg”), Ex.1037;
- U.S. Patent Publication No. 2006/0135174 to Kraufvelin et al. (“Kraufvelin”), Ex.1006;
- U.S. Patent Publication No. 2004/0203863 to Huomo (“Huomo”), Ex.1016; and
- International Publication No. WO2000/027152 to Vimpari et al. (“Vimpari”), Ex.1010.

5. In forming the opinions expressed below, I have considered: the documents listed above; the relevant legal standards, including the standard for obviousness; and my own knowledge and experience based upon my work in the field as described below, as well as portions of the following additional materials:

- U.S. Patent No. 8,615,256 to Putkiranta (“Putkiranta”), Ex.1005;
- U.S. Patent No. 6,324,404 to Dennison et al. (“Dennison”), Ex.1045;
- U.S. Patent Publication No. 2008/0132233 to Li et al. (“Li”), Ex.1046;
- Jeff Rutenbeck, Tech Terms: What Every Telecommunications and Digital Media Professional Should Know, (2006), Ex.1052;
- Wiley Electrical and Electronics Engineering Dictionary, (2004), Ex.1053;

- Microsoft Computer Dictionary (5th ed. 2002), Ex.1054;
- Dictionary of Computer Science, Facts on File (Rev. ed. 2006), Ex.1055;
- A Dictionary of Computing (5th ed. 2004), Ex.1056;
- Dictionary of Computer and Internet Terms (9th ed. 2006), Ex.1057;
- Newton's Telecom Dictionary (22nd ed. 2006), Ex.1058;
- McGraw-Hill Illustrated Telecom Dictionary (4th ed. 2001), Ex.1059; and
- Hargrave's Communications Dictionary (2001), Ex.1060.

6. Unless otherwise noted, all **emphasis** in any quoted material has been added. Claim terms are *italicized*.

II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

7. My complete qualifications and professional experience are described in my *Curriculum Vitae*, a copy of which can be found in Exhibit 1004. The following is a brief summary of my relevant qualifications and professional experience.

8. I am currently a Professor of Electrical and Computer Engineering at Virginia Tech and the former (2014-2022) Director of *Wireless @ Virginia Tech*.

9. My academic and professional background is in Electrical and Computer Engineering, and I have been working in those fields since the completion

of my Ph.D. over 25 years ago. Below, I provide a short summary of my education and experience that I believe to be most pertinent to the opinions I have formed in this case.

10. I received a B.S. in Electrical Engineering from The University of Toledo in 1991, an M.S. in Electrical Engineering from The University of Toledo in 1993, and a Ph.D. in Electrical Engineering from Virginia Polytechnic Institute and State University in 1996. The focus of my graduate work was wireless communication systems. My Ph.D. thesis involved the application of multiuser detection (an advanced signal processing approach to interference mitigation) to CDMA-based cellular systems.

11. After completion of my Ph.D. in 1996, I joined Bell Laboratories, the research division of Lucent Technologies, where I worked for five years as a Member of Technical Staff and later as a Distinguished Member of Technical Staff. My work there focused on developing advanced technologies for cellular telecommunications, including for 3G cellular standards. For example, while at Bell Labs, I developed and implemented algorithms for intelligent antenna systems that increased the voice capacity (i.e., number of simultaneous phone calls) and data capacity of cellular systems. These algorithms were included in Lucent Technologies' 3G CDMA cellular base station. I also developed techniques known as transmit diversity techniques that increased reliability (i.e., reduced the

probability of a dropped call) of cellular systems. These transmit diversity techniques were standardized in the 3GPP2 cellular standard known as cdma2000. During that time, I supported the standardization of my ideas by writing contributions to the working groups developing the standards and attending standards meetings. In particular, I participated in the 3GPP2 standardization process. During that time, I worked with colleagues to include my ideas on the use of transmit diversity in CDMA systems in the 3GPP2 standard.

12. I am currently a Professor in the Bradley Department of Electrical and Computer Engineering at Virginia Polytechnic Institute and State University (Virginia Tech), where I have taught and conducted research in the area of wireless communications, geolocation and radar for over 20 years. Specifically, I have taught courses that cover wireless communications and signal processing (including the underlying concepts) at the undergraduate and graduate levels. For example, I teach a sophomore-level course which introduces the concepts of signals and systems, a junior-level course which introduces the basic concepts of communication systems, senior-level and graduate-level courses that cover advanced digital communication topics, and also graduate-level courses that teach the advanced technologies underlying the latest wireless systems, such as Fourth and Fifth Generation (4G/5G) cellular communication standards (e.g., LTE, LTE-Advanced, New Radio) and Wi-Fi. I also teach graduate courses on advanced topics such as Information Theory,

Machine Learning Applied to Communication Systems, Spread Spectrum Communications and CDMA. Furthermore, I have taught short courses covering topics such as position location and position location using ultra-wideband signals.

13. Additionally, I have conducted research into Ultra-Wideband (UWB) signal propagation, UWB receiver design, and UWB signal processing across a number of funded research projects. I also developed a UWB-based ranging system as part of an automated cargo container transfer system for the United States Navy. Further, I have developed geolocation systems in a number of research projects including designing a prototype system for localizing first responders, developing localization techniques for 5G and 6G cellular networks, localization sub-systems for in-home smart health systems, algorithms for enhancing cellular-based localization, algorithms for localization in the presence of interference and harsh propagation, and a second UWB-based positioning system.

14. From 2014 until 2022, I also served as the director of *Wireless @ Virginia Tech*, a comprehensive research group focusing on wireless communications, which consists of 14 faculty members and approximately 85 graduate students. My specific research focuses on advanced wireless communications and geolocation techniques. This research has examined both advanced theoretical concepts as well as the application of these concepts to the latest wireless standards. As an example of the latter, I (along with my students) have

conducted research applying multiuser/multi-antenna signal processing to LTE. I have also applied advanced geolocation techniques to LTE systems.

15. My research work has been funded by national agencies including the National Science Foundation (NSF), the Defense Advanced Research Projects Agency (DARPA), the Office of Naval Research (ONR), the Army Research Lab, the Air Force Research Lab as well as many industrial sponsors.

16. During 2009, I was a visiting researcher at the Laboratory for Telecommunication Sciences (LTS), a Federal Research Lab that focuses on telecommunication challenges for national defense. While at LTS, my research focus was in the area of cognitive radio with a particular emphasis on statistical learning techniques.

17. I have authored and co-authored over 350 publications in my area of expertise, which have been published in the leading journals in my field including *IEEE Transactions on Communications*, *IEEE Transactions on Wireless Communications*, *IEEE Transactions on Information Theory*, *Proceedings of the IEEE*, and *IEEE Transactions on Signal Processing*, and at all of the major conferences in my field. These publications include the areas of wireless position location (i.e., geolocation). This research has been cited over 13,000 times. A complete list of my publications over the last 30 years is included in my Curriculum Vitae. I am a Fellow of the IEEE (so named “for contributions to wideband signal

processing in communications and geolocation”). Additionally, in 2023 I received the prestigious MILCOM Lifetime Award for Technical Achievement. This award recognizes individuals who have made important technical contributions to military communications over the course of their careers. I was a co-recipient of both the Vanu Bose Award for the best paper and the Fred Ellersick Award for the best paper, both at the 2023 Military Communications Conference for my work on LEO-based geolocation. I was also a co-recipient of the Vanu Bose Award for the best paper at the 2021 Military Communications Conference.

18. In 2010, I was awarded the Ellersick Best Paper Award in the Unclassified Technical Program, at the IEEE Military Communications Conference. I received the SDR Forum Best Paper Award in 2007 and the Outstanding Paper Award at the SDR Forum in 2008. I received the Dean’s Award for Teaching Excellence in April 2014 and the Dean’s Award for Outstanding New Assistant Professor, College of Engineering in 2003. While at Bell Laboratories, I was awarded the Bell Labs President’s Silver Award for outstanding research contributions and the 1999 Best Paper Award in the Bell Labs Technical Journal.

19. I also hold 18 issued patents in the area of wireless communications, many of which relate to wirelessly locating a wireless device.

20. I formerly served as an area editor for *IEEE Transactions on Wireless Communications* supervising a team of 12 editors. I also recently served as a guest

editor for a special issue of the *Proceedings of the IEEE* and as a guest lead editor for a special issue of the *IEEE Journal on Special Topics in Signal Processing* relating to non-cooperative position location networks. I was formerly an associate editor for *IEEE Wireless Communications Letters*, *IEEE Transactions on Vehicular Technologies*, *IEEE Transactions on Communications*, *IEEE Transactions on Signal Processing*, and *IEEE Transactions on Education*.

21. Additionally, I formerly served as the guest editor for the *IEEE Journal on Special Topics in Signal Processing*. I served as the Technical Program Chair for the Signal Processing for Communications Symposium at the 2017 IEEE International Conference on Communications. Previously, I was the Organizer and Technical Co-Chair for both the 2015 and 2016 IEEE Global Communications Conference Workshop on Localization and Tracking: Indoors, Outdoors and Emerging Networks (LION). I have also served on the technical program committees of several other conferences and workshops in my field.

22. A complete copy of my curriculum vitae, which includes a list of my publications and contains further details on my education, experience, publications, patents, and other qualifications to render an expert opinion, is provided in Exhibit 1004.

23. I have reviewed the '720 patent, and relevant excerpts of the prosecution history of the '720 patent. Based on my experience and education, and

the acceptance of my publications and professional recognition by societies in my field, I believe that I am qualified to offer opinions as to the knowledge and level of skill of one of ordinary skill in the art at the time of the invention of the '720 patent (which I further describe below).

III. LEVEL OF ORDINARY SKILL IN THE ART

24. I understand there are multiple factors relevant to determining the level of ordinary skill in the pertinent art, including (1) the levels of education and experience of persons working in the field at the time of the invention; (2) the sophistication of the technology; (3) the types of problems encountered in the field; and (4) the prior art solutions to those problems.

25. A POSITA in the field of the '720 patent, as of its earliest possible priority date of March 28, 2006¹, would have been someone knowledgeable and familiar with using geolocation in the provision of location-based services in a wireless communications network (e.g., a cellular telephone network or Wi-Fi network). Such a POSITA would have a bachelor's degree in electrical engineering, computer science, computer engineering, or a related field, and two years of experience relating to research, design, and development of wireless

¹ I have been asked to apply March 28, 2006 as the priority date for the purposes of my analysis.

communications networks. Additional work experience can substitute for specific educational background, and vice versa.

26. For purposes of this Declaration, in general, and unless otherwise noted, my statements and opinions, such as those regarding my own experience and what a POSITA would have understood or known generally (and specifically related to the references I consulted herein), reflect the knowledge that existed in the relevant field as of the earliest possible priority date of the '720 patent.

IV. RELEVANT LEGAL STANDARDS

27. I am not an attorney. In preparing and expressing my opinions and considering the subject matter of the '720 patent, I am relying on certain basic legal principles that Apple's counsel has explained to me.

28. I understand that prior art to the '720 patent includes patents and printed publications in the relevant art that predate the earliest possible priority date of the '720 patent. For purposes of this Declaration, I am applying March 28, 2006, as the priority date of the '720 patent.

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

the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the claimed subject matter.

30. I have been further informed by Apple's counsel that there are several recognized rationales for combining references or modifying a reference to show obviousness. These rationales include: (a) combining prior art elements according to known methods to yield predictable results; (b) simple substitution of one known element for another to obtain predictable results; (c) use of a known technique to improve a similar device (method, or product) in the same way; (d) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (e) choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and (f) some teaching, suggestion, or motivation in the prior art that would have led a POSITA to modify the prior art or to combine prior art teachings to arrive at the claimed invention.

V. BACKGROUND

31. In cellular networks, the location of a mobile device may be estimated based on its interaction with the network's base stations (e.g., cell towers in a cellular telephone network). TS23.171 standard (Ex.1018), 7. For example, each base station generally broadcasts a signal used by mobile devices to detect nearby base stations. Putkiranta (Ex.1005), 5:65-6:3. The signal includes a unique identifier for the particular base station to allow mobile devices to identify that base station.

Putkiranta, 5:65-6:3. Because the location of each base station in a cellular network is generally fixed, the mobile device's location may be estimated based on the set of base stations from which it is currently receiving these broadcast signals. Putkiranta, 4:60-5:8; Kraufvelin (Ex.1006), [0056], [0060]. The mobile device may be configured to notify particular computing devices or servers of the cellular network when the set of base stations changes—such as when the mobile station begins receiving a broadcast signal with a new unique identifier (e.g., when it enters a particular area), or stops receiving one it was previously receiving (e.g., when it leaves a particular area). Putkiranta, 8:60-65. Cellular network operators collect and store this location information and make it available to authorized external entities to enable location-dependent applications, such as specific call pricing, targeted advertisements associated with the location, and the like. Putkiranta, 6:13-52.

32. These techniques, referred to as “location services,” were well-known as early as the 1990s. In fact, by 1999, the 3rd Generation Partnership Project (3GPP), a standards organization for mobile telecommunications, issued multiple technical specifications standardizing aspects of location services. *See* Ex.1019 (3GPP specification for “location services in UMTS,” dated October 1999); Ex.1021 (3GPP specification for a system for “coding of locations,” dated May 1999). As described herein, the '720 patent simply rehashes “location services” techniques that

were well-known—and some that were even standardized—well before its earliest possible priority date (March 28, 2006).

VI. THE '720 PATENT

33. The '720 patent relates to a system and method for monitoring a mobile station's presence in a special area to provide location-dependent rates or services. Ex.1001, [54], Abstract ("Method for monitoring the presence of a mobile station in at least one special area" where a network "adapt[s] the value of an operating parameter" based the mobile station receiving a "defining signal and more precisely a distinctive one that defines the special area"), 4:29-34 ("the operating parameter is a tariff or a service flag that enables or disables a special tariff or a service for the mobile station" so that "the operator's services offer can therefore being dependent on the location of the mobile station").

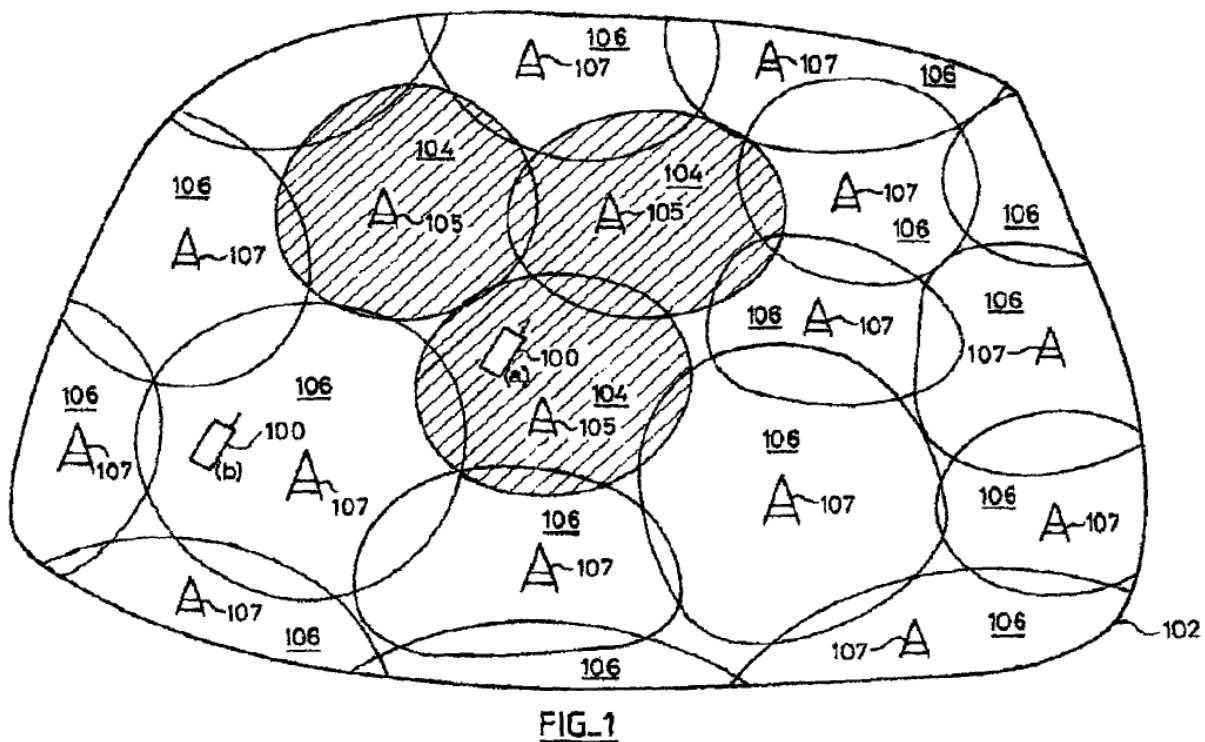
34. The claims are directed to a "radio communication defining device," such as a base station of a mobile telephone network or wireless device, that transmits a "distinctive defining signal" to define a special area. Ex.1001, claim 1 ("a radio communication defining device that transmits a distinctive defining signal"), 6:16-28 ("base station...105... is a radio communication defining device" where "the distinctive radio defining signal that defines the special area is a distinctive signal transmitted by some selected base stations 105"), 7:42-51 ("the radio communication defining device is a wireless device (212 or 212b), e.g. a WIFI,

Bluetooth or DECT device, the radio distinctive defining signal that defines the special area is a distinctive wireless signal 214 or 214*b* (e.g. a WIFI, Bluetooth or DECT signal) transmitted by the wireless device (212 or 212*b*)”).

35. The claims recite different ways the distinctive defining signal may define a special area, including (1) the special area corresponding to the coverage area of the distinctive defining signal; (2) the special area corresponding to an intersection of coverage areas by two radio communication defining devices; and (3) the special area corresponding to the sum of coverage areas of multiple radio communication defining devices. Ex.1001, claim 1 (“the distinctive defining signal at least defining a special area by one or more of: (1) a coverage area of the distinctive defining signal; (2) a portion of the coverage area that intersects with another area of coverage of another radio communication defining device; and (3) a sum of the area of coverage and the another area of coverage”), 9:60-67. The ’720 patent explains that “[t]he definition of the special area can be done by the coverage of one or several radio defining signals or by the intersection of the coverage of two or more radio defining signals.” Ex.1001, 12:8-11. The ’720 patent states that “the mobile station knows that it is into a special area defined as the intersection of the coverage of several distinctive defining signals when it is observing and recognizing at one time all these distinctive defining signals” and that “[i]f the special area is defined by the sum of the coverage of several distinctive defining signals, the mobile

station has to recognize at least one of the three distinctive defining signals at one time in order to determine that it is into this special area.” Ex.1001, 15:66-16:8.

36. Figure 1 shows one example of the claimed “special area,” where base stations 105 transmit a “distinctive defining signal” having a “radio coverage 104.” Ex.1001, 6:22-24, 32-35, 48-55.



Ex.1001, FIG 1.

As shown in Figure 1, “the sum of the coverage areas of the[] selected base stations 105 defines a special area (the shaded area of FIG. 1).” Ex.1001, 6:16-28.

37. The claims also specify that the recited distinctive defining signal includes “information indicating whether or not the radio communication defining

device is in a predetermined environment.” Ex.1001, claim 1. In the specification, this information is referred to as “reliable information” indicating whether or not a wireless device is in a predetermined environment. Ex.1001, 7:56-59, 8:9-14, 8:32-41, 8:52-64, 9:39-41, 15:51-58, 18:45-56; *see also* 5:34-40. The specification does not, however, explain or provide details on what the “reliable information” may be. *See* Ex.1001, 5:34-41, 7:56-59, 8:9-14, 8:32-41, 8:52-64, 9:39-41, 15:51-58, 18:45-56.

38. A mobile station within the special area receives the distinctive defining signal and sends an “updating signal” to a “provider of presence related services,” such as a mobile telephone network operator or different provider. Ex.1001, claim 1, 15:51-58 (“When a defining signal received is from a wireless device (transmitted in a frequency range outside the frequency range allocated for the mobile telephone network), the mobile station preferably also search in step 518 whether or not the defining signal received contains reliable information confirming (or not) that the wireless device is effectively located into a predetermined environment defined by the operator of the mobile telephone network.”), 2:36-38 (“[T]he mobile station sends an updating signal to a mobile telephone network about its presence in the special area”), 4:35-43 (“updating signal” is sent to “special operating means” that is “operated by the mobile telephone network operator or by a different provider” to allow or forbid provision of a service).

39. Like the distinctive defining signal, the updating signal also includes “information indicating whether or not the radio communication defining device is in the predetermined environment.” Ex.1001, claim 1. The specification explains that this information is “reliable information related to whether or not the wireless device 212 or 212*b* is or not effectively located into its predetermined environment.” Ex.1001, 9:56-59. The provider can “adjust, activate, or deactivate” tariffs or services based on the mobile station’s presence in a special area. Ex.1001, claim 1; *see also* 2:39-52 (updating signal used to “adapt the value of at least one operating parameter depending on the presence of the mobile station in the special area”), 4:13-28 (updating signal adapts value of at least one operating parameter, where “the operating parameter is a tariff or a service flag that enables or disables a special tariff or a service for the mobile station”), 12:12-35 (the adapted operating parameters are “related to activation or deactivation flags of tariffs and/or services provided to the mobile station by the mobile telephone network”).

VII. CLAIM CONSTRUCTION

40. It is my understanding that in order to properly evaluate the ’720 patent, the terms of the claims must first be interpreted. It is my understanding that for the purposes of this *inter partes* review, the claims are to be construed under the so-called *Phillips* standard, under which claim terms are given their ordinary and customary meaning as would have been understood by a POSITA in light of the

specification and prosecution history, unless the inventor has set forth a special meaning for a term. I have also been informed that claim terms only need to be construed to the extent necessary to resolve the obviousness inquiry. I have reviewed the entirety of the '720 patent, as well as its prosecution history. It is my opinion that, at this stage, no claim term requires express construction.

VIII. THE CHALLENGED CLAIMS ARE UNPATENTABLE

41. The discussion in this Declaration provides a detailed analysis of how the asserted prior art references teach each limitation of the Challenged Claims.

42. As part of my analysis, I have considered, and discuss in detail, the scope and content of the prior art and any differences between the alleged invention and the prior art.

43. It is my opinion that the alleged invention recited in the Challenged Claims would have been obvious in view of the teachings of the asserted prior art and the knowledge of a POSITA before the time of the alleged invention of the '720 patent.

IX. GROUND 1: CLAIMS 1, 2, 5, 7, 9-10, 12, AND 15 ARE UNPATENTABLE AS OBVIOUS OVER THE COMBINATION OF VENDETTI AND GRANBERG

A. Summary of Vendetti

44. Vendetti relates to “a system for dividing a cellular telephone service area into a plurality of zones.” Vendetti (Ex.1009), 1:5-9. The zones allow a user to

be “billed according to a rate schedule set for that particular zone.” Vendetti, 4:43-46.

45. Vendetti generally discloses “marker transmitters” used to designate particular zones in a cellular service area. For example, Figure 3 shows a pair of marker transmitters M_1 and M_2 that define zones Z_1 and Z_2 . Vendetti, 5:14-19.

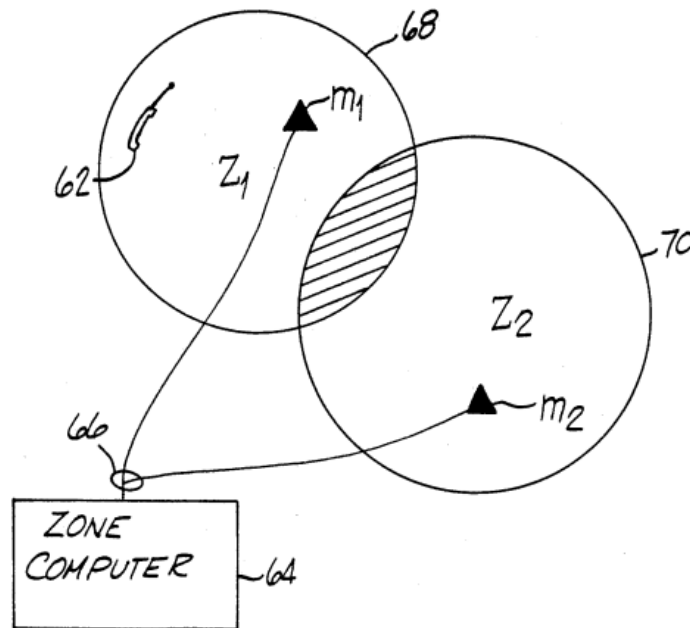


FIG. 3

Vendetti, FIG. 3.

The marker transmitters transmit “marker signals,” which “allow the mobile unit 62 to determine whether the unit is within a particular zone.” Vendetti, 5:15-23. The marker signals may include information such as a “zone identification signal” and a

“dynamically changing” “password” that is unique to the zone for a specific time period. Vendetti, 7:20-53, 9:50-58.

46. When a mobile unit is within a particular zone, it “receives the zone identification signals for the particular” zones, as well as the “variable password.” Vendetti, 3:1-6, 3:27-33. The mobile unit “transmits the received zone identification signal and the password for the zone” to a mobile telephone switching office (MTSO). Vendetti, 7:63-8:1, 11:66-12:2. Using the received information, the MTSO verifies that the mobile unit is in a particular zone by comparing “the password received from the mobile unit” with “the password transmitted by the marker transmitters.” Vendetti, 3:29-33, 8:1-7. “If the passwords are the same, the cellular service provider can be confident that the mobile unit is within a particular zone.” Vendetti, 3:33-35.

47. The zones allow a user to be “billed according to a rate schedule set for that particular zone.” Vendetti, 4:43-46. For example, when a mobile unit is “in the primary zone,” “the user is billed for the call at a rate set for that particular zone,” such as at a discount. Vendetti, 4:53-59. If the unit is in a “secondary zone,” the user is “billed at a ‘secondary zone’ rate,” and a “public zone” rate if the user is in a “public zone.” Vendetti, 4:67-5:7.

B. Summary of Granberg

48. Granberg describes a “mobile communications network 10” that includes a “database that stores and manages subscriptions” for a number of subscriber devices (e.g., cell phones). Granberg (Ex.1037), 5:38-40, 6:3-4. Granberg describes that the database “stores a number of subscriber records,” each including “individual subscriber data such as MSISDN, IMSI, current VLR location, and supplementary services data.” Granberg, 7:40-44. Granberg further describes that “each subscriber record may include one or more network-specific indicators, e.g., one or more flags, corresponding to one or more network-specific services.” Granberg, 7:44-48. “Each network-specific indicator is then set or activated when that subscriber is to receive a corresponding network-based service in a network that supports that network-based service.” Granberg, 7:49-53. Or, “[i]f that subscriber is not to receive the service” in the particular network to which it is presently registered, “the flag is reset or otherwise deactivated.” Granberg, 7:53-54.

49. Granberg explains that “when a mobile station enters into a visiting location or service area,” a request is sent for data about the roaming mobile station from the mobile’s home location register (HLR), which triggers the HLR’s updating of the “network-specific indicators” to activate or deactivate “network-based services” as appropriate for the particular network where the mobile station is operating within. Granberg, 5:61-64, 7:34-54, 8:11-22.

C. Reasons to Combine Vendetti and Granberg

50. In my opinion, a POSITA would have been motivated to combine the teachings of Vendetti and Granberg for several reasons as discussed further below. Combining Granberg's implementation details for adjusting a flag to activate or deactivate services for a mobile device with Vendetti's system, which charges a user different tariff rates based on location, would have been obvious, beneficial, and predictable. Vendetti describes charging a user different rates based on location, but leaves implementation details up to a POSITA. Thus, a POSITA would have been motivated to turn to Granberg's well-known flag-setting techniques. Additionally, combining Granberg's teaching of a service flag with Vendetti's system that teaches location-based rates would be obvious, beneficial, and predictable because it expands the application and usefulness of Vendetti's zone marking system.

1. Vendetti and Granberg are analogous art to the '720 patent.

51. As a threshold matter, Vendetti and Granberg are analogous art to the '720 patent. The '720 patent relates to a system and method for monitoring the presence of a mobile station in particular geographic areas. Ex.1001, (54), Abstract. This monitoring is to, in part, "activat[e] or deactivat[e] flags of tariffs and/or service" "offered by the operator of the mobile telephone network in predetermined special areas." Ex.1001, 12:12-35; *see also* 11:30-33.

52. Vendetti and Granberg are within the same field of endeavor. Like the '720 patent, Vendetti and Granberg are both systems and methods directed to monitoring the location of a mobile device and providing location-based tariffs and services. In particular, Vendetti discloses determining whether a mobile unit “is within the boundaries” of a particular zone so that “the user is billed according to a rate schedule set for that particular zone.” Vendetti, 4:43-51. For example, “[i]f, while in the primary zone, the user initiates or receives a telephone call,” “the user is billed for the call at a rate set for that particular zone.” Vendetti, 4:53-56. “If the unit is within a secondary zone at the time of call initiation,” “the user is billed at a ‘secondary zone’ rate” and “if [the mobile unit is] located in a public zone” the user is “billed for calls...at a ‘public zone’ rate.” Vendetti, 4:67-5:7; *see generally* 4:30-5:13, 7:51-8:7. Likewise, Granberg “relates to providing services to mobile stations in a mobile communications system,” specifically by selectively providing services to the mobile stations based on their location. Granberg, 1:20-23, Abstract (describing a method for selectively providing services to “mobile communication units” when roaming on networks outside their home network).

53. Furthermore, Vendetti and Granberg are reasonably pertinent to the '720 patent. The '720 patent states that one of the problems it was facing was avoiding fraud while providing location-based tariffs and services. Ex.1001, 3:48-60 (“The operator of the mobile telephone network advantageously avoids fraud

linked to a possible shifting of the wireless device” by implementing a “distinctive wireless signal [that] contains wireless device identification data and reliable information confirming that the wireless device is effectively located into a predetermined environment”), 4:12-34 (describing providing mobile station with tariffs or services based on mobile station’s location in a special area).

54. Vendetti similarly provides a solution for avoiding fraud while providing location-based tariff rates for calls. Vendetti describes using a “a variable password that is unique to the particular zone.” Vendetti, 3:27-37. The variable password “help[s] prevent fraud on the cellular service provider” and ensures that the mobile station should “be given the ‘in-zone’ rate.” Vendetti, 7:51-8:11. Granberg also provides a solution that overcomes problems associated with providing location-based services. Granberg discloses using databases with flags to “more efficiently store information for network-specific supplementary services for large numbers of mobile subscribers” and “efficiently administer and update network-specific supplementary services for large numbers of mobile subscribers.” Granberg, 3:58-63. Thus, Vendetti and Granberg are analogous art to the ’720 patent.

2. A POSITA would have been motivated to combine the teachings of Vendetti with the teachings of Granberg.

55. In my opinion, a POSITA would have been motivated to turn to Granberg’s implementation details for adjusting a flag to activate or deactivate

services for a mobile device based on Vendetti's teachings regarding charging users different tariff rates based on location.

56. As explained above, Vendetti generally discloses billing a user a particular rate based on the user's location in a specific zone. Vendetti, 4:30-5:13, 7:51-8:7. Vendetti, however, leaves up to a POSITA details on how to implement these rate changes. A POSITA would have known that a database storing service profiles with flags to activate and deactivate services is a straightforward way to implement Vendetti's rate changes based on location. Granberg provides examples of these well-known database structures. Specifically, Granberg describes storing "network-specific indicators, e.g., one or more flags, corresponding to one or more network-specific services" that are "set or activated" when the mobile station is supposed to receive that service or "reset or otherwise deactivated" "[i]f that subscriber is not to receive the service." Granberg, 7:44-54. A POSITA would have been motivated to turn to Granberg for the implementation details useful with Vendetti's teachings, and indeed would have been motivated to implement Granberg's database structures and management techniques with Vendetti's teachings to gain the efficiencies beneficially described by Granberg, including to "more efficiently store information for network-specific supplementary services for large numbers of mobile subscribers." Granberg, 3:58-63.

57. In my opinion, a POSITA would have had a reasonable expectation of success using Granberg's flag-setting teachings with Vendetti's system teachings. Vendetti teaches charging different rates depending on what zone the mobile station is in. *See, e.g.,* Vendetti, 4:43-46, 4:53-59, 4:67-5:7. Granberg's flag-setting teachings provide an efficient way of administering and updating services for a large number of mobile subscribers regardless of the mobile device's location. Granberg, Abstract (describing database including subscriber records with flags indicating whether the subscriber "is to receive the network-specific service"), 3:58-63 ("It is also an object of the invention to more efficiently store information for network-specific supplementary services for large numbers of mobile subscribers"). Granberg achieves this by providing a well-understood, standardized way to store and manage such profiles, including fields for flags regarding network-specific services. Granberg, 4:10-29 (describing using database with subscriber records including network-specific flags to indicate a subscriber can receive network-specific service in a home or visiting network), 6:3-15 (describing home location register (HLR) storing and managing subscriber data), 7:44-54 (describing subscriber records with flags that are "set or activated" or "reset or otherwise deactivated" corresponding to a subscriber's permission to receive network-specific services). Granberg teaches doing so to provide information regarding the mobile station's configured services when visiting different network areas. Granberg, 5:61-64 (describing a visiting

location register (VLR) receiving data about the mobile station when the mobile station “enters into a visiting location or service area”).

58. Applying Granberg’s database teachings is simply a practical and conventional way to implement profile management functionality with Vendetti’s location-based rate teachings. Both references operate within the context of cellular networks and maintain some sort of subscriber profile for a user. For example, Vendetti teaches that “the owner of the mobile unit 62 has contracted with the cellular service provider to select zone Z_1 as a primary zone and zone Z_2 as a secondary zone.” Vendetti, 5:26-29. Granberg similarly teaches that a “home location register 42 stores a number of subscriber records 60 including subscriber records 1, 2, ...N,” where “each subscriber record may include one or more network-specific indicators, e.g., one or more flags, corresponding to one or more network-specific services.” Granberg, 7:39-54. In such networks, subscriber profiles are routinely maintained in structured databases—thus, they are compatible. The use of a database structure like Granberg’s to store location-based service data is a predictable and routine implementation detail for any system that manages per-user, location-dependent tariffs, like Vendetti.

59. Moreover, implementing Granberg’s database structure teachings with Vendetti’s teachings of charging users different rates is a design choice that leverages established database practices for managing subscriber data in

telecommunications networks. Vendetti's system, which charges users different rates based on location, naturally fits with the use of a profile record that includes allowed locations and flags. Thus, a POSITA would have combined Granberg with Vendetti as a straightforward implementation for managing service profiles for charging such different rates based on location.

60. Further, a POSITA would have found it obvious to modify Vendetti's system teachings to include service flags to activate and deactivate location-based services, in addition to Vendetti's location-based rates, based on the teachings of Granberg. It was well-known at the time of the '720 patent that it was desirable to provide systems that provided both location-based rates and location-based services. For example, Vimpari teaches it being desirable to provide a system that observes whether a mobile station is located in a predetermined area "for defining call tariffs, or for defining available services on the basis of the location of the mobile station." Vimpari (Ex.1010), 1:4-8. Vimpari contemplates applying "lower tariffs" and "offer[ing] special services that are only available when [a] subscriber is 'at home'" or "in some other predetermined place." Vimpari, 1:9-19. Similarly, Putkiranta provides another example, teaching defining a "service profile" for a "localized service area" that includes "call pricing" (i.e., tariffs), as well as services such as call prioritization, "limitations concerning the modulation method, data rate and/or connection quality in the communication between the base station and mobile

station,” “routing of incoming email messages to a mobile station instead of the user’s desktop workstation,” or “activation or inactivation of automatic call transfer and/or voice mail service.” Putkiranta (Ex.1005), 6:42-56. Moreover, modifying Vendetti’s system teachings that provide location-based rates to also include location-based services beneficially expands the application and usefulness of Vendetti’s zone marking system. In this way, Vendetti’s same location tracking system for providing location-based rates could also be used to provide location-based services.

61. A POSITA would have had a reasonable expectation of success in combining Vendetti’s system teachings with Granberg’s service flag for location-based services teachings. Vendetti already contemplated changing what rate was offered depending upon location. Vendetti, 4:30-5:13, 7:51-8:7. Granberg’s teachings simply extend the location-based offerings to additional services. And as already noted, other prior art systems such as Vimpari and Putkiranta had already implemented systems which provided both location-based tariffs and location-based services. Vimpari, 1:4-19; Putkiranta, 6:42-56.

62. Accordingly, it is my opinion that a POSITA would have found it obvious to modify Vendetti’s system, which teaches location-based tariff rates, to implement a tariff setting functionality to activate and deactivate the different tariffs, and additionally incorporate location-based services, as taught by Granberg.

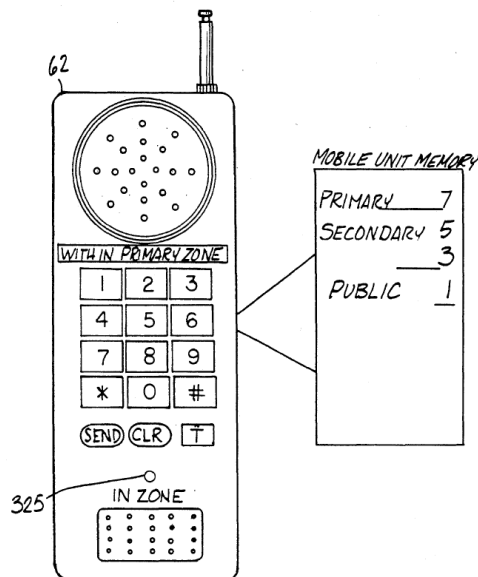
D. Detailed Analysis of Claims

1. Claim 1

- a. [1.0] *A method associated with the use of a mobile station and a radio communication defining device that transmits a distinctive defining signal, the method comprising:*

63. To the extent the preamble (limitation [1.0]) is limiting, it is met, in the combination, by Vendetti.

64. Vendetti discloses “[a] handset of a mobile unit.” Vendetti, 12:44-45. Vendetti’s “mobile unit” is a *mobile station*, since both the *mobile station* and Vendetti’s “mobile unit” operate within, and are serviced by, a mobile telephone network. See Ex.1001, 6:3-4; Vendetti, 1:20-23, Figure 10:



Vendetti, FIG. 10.

65. Vendetti also discloses a marker transmitter (*a radio communication defining device*). Vendetti's system "comprises **a plurality of marker transmitters** located throughout the cellular service area." Vendetti, 2:59-61; *see also* Abstract ("**One or more marker transmitters are disposed throughout a cellular area** to transmit a zone identification signal that is independent of normal RF cellular coverage to a mobile or portable cellular receiver."). Figure 3 illustrates an example where "a pair of marker channel transmitters M_1 and M_2 (marker transmitters) transmit marker signals on a common, dedicated 30 kHz cellular traffic channel or portion thereof," and "mobile unit 62" monitors that channel "to determine if it is in one of these zones." Vendetti, 5:14-32, Figure 3:

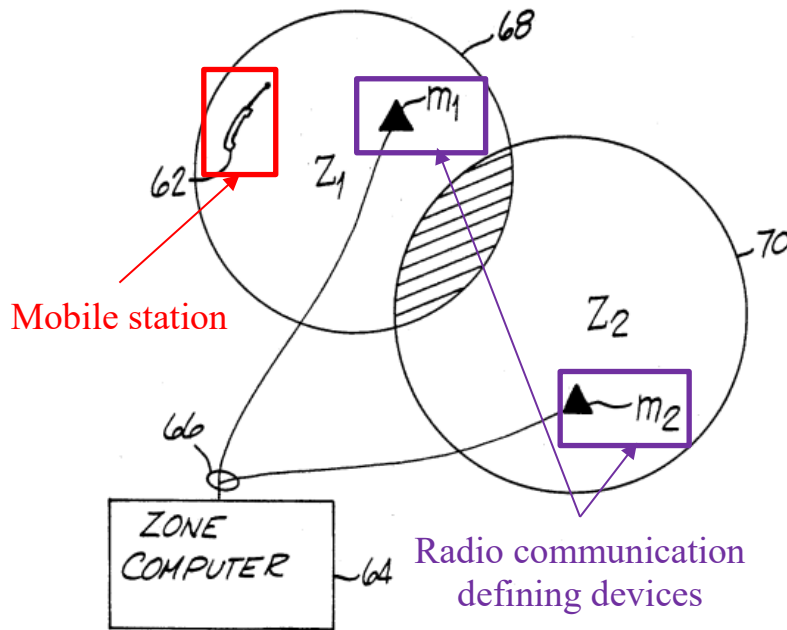


FIG. 3

Vendetti, FIG. 3 (annotated).

66. Vendetti's marker transmitter (*radio communication defining device*) transmits a "marker signal" including a zone identification signal and a password (*that transmits a distinctive defining signal*) to the mobile unit. "A **marker signal is transmitted by one or more marker transmitters such that the marker signal** can be received by a mobile unit in a radio frequency coverage area that is substantially coincident with the boundaries of the zone." Vendetti, 2:61-65. The marker signals include "**zone identification signals** that are unique to each zone in the cellular service area" and "**a variable password** that is unique to the particular zone." Vendetti, 2:65-67, 3:27-29.

67. Figure 5 provides more detail about the marker signal, with “marker signal 80” “divided into N time slots $S_1, S_2, S_3, \dots, S_N$.” Vendetti, 7:25-26. For an exemplary “time slot S_4 ,” a “zone identification signal 84” and a “password 86” are transmitted, where “[o]nly the marker transmitters that mark a given zone transmit the zone identification signal 84 during a single time slot.” Vendetti, 7:34-37, 43-45; see also 3:27-29, 7:45-50, 10:17-27, Figure 5:

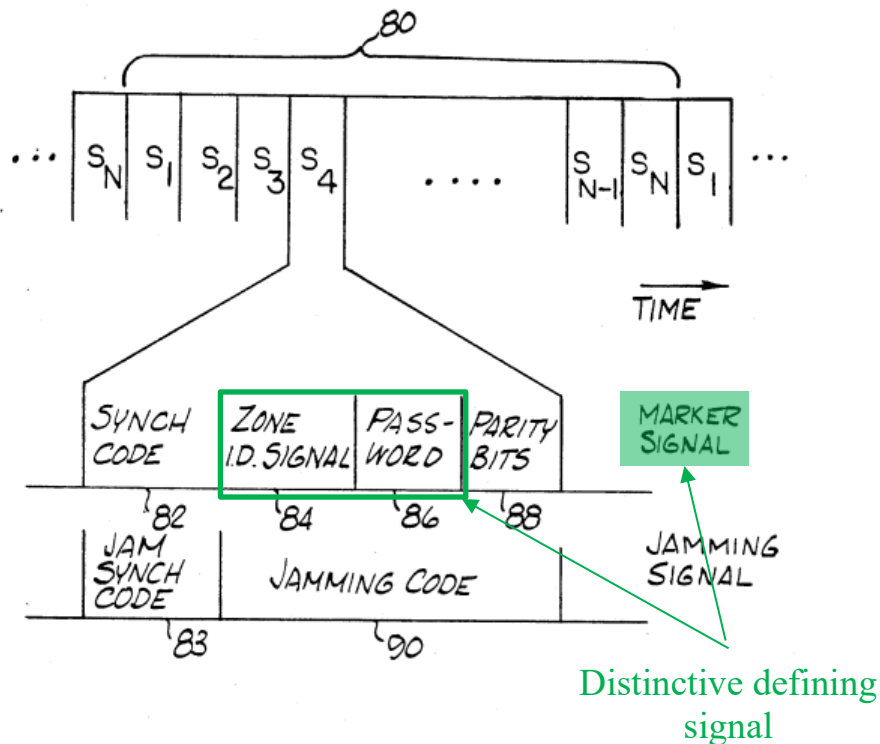


FIG.5

Vendetti, FIG. 5 (annotated).

68. Finally, Vendetti discloses *methods* for transmitting a marker signal from the marker transmitter, and for the mobile unit receiving and using the marker signal. This includes Figure 7’s “flow chart of a computer program for operating

each marker transmitter to mark one or more zones within a cellular service area” and Figure 8’s “**flowchart of a computer program that causes a mobile unit** made according to the present invention **to determine whether it is within a zone.**” Vendetti, 9:48-50, 10:58-60; *see also* claim 1 (claiming a method).

69. Thus, the combination renders obvious *[a] method* (Vendetti’s method) *associated with the use of a mobile station* (Vendetti’s mobile unit) *and a radio communication defining device* (Vendetti’s marker transmitter) *that transmits a distinctive defining signal* (transmitting a marker signal including zone information and a password).

b. [1.1] receiving and processing the distinctive defining signal in the mobile station;

70. Limitation [1.1] is met, in the combination, by Vendetti.

71. Vendetti discloses the mobile unit *receiving* a marker signal including the zone identification signal and password (collectively, *a distinctive defining signal, see [1.0]*). These marker signals, transmitted “by one or more marker transmitters,” are “**received by a mobile unit.**” Vendetti, 2:61-67. In particular, “[e]ach mobile unit monitors a marker channel to **receive the marker signals transmitted by the marker transmitters**” and “receives the zone identification signals for” a particular preselected zone. Vendetti, 3:1-6.

72. As further explained with respect to Figure 8, which depicts the computer program in the mobile unit, Vendetti’s mobile unit “acquires the marker

channel” at block 184. Vendetti, 11:3-4. From there, at block 188, “**the mobile unit monitors the marker channel to determine whether the mobile unit has received a zone identification signal** that matches a zone identification signal stored within the mobile unit’s internal memory.” Vendetti, 11:5-9; *see also* Figure 8:

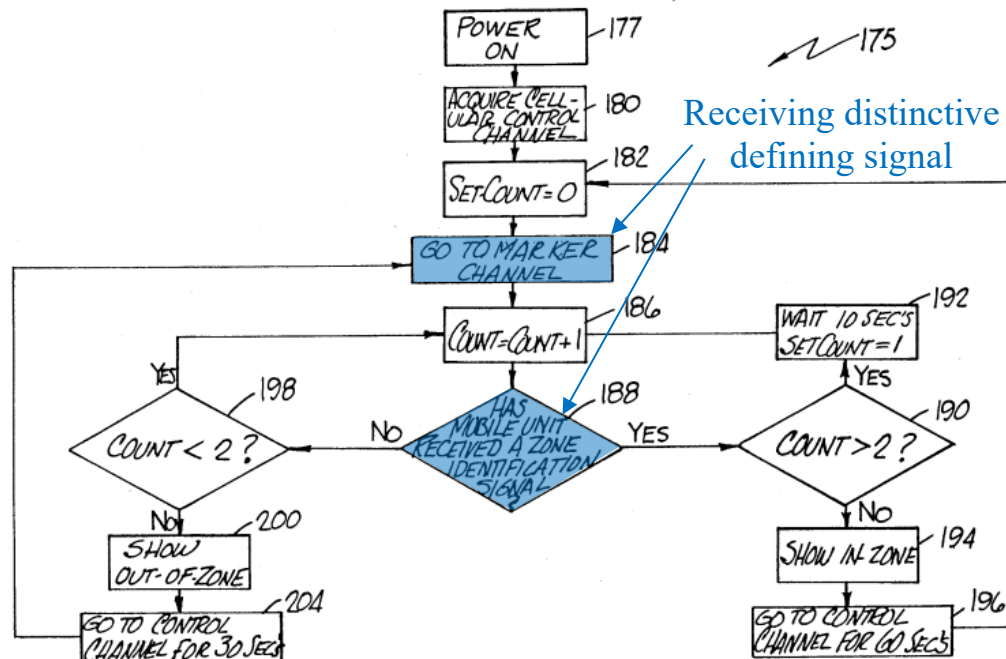


FIG.8

Vendetti, FIG. 8 (annotated).

73. As noted at [1.0], the marker signal received by the mobile unit includes both the “zone identification signal and a password for the particular zone” (*distinctive defining signal*). Vendetti, 7:34-50, Figure 5.

74. Vendetti further discloses the mobile unit *processing* the marker signal that includes the zone identification signal and password (*distinctive defining signal*). Vendetti’s mobile unit extracts information from the marker signals

including the zone identification signal and a password for storage and subsequent operations. *See* Vendetti, Figure 5, 7:63-66 (when the mobile unit is in a zone, it “stores the received password” and will “update its memory” if the password changes), 11:54-12:2 (mobile unit receives signal and detects it is in a zone, which includes operations based on the received zone identification signal and the password for the zone, as received in the marker signal at the mobile unit). For example, “[t]he zone identification signals stored within the mobile unit’s memory **are compared [by the mobile unit] to the zone identification signals received from the marker transmitters.**” Vendetti, 12:60-62; *see also* 3:29-33, 11:5-9.

75. These actions are consistent with the use of *processing* in the ’720 patent. According to the ’720 patent specification, *processing* at least refers to comparing received signal codes to codes stored in the mobile station itself. In particular, the ’720 patent refers to the mobile station including “processing means” that include “comparing means” where “the mobile telephone network identification codes received by the mobile station are compared to IC2 stored into the internal mobile station database.” Ex.1001, 6:62-7:3. Vendetti discloses the very same concept of comparing received identifiers with stored identifiers, as noted above. Indeed, Vendetti discloses that “[t]he zone identification signals stored within the mobile unit’s memory are compared to the zone identification signals received from the marker transmitters.” Vendetti, 12:60-62; *see also* 3:29-33 (“The mobile unit

transmits the password back to the cellular system where the password received from the mobile unit is compared with the password transmitted by the marker transmitters.”), 11:5-9 (“[T]he mobile unit monitors the marker channel to determine whether the mobile unit has received a zone identification signal that matches a zone identification signal stored within the mobile unit’s internal memory.”).

76. Thus, the combination renders obvious *receiving and processing the distinctive defining signal in the mobile station* through Vendetti’s mobile unit receiving and processing the marker signal including the zone information and password.

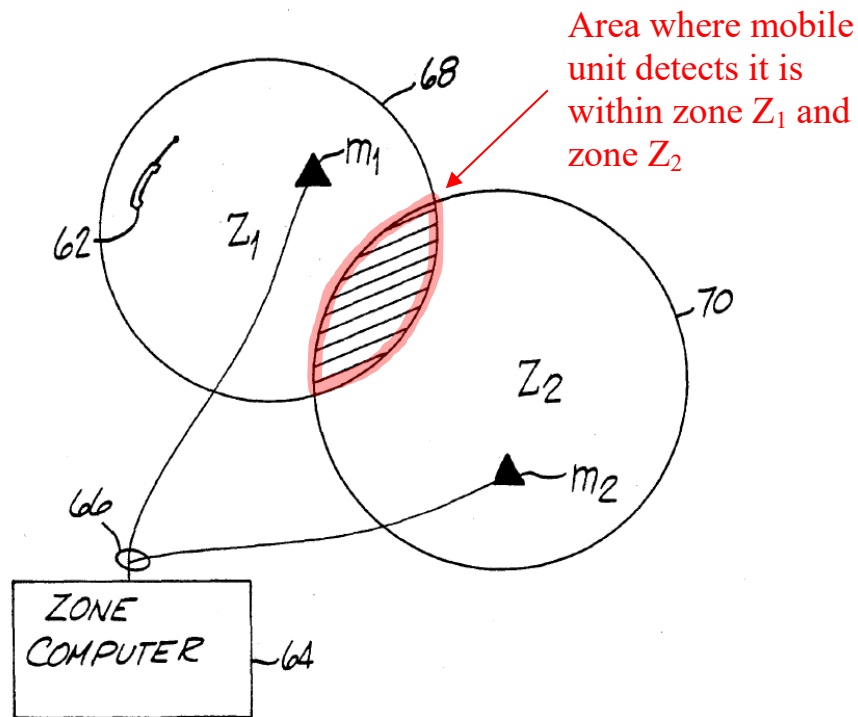
- c. [1.2] *the distinctive defining signal at least defining a special area by one or more of: (1) a coverage area of the distinctive defining signal; (2) a portion of the coverage area that intersects with another area of coverage of another radio communication defining device; and (3) a sum of the area of coverage and the another area of coverage;*

77. Limitation [1.2] is met, in the combination, by Vendetti.

78. *First*, in the combination, Vendetti discloses the zone identification signal (that is part of a marker signal) having a radio frequency coverage area that corresponds to the boundaries of a particular zone (*the distinctive defining signal at least defining a special area by... (1) a coverage area of the distinctive defining signal*). In Vendetti, “[a] marker signal is transmitted by one or more marker transmitters” and “received by a mobile unit **in a radio frequency coverage area**

that is substantially coincident with the boundaries of the zone.” Vendetti, 2:61-67. Vendetti also discloses that “[o]ne or more marker transmitters are disposed throughout a cellular area to transmit **a zone identification signal**,” as part of a marker signal, where “[e]ach zone identification signal is transmitted in a radio frequency coverage area that **illuminates the zone to be identified**[.]” Vendetti, Abstract. As demonstrated in [1.0], the marker signal including the zone identification signal is *the distinctive defining signal*. The marker transmitter’s radio frequency coverage area *defin[es] a special area by...(1) a coverage area of the distinctive defining signal*.

79. Second, Vendetti discloses an intersecting area where the mobile unit receives two or more zone identification signals (included in the marker signals) from different marker transmitters (*the distinctive defining signal at least defining a special area by...(2) a portion of the coverage area that intersects with another area of coverage of another radio communication defining device*). As shown in Figure 3, Vendetti discloses an embodiment with two zones, “zone Z_1 ...defined by the boundary line 68 and zone Z_2 ...defined by boundary line 70.” Vendetti, 5:61-65. There is also an area, shown as the “shaded area” in Figure 3, where zones Z_1 and Z_2 intersect and the mobile unit “detects that it is **within both zone Z_1 and zone Z_2** .” Vendetti, 5:37-40.



Vendetti, FIG. 3 (annotated).

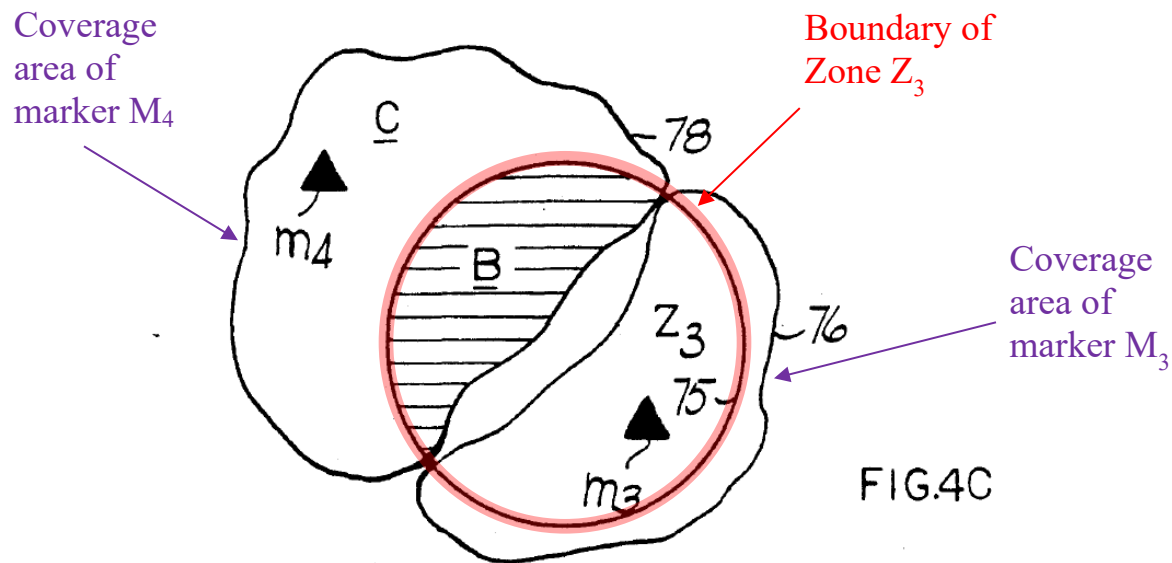
80. The mobile unit detects it is within both zone Z_1 and zone Z_2 because the mobile unit receives the marker signals from M_1 and M_2 . Vendetti describes “a pair of marker channel transmitters M_1 and M_2 (marker transmitters) transmit[ting] marker signals” that “allow the mobile unit 62 to determine whether the unit is within a particular zone.” Vendetti, 5:14-25. As shown in Figure 3 above, the mobile unit can “detect[] that it is within both zone Z_1 and zone Z_2 (shown as the shaded area),” which correspond to the zones for marker transmitters M_1 and M_2 , respectively. Vendetti, Figure 3, 5:37-40. The mobile unit then “**decides which zone it is in according to a set of predetermined rules.**” For example, the rules may direct

the mobile unit to choose a primary zone over a secondary zone, so that a mobile unit detecting that it is in both zones would designate itself to be in its primary zone. Other priority conditions may also be implemented.” Vendetti, 5:37-45.

81. This disclosure in Vendetti is consistent with how the ’720 patent describes an intersection of a special area, which generally refers to the special area being defined by the mobile station simultaneously receiving two or more defining signals. For example, the ’720 patent states that “[i]n the case where the special area is defined by two or more defining signals, **this special area may be the intersection of all or part of them** or the global coverage of the defining signals.” Ex. 1001, 3:6-9. The “mobile station knows that it is into a special area defined as the intersection of the coverage of several distinctive defining signals **when it is observing and recognizing at one time all these distinctive defining signals.**” Ex. 1001, 16:4-8. Vendetti, similarly, discloses an area defined by the intersection of zones Z_1 and Z_2 and the mobile device recognizing it is in the shaded area when it observes and recognizes the marker signals from zones Z_1 and Z_2 . Vendetti, 5:14-25, 5:37-45.

82. Third, Vendetti discloses using the combination of two marker transmitters with radio frequency coverage areas corresponding to a larger zone, so that when a mobile unit receives either one of the marker signals, it determines it is in that zone (*the distinctive defining signal at least defining a special area by...(3) a*

sum of the area of coverage and the another area of coverage). In a first example shown in Figure 4C, Vendetti discloses a “zone Z_3 ,” shown as “boundary line 75,” that is designated by “a radio frequency coverage area defined by boundary line 76” and “a radio frequency coverage area defined by boundary line 78.” Vendetti, 6:41-57, Fig. 4C:



Vendetti, FIG. 4C (annotated).

83. Vendetti explains that “a marker transmitter M_3 located in the zone has a radio frequency coverage area defined by boundary line 76.” Vendetti, 6:42-44. The coverage area of marker transmitter M_3 defined by boundary line 76 is an *area of coverage*. Vendetti teaches ensuring coverage to shaded region “B” as part of zone Z_3 with “another marker transmitter M_4 [that] transmits the marker signal for zone Z_3 during the same time slot when marker transmitter M_3 is

transmitting the marker signal that marks zone Z_3 ,” while also minimizing coverage to the region C using jamming techniques. Vendetti, 6:38-64. The coverage area of marker transmitter M_4 defined by boundary line 78 is *another area of coverage*. “By **using two or more marker transmitters to mark a zone**, any holes within a zone where a mobile unit cannot receive the marker signals can be filled.” Vendetti, 6:57-60. Thus, Vendetti discloses defining *a special area* using *a sum of the area of coverage* (the coverage area of marker transmitter M_3) *and the another area of coverage* (the coverage area of marker transmitter M_4) to correspond to the zone Z_3 .

84. Vendetti further demonstrates the *sum of the area of coverage* in a second example in Figure 11, where “marker transmitters M_{26} and M_{27} ” are “dynamically reconfigured” so that users located in zone Z_{25} may still be detected even if marker M_{25} fails. Vendetti, 13:5-18. This is done by configuring marker transmitters M_{26} and M_{27} to “**simultaneously transmit the zone identification signal for zone Z_{25} so that a mobile unit will be able to detect that it is within the zone,**” ensuring service does not degrade if a transmitter fails. Vendetti, 13:18-24, 13:31-35, Figure 11:

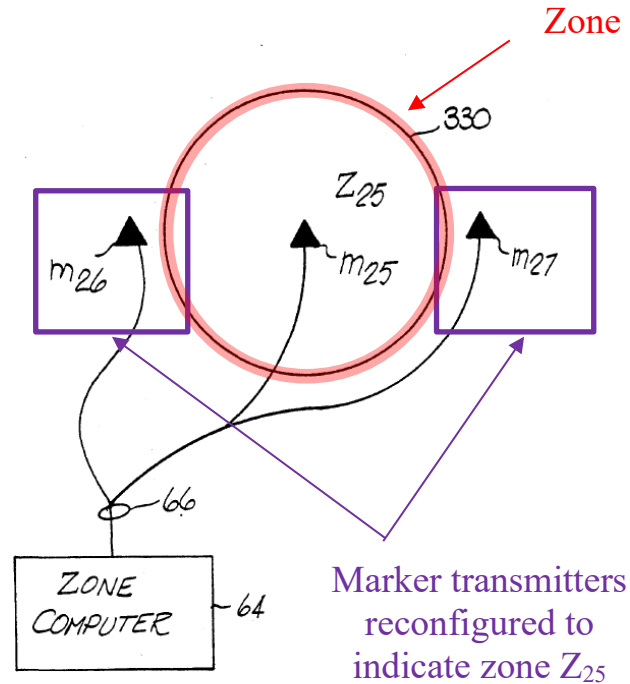


FIG. 11

Vendetti, FIG. 11 (annotated).

85. Thus, in the context of Figure 11, the *special area* is defined by a *sum of the area of coverage* (the coverage area of marker transmitter M₂₆) and the *another area of coverage* (the coverage area of marker transmitter M₂₇) to correspond to zone Z₂₅.

86. More generally, Vendetti repeatedly discloses using multiple markers to collectively identify a particular zone. *See also* Vendetti, 2:61-65 (“A marker signal is transmitted by **one or more marker transmitters** such that the marker signal can be received by a mobile unit in a radio frequency coverage area that is substantially coincident with the boundaries of the zone.”), 6:65-7:3 (“The cellular

telephone system according to the present invention combines the use of jamming and **using more than one marker transmitter to mark a zone** to shape the radio frequency coverage areas of the marker transmitters so they coincide more closely with the boundary of a zone as determined by the cellular service provider”), 7:43-50 (describing using “marker transmitters M_1 , M_2 and M_3 ...to mark a zone”), 8:46-53 (discussing using “**some marke[r] transmitters**” to “mark[] zone Z_1 ” and “**other marker transmitters**” to “mark zone Z_{30} ”).

87. Vendetti’s multiple disclosures of detecting one of multiple marker transmitter signals to indicate the entire boundary of a zone is consistent with the ’720 patent’s discussion of the sum of coverage areas: “[i]f the special area is defined by the sum of the coverage of several distinctive defining signals, **the mobile station has to recognize at least one of the three distinctive defining signals at one time** in order to determine that it is into this special area.” Ex. 1001, 15:66-16:3. Thus, Vendetti discloses *the distinctive defining signal at least defining a special area by...(3) a sum of the area of coverage and the another area of coverage.*

88. Accordingly, Vendetti discloses *the distinctive defining signal at least defining a special area by one or more of: (1) a coverage area of the distinctive defining signal* through the marker transmitters transmitting a marker signal including a zone identification signal that has a radio frequency coverage area; *(2) a portion of the coverage area that intersects with another area of coverage of another*

radio communication defining device through an intersecting area where a mobile unit receives two or more zone identification signals included in the marker signals simultaneously; and (3) *a sum of the area of coverage and the another area of coverage* through the use of a combination of at least two marker transmitters with radio frequency coverage areas corresponding to a larger zone.

d. [1.3] *the distinctive defining signal including information indicating whether or not the radio communication defining device is in a predetermined environment; and*

89. Limitation [1.3] is met, in the combination, by Vendetti.

90. As discussed with respect to [1.0]-[1.1], in the combination, Vendetti's marker transmitter (*radio communication defining device*) transmits a marker signal (*distinctive defining signal*) to the mobile unit. The "marker signal" (*the distinctive defining signal*) includes a zone identification signal and a "password 86." Vendetti, 7:14-37. The password 86 is **"a variable password that is unique to the particular zone"** (*information indicating whether or not the radio communication defining device is in a predetermined environment*). Vendetti, 7:51-53, 3:27-29.

91. The particular zone itself—as defined by the **"boundary line"**—is a *predetermined environment*. Vendetti, 6:13-17. The zones each demonstrate a *predetermined environment* because the zones are predefined in the cellular network: **"[t]he boundaries of the zones...are drawn on a map of the cellular service area according to the marketing needs of the cellular service provider."** Vendetti,

5:61-65. “[T]he cellular service area 55 [is divided] into a number of zones $Z_1, Z_2, Z_3, \dots, Z_n$ ” that “may be larger or smaller than a cell site coverage area 52,” as shown in Figure 2 below. Vendetti, 4:30-38, Figure 2:

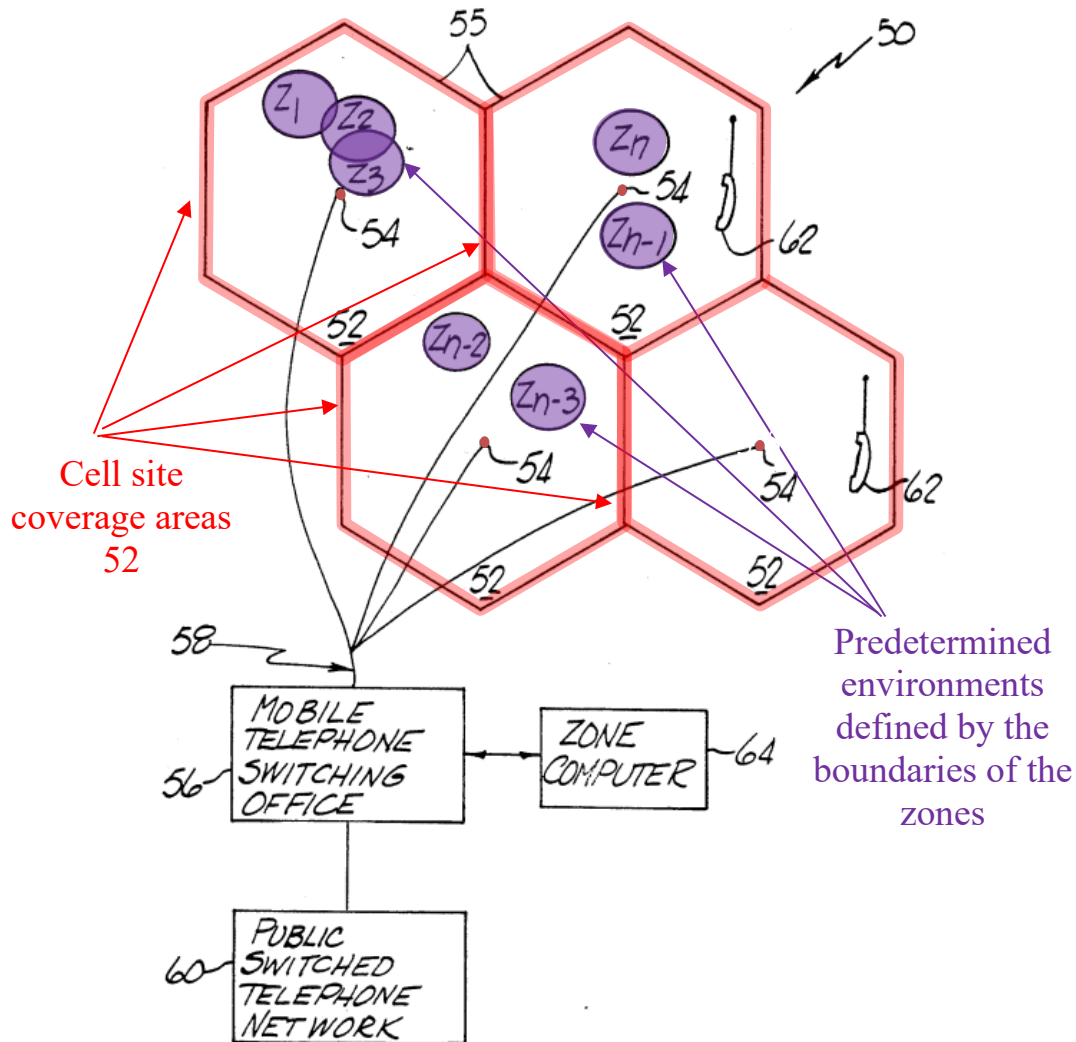


FIG.2

Vendetti, FIG. 2 (annotated).

92. In Vendetti's system, the marker transmitter (*radio communication defining device*) "transmit[s] the zone identification signal and the password for the zone." Vendetti, 7:43-50. When a mobile unit is in a zone, it "stores the received password," and subsequently "transmits the password" to "a billing computer interfaced to the MTSO." Vendetti, 7:63-8:1. At the MTSO, "[t]he password transmitted by the marker transmitter is compared to the password received from the mobile unit," and "[i]f the passwords are not the same, then the cellular service provider knows that the mobile unit cannot really be in the zone and therefore should not be given the 'in-zone' rate." Vendetti, 8:1-7. The variable password "help[s] prevent fraud on the cellular service provider" by preventing an "unscrupulous user" from signaling to the MTSO that the mobile unit is "in its primary zone" and "given an 'in zone' rate on every call made or received regardless of the mobile unit's location." Vendetti, 7:51-58; *see also* 3:27-37 ("[T]he marker transmitters also transmit a variable password that is unique to the particular zone. The mobile unit transmits the password back to the cellular system where the password received from the mobile unit is compared with the password transmitted by the marker transmitters. If the passwords are the same, the cellular service provider can be confident that the mobile unit is within a particular zone. By using the variable passwords, fraudulent use of the zone marking system is restricted.").

93. Because Vendetti's password transmitted by the marker transmitter is unique to each zone (which is "drawn on a map" beforehand), including zones associated with the mobile unit's primary zone, and is used by the MTSO to determine if a mobile unit is within a primary zone, the password is *information indicating whether or not the radio communication defining device* (the marker transmitter) *is in a predetermined environment* (a particular zone previously drawn on a map).

94. Thus, Vendetti teaches *the distinctive defining signal* (the marker signal) *including information indicating whether or not the radio communication defining device is in a predetermined environment* (including a password to indicate a marker transmitter is associated with a particular zone).

- e. [1.4] *sending from the mobile station via a mobile telephone network the updating signal to one or more servers of a provider of presence related services about the mobile station's presence in the special area,*

95. Limitation [1.4] is met, in the combination, by Vendetti.

96. Vendetti's mobile unit transmits signals to the MTSO "under the current **cellular communications protocol**" (*sending from the mobile station via a mobile telephone network*). Vendetti, 5:52-54. Such signals include the "zone identification signal," "password for the particular zone," and optionally a "zone type code" that "indicates to the MTSO whether the unit is in its primary, secondary or a public zone" (collectively, the *updating signal...about the mobile station's*

presence in the special area). Vendetti, 5:46-51; *see also* 11:66-12:5 (“If the mobile unit has detected it is within a zone, the mobile unit transmits the received zone identification signal and the password for the zone to a cell site receiver” and may also transmit a “‘zone-type code’ that indicates whether the mobile unit is within its primary, secondary or a public-type zone in the block 262”), 12:19-23 (discussing similar).

97. This signal from the mobile unit is “transmitted to the MTSO,” including “a **billing computer** interfaced to the MTSO” (*one or more servers of a provider of presence related services*). Vendetti, 5:46-54, 7:60-8:1. A billing computer is a “server” and, therefore, demonstrates this limitation. The “server” term was commonly known in the art in March 2006 (the earliest possible priority date of the ’720 patent) to encompass entities like billing computers. This is shown by multiple dictionary definitions of “server” from 2006 and earlier:

- Ex.1052 defines “server” as “[a] **type of computer providing specific types of services to ‘client’ computers or terminals connected to a network....**What distinguishes a server from other computers in a network is that the servers are charged with processing requests made by other computers. A server can operate as a standalone system, or it can run as a separate process on any type of computer that is carrying out other, non-server

functions.” Ex.1052 (Tech Terms: What Every Telecommunications and Digital Media Professional Should Know), 3.

- Ex.1053 provides one definition of “server” as “**a computer and/or program which responds to requests made by clients.**” Ex.1053 (Wiley Electrical and Electronics Engineering Dictionary), 4.
- Ex.1054 defines “server” as “[o]n a local area network (LAN), **a computer running administrative software that controls access to the network and its resources**, such as printers and disk drives, and **provides resources to computers functioning as workstations on the network**” or “[o]n the Internet or other network, **a computer or program that responds to commands from a client.**” Ex.1054 (Microsoft Computer Dictionary Fifth Edition), 3.
- Ex.1058 defines “server” as “a program which provides some service to other (client) programs.” Ex.1058 (Newton’s Telecom Dictionary), 4.
- Ex.1055 defines “server” as “[a] program that provides services to other programs, called *clients*. Usually a server and its clients run on different computers attached to a network.” Ex.1055 (The Facts On File Dictionary of Computer Science), 3-4.

- Ex.1056 defines “server” as “[a] system on a network that provides a service to other systems connected to the network.” Ex.1056 (A Dictionary of Computing), 3.
- Ex.1057 defines “server” as “a computer that provides services to another computer (called the *client*).” Ex.1057 (Dictionary of Computer and Internet Terms), 3.

As shown in these numerous definitions, as of March 2006, the term “server” was generally understood to mean a computer or program that provided services (e.g., billing) to another computer or program.

98. In Vendetti, the billing computer interfaced to the MTSO is *one or more servers of a provider of presence related services* because it is a computer “interfaced to the MTSO.” Vendetti, 7:60-8:1. Further, by referring to the computer as a “billing computer,” a POSITA would have understood that, at minimum, the computer provides billing-related services to the MTSO. Vendetti, 7:60-8:1. And as previously explained, the MTSO charges different rates depending on a mobile unit’s location in a primary, secondary, or public zone. Vendetti, 4:39-5:7, 7:51-8:7. Thus, a POSITA would have considered Vendetti’s billing computer to be *one or more servers of a provider of presence related services*.

99. Additionally, based on the above-demonstrated understanding of “server,” the MTSO, with or without the billing computer, also renders obvious *one*

or more servers of a provider of presence related services. Vendetti teaches that the MTSO determines “which zone the mobile unit is in and what password the mobile unit has received from the zone” so that “the **rate charged to the user can be varied based on the mobile unit[']s location** within the zone.” Vendetti, 5:55-60. Vendetti’s MTSO thus performs *presence related services*.

100. Further, it was well-known that MTSOs provided billing services, including Vendetti’s particular presence-related billing services, as of the earliest possible priority date of the ’720 patent. Multiple dictionaries recognize that an MTSO is an office or central computer that provides billing services.

- Ex.1058 defines “MTSO” as “[the] central office [that] houses the field monitoring and relay stations for switching calls between the cellular and wire-based (land-line) central office. **The MTSO controls the entire operation of a cellular system. It is a sophisticated computer that** monitors all cellular calls, keeps track of the location of all cellular-equipped vehicles traveling in the system, arranges handoffs, [and] **keeps track of billing information, etc.**” Ex.1058 (Newton’s Telecom Dictionary), 3.
- Ex.1053 defines “MTSO” as “[a] structure that houses **the computers that monitor and control a mobile cellular communications system. It performs functions such as** validating ESNs, establishing connections,

tracking calls, arranging handoffs, and **gathering billing information.**”

Ex.1053 (Wiley Electrical and Electronics Engineering Dictionary), 3.

- Ex.1059 defines “MTSO” as “**where all control is done for a cellular switching network**” and “**is where the billing**, trafficking, maintenance monitoring, and hand-offs to long distance and local land-based carriers **happens.**” Ex.1059 (McGraw-Hill Illustrated Telecom Dictionary), 3.

101. Further, it was also well-known that a MTSO contained a computer or processors (*a server*) to perform these services. For example, Dennison teaches that an MTSO contains “peripheral processors, adjunct processors, and various other information gathering equipment used in the operation and management of a wireless over-the-air communications system.” Dennison (Ex.1045), 2:30-35. In addition, multiple dictionaries recognize that MTSOs include a computer. Ex.1058 (Newton’s Telecom Dictionary), 3 (“The MTSO...is a sophisticated computer”); Ex.1053 (Wiley Electrical and Electronics Engineering Dictionary), 3 (The MTSO is “[a] structure that houses the computers”); Ex.1060 (Hargrave’s Communications Dictionary), 3 (defining MTSO to include “a central computer”). Because MTSOs are well-known to include computers or processors that provide billing services and Vendetti’s MTSO charges users different rates based on the mobile unit’s location in a zone (Vendetti, 5:55-60), a POSITA would have understood Vendetti’s MTSO to be *one or more servers of a provider of presence related services*.

102. Vendetti illustrates a mobile unit transmitting signals via a mobile telephone network to the MTSO (which interfaces with the billing computer):

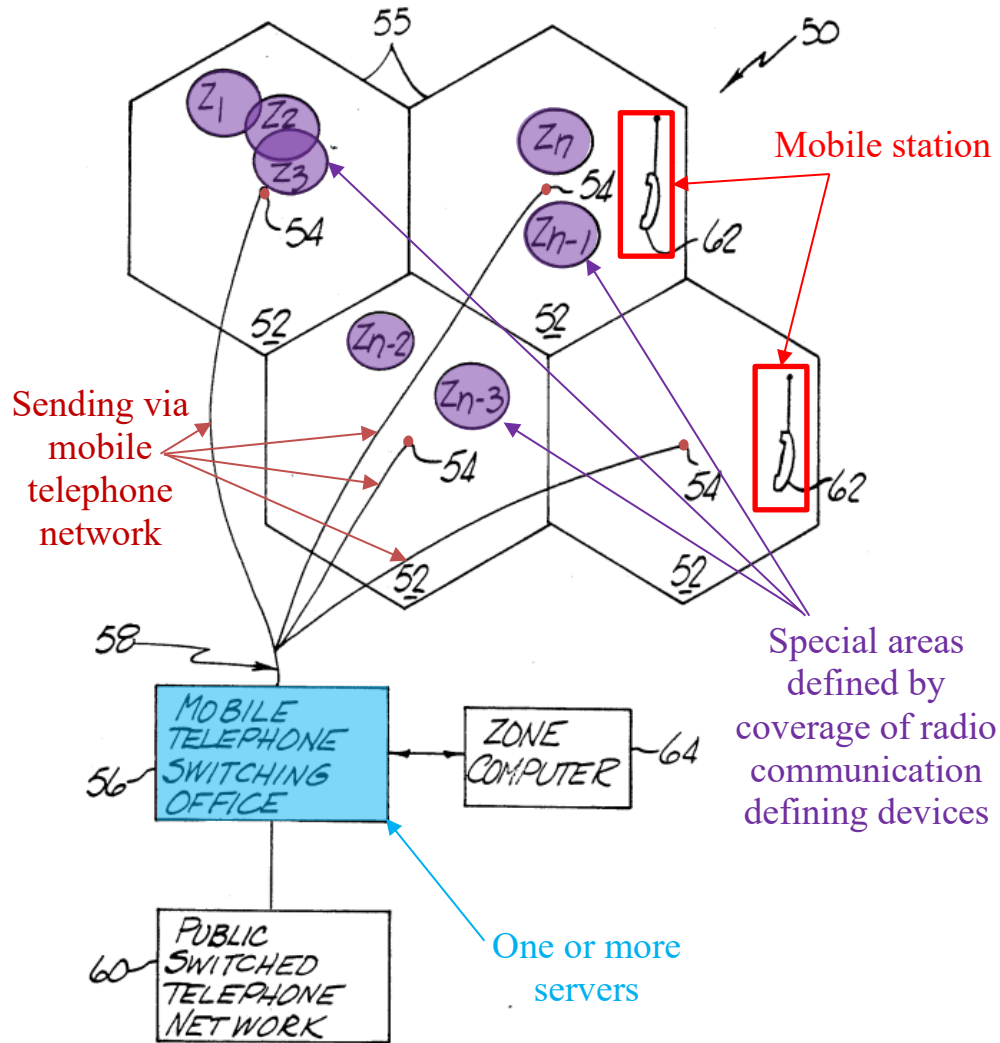


FIG.2

Vendetti, FIG. 2 (annotated).

103. Thus, Vendetti teaches *sending from the mobile station via a mobile telephone network* (the mobile station communicating using a cellular communications protocol) *the updating signal* (a signal including a zone

identification signal, password for a particular zone, and, optionally, a zone type code) *to one or more servers of a provider of presence related services* (to the MTSO or billing computer interfaced with the MTSO) *about the mobile station's presence in the special area* (a signal including a zone identification signal and, optionally, a zone type code to indicate the mobile station's presence in a special area).

- f. **[1.5] *the updating signal being useable by the one or more servers of the provider of presence related services to adjust an operating parameter, which comprises one or more of a tariff and a service flag, to adjust, activate, or deactivate the presence related services provided to the mobile station, and***

104. Limitation [1.5] is met by the combination of Vendetti and Granberg.

105. Vendetti teaches that, after the mobile unit sends the updating signal to the MTSO, the MTSO “is able to **determine which mobile unit is sending the signal, which zone the mobile unit is in and what password the mobile unit has received for the zone**” (*the updating signal being useable by the one or more servers of the provider of presence related services*). Vendetti, 5:46-58. This includes the billing computer, as further demonstrated in [1.4]. See, e.g., Vendetti, 5:46-54, 7:63-8:1.

106. Vendetti further explains that “[w]ith this data, **the rate charged to the user can be varied based on the mobile unit[']s location** within the zone.” Vendetti, 5:46-60. The rate charged is *a tariff*. In Vendetti, “the user is billed according to a rate schedule set for” a particular zone. Vendetti, 4:43-46. For

example, “[i]f, while in the **primary zone**, the user initiates or receives a telephone call, a signal is transmitted to the MTSO 56 and **the user is billed for the call at a rate set for that particular zone.**” Vendetti, 4:53-56. Similarly, “[i]f the unit is within a **secondary zone** at the time of call initiation, a signal is transmitted to the MTSO and **the user is billed at a ‘secondary zone’ rate**” and if the mobile unit is in a “**public zone**,” it is “**billed for calls...at a ‘public zone’ rate.**” Vendetti, 4:67-5:7. Vendetti’s updating signal is “forwarded to the [MTSO] **where the rate charged to the user for the call is adjusted based on his location** within the cellular service area.” Vendetti, 12:39-43. Therefore, Vendetti’s MTSO with a billing computer (*one or more servers of the provider of presence related services*) would be responsible for billing, which was a well-known use of the MTSO. *See, e.g.,* Ex.1058 (Newton’s Telecom Dictionary), 3; Ex.1053 (Wiley Electrical and Electronics Engineering Dictionary), 3; Ex.1059 (McGraw-Hill Illustrated Telecom Dictionary), 3 (all defining MTSO to include providing billing services). Vendetti thus renders obvious that the one or more servers update the rate charged (*one or more servers of the provider of presence related services to adjust an operating parameter, which comprises one or more of a tariff*).

107. Vendetti leaves up to a POSITA details on how to implement the rate changes based on the user’s location in a particular zone. As a result, a POSITA would have been motivated to turn to Granberg’s well-known flag-setting techniques

to implement Vendetti's rate change teachings. Granberg confirms that it was well-known for a server, like Vendetti's MTSO and billing computer, to use a database to maintain profiles for users' rates for different areas. Granberg teaches "a database that stores and manages subscriptions." Granberg, 6:3-4. The database "stores a number of subscriber records," each including "individual subscriber data such as MSISDN, IMSI, current VLR location, and supplementary services data." Granberg, 7:40-44. "[E]ach subscriber record may include **one or more network-specific indicators**" (*operating parameters*) "e.g., **one or more flags**, corresponding to one or more network-specific services." Granberg, 7:44-48. "**Each network-specific indicator is then set or activated when that subscriber is** to receive a corresponding network-based service **in a network that supports that network-based service.**" Granberg, 7:49-53. Or, "[i]f that subscriber is not to receive the service" in the particular network, "**the flag is reset or otherwise deactivated.**" Granberg, 7:53-54. A POSITA would have understood Granberg's network-specific indicator including one or more flags that can be set/activated or reset/deactivated to be an indicator for *adjust[ing] an operating parameter, which comprises one or more of...a...flag, to adjust, activate, or deactivate the presence related services provided to the mobile station.*

108. As explained above in § IX.C.2, a POSITA would have been motivated to modify Vendetti's different rate charge teachings according to Granberg's

teachings such that Vendetti's MTSO and billing computer maintain service profiles that each include adjustable flags for the rates charged based on the location of a mobile station. The combination of Vendetti and Granberg thus renders obvious *one or more servers of the provider of presence related services to adjust an operating parameter, which comprises one or more of a tariff...flag to adjust, activate, or deactivate the presence related services provided to the mobile station.*

109. The combination of Vendetti and Granberg further renders obvious “*a service flag.*” In Granberg, “each subscriber record may include **one or more network-specific indicators**” (*operating parameters*) “e.g., **one or more flags**, corresponding to **one or more network-specific services**” (*a service flag*) Granberg, 7:44-48. It would have been obvious to combine Granberg's teachings of service flags with the cellular system teachings of Vendetti. This would be a simple application of a known technique to improve Vendetti's similar system in the same way. Granberg, 2:4-11, 7:42-54. As previously explained in § IX.C.2, it was well-known at the earliest possible priority date of the '720 patent that it was desirable to provide systems supporting both location-based rates and location-based services. Vimpari, 1:4-19; Putkiranta, 6:42-56. Thus, it would have been obvious to modify Vendetti's system teachings to also include location-based network services and maintenance thereof by adjusting a service flag, as further taught by Granberg.

110. Thus, the combination of Vendetti and Granberg renders obvious *the updating signal being useable by the one or more servers of the provider of presence related services* (the MTSO and/or billing computer using the zone identification signal and the password received from the mobile unit) *to adjust an operating parameter, which comprises one or more of a tariff and a service flag* (adjusting a flag corresponding to a different rate, alone or in addition to a network-specific service), *to adjust, activate, or deactivate the presence related services provided to the mobile station* (to provide location-based tariffs or services).

- g. [1.6] *the updating signal comprising the information indicative of whether or not the radio communication defining device is located in the predetermined environment.***

111. Limitation [1.6] is met, in the combination, by Vendetti.

112. As explained with respect to [1.4], in the combination, Vendetti discloses that the signal sent from the mobile unit to the MTSO includes the “zone identification,” “**password for the particular zone**,” and optionally a “zone type code” (together, an *updating signal*). The signal from the mobile station “indicates to the MTSO whether the unit is in its primary, secondary or a public zone.” Vendetti, 5:46-51; *see also* 11:66-12:5, 12:19-23. As explained with respect to [1.3], the password for the particular zone (with zone boundaries defined beforehand by the cellular network) is *information indicative of whether or not the radio communication defining device is located in the predetermined environment* because

it is unique to each zone and is used to determine if a mobile unit is within a particular zone, including a primary zone.

113. Thus, Vendetti teaches *the updating signal* (the signal sent from the mobile unit to the MTSO) *comprising the information indicative of whether or not the radio communication defining device is located in the predetermined environment* (the signal including the zone identification, password for the particular zone, and zone type code, where the password indicates the marker transmitter is in a particular zone).

2. Claim 2

- a.** *The method according to claim 1, wherein the sending of the updating signal is uncorrelated to any mobile station phone call establishment, the updating signal being sent at least one of (i) periodically, (ii) at times recent to when the mobile station enters into or exists [sic]² from the special area, and (iii) when the mobile station remains in the special area.*

114. In the combination, Vendetti renders obvious *wherein the sending of the updating signal is uncorrelated to any mobile station phone call establishment, the updating signal being sent... (i) periodically.*

115. As discussed in [1.4], Vendetti discloses the mobile unit transmitting a signal including the “zone identification,” “password for the particular zone,” and optionally a “zone type code” (*sending an updating signal*). Vendetti, 5:46-51; see

² I interpret the term “exists” to mean “exits.”

also 11:66-12:5, 12:19-23. The mobile unit will “attempt to determine if it is in one of [the primary or secondary zones] by **periodically monitoring the marker signals transmitted on the marker channel.**” Vendetti, 5:26-32. “If the mobile unit detects” that it is in a particular zone, “the user will be billed” at the corresponding zone rate. Vendetti, 5:32-37. This occurs because “[t]he **signal transmitted by the mobile unit** that indicates the mobile unit is within a zone **comprises the zone identification signal and a password for the particular zone** so designated,” including “a ‘**zone type code**’” “that indicates to the MTSO whether the unit is in its primary, secondary or a public zone” (*the updating signal*). Vendetti, 5:46-51. This signal from the mobile unit is “transmitted to the MTSO.” Vendetti, 5:52-54.

116. Because the signal transmitted from the mobile station to the MTSO is sent in response to periodically monitoring the marker signals, the signal transmitted from the mobile station to the MTSO also occurs periodically (*wherein the sending of the updating signal is uncorrelated to any mobile station phone call establishment, the updating signal being sent... (i) periodically*).

3. Claim 5

- a.** *The method according to claim 1, wherein the predetermined environment comprises one or more of: (1) one or more specific geographic locations; (2) a physical environment; (3) an environment defined by an operator of the mobile telephone network; and (4) an area defined by a fixed network.*

117. Claim 5 is met, in the combination, by Vendetti.

118. First, in the combination, Vendetti discloses different zones with boundaries previously defined by the cellular network (*the predetermined environment*) corresponding to geographic areas (*comprises...(1) one or more specific geographic locations*). Vendetti teaches that its inventive cellular telephone system 50 has a “**division of the cellular service area 55 into a number of zones $Z_1, Z_2, Z_3, \dots Z_n$. These zones may be located in separate geographic areas or may overlap partially or completely. The zone may be larger or smaller than a cell site coverage area 52. However, each zone typically has a diameter of approximately five miles.**” Vendetti, 4:30-38. Figure 2 shows the zones corresponding to different geographic areas:

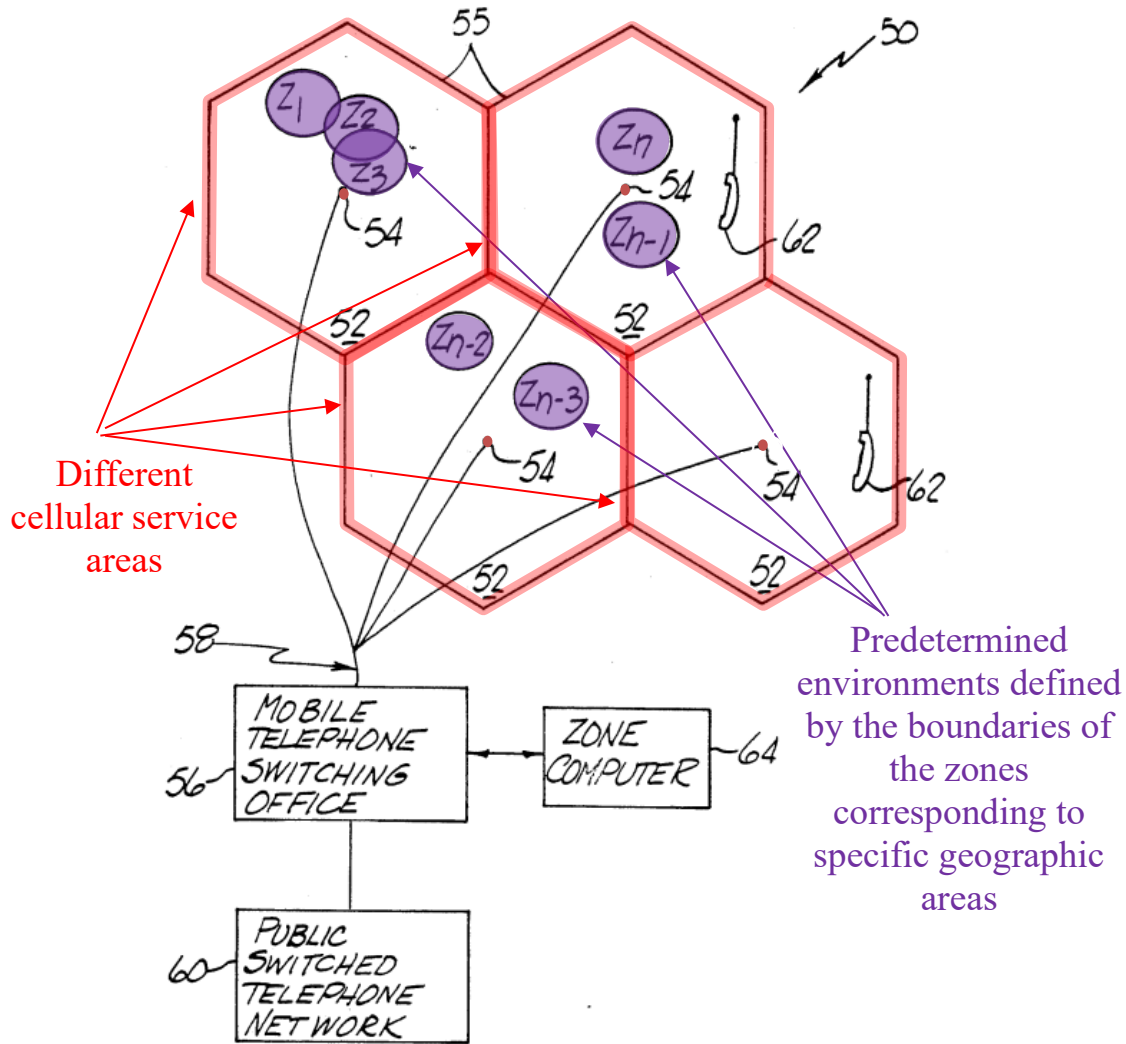


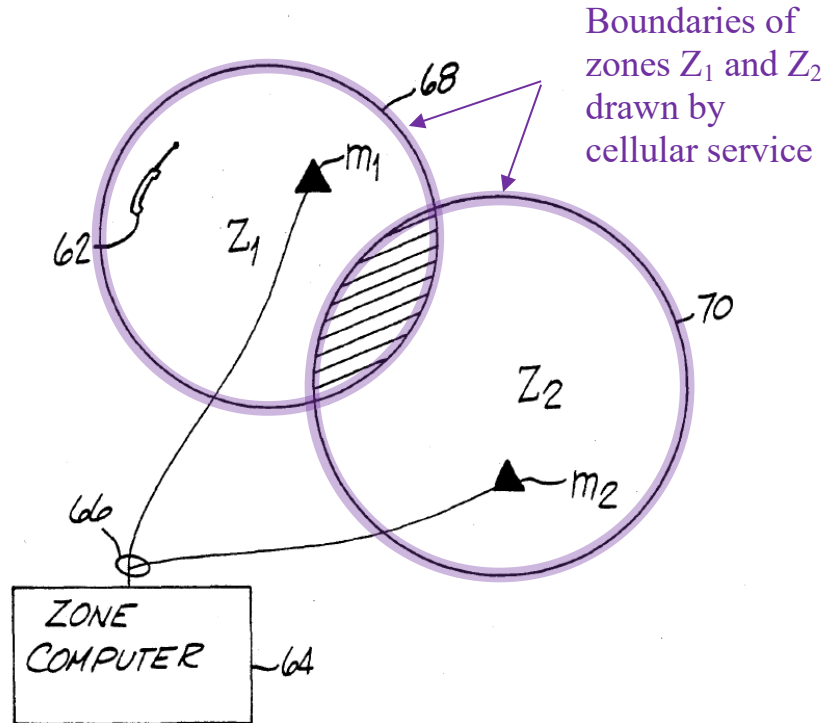
FIG. 2

Vendetti, FIG. 2 (annotated).

119. *Second*, Vendetti discloses zones with boundaries previously defined by the cellular network (*the predetermined environment*) corresponding to specific physical environments, such as an airport or shopping mall (*comprises...(2) a physical environment*). “[T]he cellular service area may contain several ‘public

zones’ in such areas as airports or shopping malls. The mobile units of the present invention can also determine if they are located in a public zone and, if so, are billed for calls made in a public zone at a ‘public zone’ rate.” Vendetti, 5:2-7.

120. Third, Vendetti discloses *wherein the predetermined environment comprises...(3) an environment defined by an operator of the mobile telephone network.* Vendetti explains that the “cellular service provider” is the one that draws “[t]he boundaries of the zones Z_1 and Z_2 ” (*the predetermined environment and an environment*) “**on a map of the cellular service area** according to the marketing needs of the cellular service provider. For example, zone Z_1 is defined by the boundary line 68 and zone Z_2 is defined by boundary line 70” (*defined by an operator of the mobile telephone network*). Vendetti, 5:61-65, Figure 3:



Vendetti, FIG. 3 (annotated).

121. *Fourth*, Vendetti discloses *wherein the predetermined environment comprises... (4) an area defined by a fixed network*. Vendetti discloses that “[e]ach zone within the cellular service area is marked by the marker signal transmitted by each of the marker transmitters.” Vendetti, 5:65-67. The marker transmitters, in combination with jamming techniques, “mark a zone to shape to radio frequency coverage areas of the marker transmitters so they coincide with the boundary of a zone as determined by the cellular service provider” (*the predetermined environment comprises... (4) an area defined by a... network*).

122. In Vendetti, a “[z]one computer 64 is responsible for coordinating the power levels transmitted by the marker transmitters.” Vendetti, 9:35-37. The power level of marker transmitters and jamming signals are “transmitted at a variety of power levels in order to shape the size of zone.” Vendetti, 9:25-35. The zone computer communicates to the marker transmitters via a “communications link 58” that is “**a telephone line, fiber optic cable** or microwave link that directly connects the zone computer with the marker transmitter.” Vendetti, 8:68-9:4. When the marker transmitters are connected to the zone computer through such physical communications links, the connections, the zone computer, and the marker transmitters together constitute *a fixed network*. Vendetti’s marker transmitter marking the zones based on the control of the zone computer (when connected to the marker transmitter through a physical communications link) thus teaches *the predetermined environment comprises...(4) an area defined by a fixed network*.

123. Vendetti’s configuration is consistent with the ’720 patent’s description of using a fixed network with respect to predetermined environments. For example, the ’720 patent explains that the “wireless device” (i.e., *radio communication defining device*) defines a zone when it is “physically connected to any fixed network connection points.” Ex.1001, 8:32-41. Vendetti likewise discloses the marker transmitter defining a zone when it is physically connected to the zone computer via

a physical network connection, which is a fixed network connection point. Vendetti, 5:65-67, 8:67-9:4, 9:25-37.

124. Thus, Vendetti teaches claim 5.

4. **Claim 7**

a. **[7.0] *A method comprising:***

125. To the extent the preamble (limitation [7.0]) is limiting, it is met, in the combination, by Vendetti for the same reasons discussed in [1.0].

b. **[7.1] *wirelessly receiving, in a radio communication defining device, first information from a radio transmitting device:***

126. Limitation [7.1] is met, in the combination, by Vendetti.

127. In the combination, Vendetti discloses a “zone computer” (*radio transmitting device*) that communicates with the marker transmitter (*radio communication defining device*) via “a communications link 58” that is “a telephone line, fiber optic cable or **microwave link** that directly connects the zone computer with the marker transmitter” (*wirelessly receiving*). Vendetti, 8:68-9:4; *see also* Figure 6:

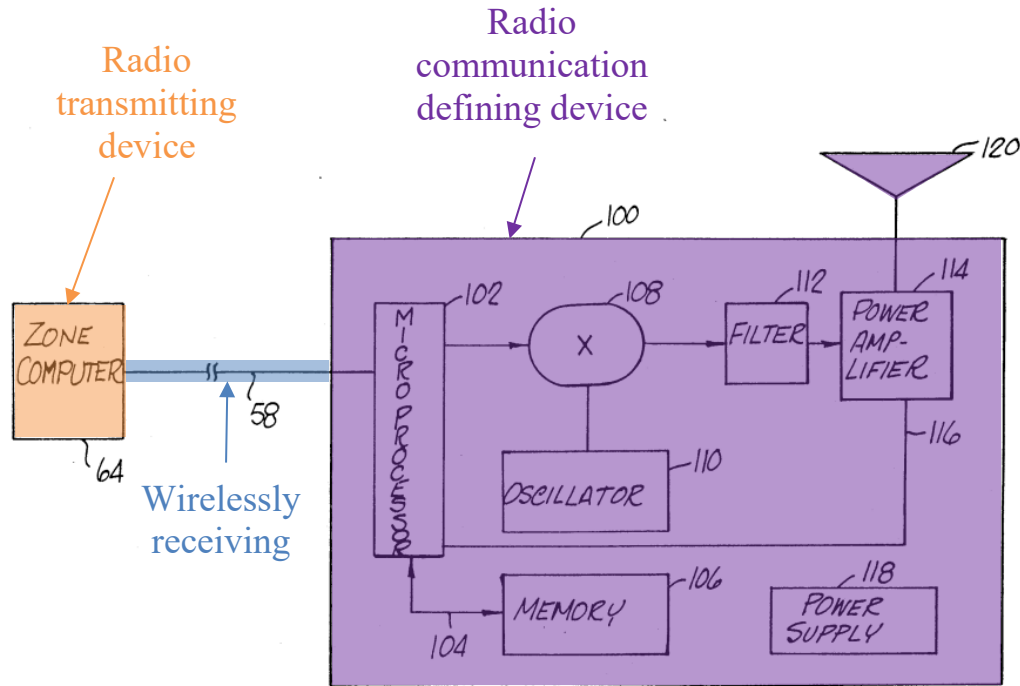


FIG. 6

Vendetti, FIG. 6 (annotated).

128. Vendetti further teaches the zone computer (*radio transmitting device*) generating a “randomly selected **password for each zone** in the cellular area,” where the marker transmitter (*radio communication defining device*) receives “**zone identification signals**” and “**passwords**” (collectively, *first information*) “from the zone computer.” Vendetti, 7:58-63, 9:50-54. The zone identification signals and passwords constitute *first information*, and therefore Vendetti discloses *receiving, in a radio communication defining device* (the marker transmitter), *first information from a radio transmitting device* (the zone computer).

129. Thus, Vendetti teaches *wirelessly receiving, in a radio communication defining device* (wireless receiving in the marker transmitter), *first information* (zone identification signals and passwords for each zone) *from a radio transmitting device* (from the zone computer).

- c. **[7.2]** *the radio communication defining device using the first information to determine whether or not the radio communication defining device is in a predetermined environment:*

130. Limitation [7.2] is met, in the combination, by Vendetti.

131. Figure 7 of Vendetti shows “a flow chart of a computer program for operating each marker transmitter to mark one or more zones within a cellular service area.” Vendetti, 9:48-50. At block 154 shown in blue below, Vendetti discloses the marker transmitters “obtain[ing] from the zone computer” “zone identification signals” and “passwords” (*first information*) from the transmission from the zone computer. Vendetti, 9:50-54.

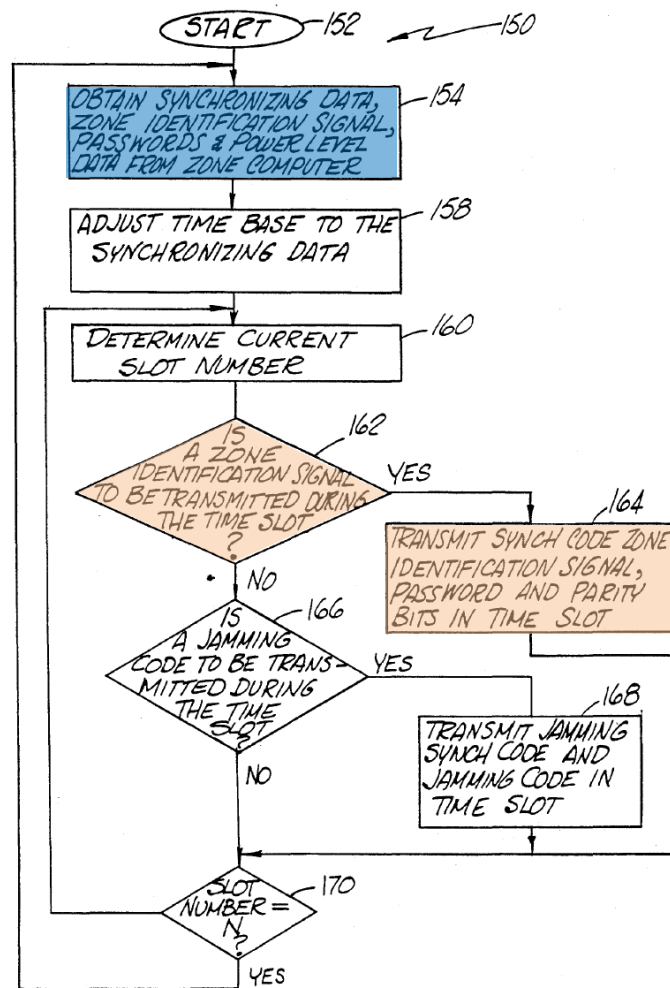


FIG. 7

Vendetti, FIG. 7 (annotated).

132. This information “tells the marker transmitter what zone identification signals are to be transmitted in what time slot as well as what the current password is **for each zone that the marker transmitter marks.**” Vendetti, 9:54-58. A POSITA would have understood that Vendetti’s disclosure of the marker transmitter “obtaining” the zone identification signals and password from zone

computer would require the marker transmitter to process and extract this data informing the marker transmitter what zones (with zone boundaries previously defined by the cellular network) it is to transmit for (the *predetermined environment*). Thus, Vendetti's obtaining of data associated with the marker transmitter receiving the zone identification signal and current password for the zone—by processing and extracting the data—in order for the marker transmitter to identify the zone identification signals and password for the marker transmitter's designated zone discloses *the radio communication defining device using the first information to determine whether or not the radio communication defining device is in a predetermined environment*.

133. Vendetti provides additional teachings that render this limitation obvious at blocks 162 and 164 of Figure 7 above, shown in orange. At block 162, the marker transmitter “determines if it needs to transmit a zone identification signal during the current time slot.” Vendetti, 10:17-21. If yes, then at block 164, the “zone identification signal” and “password” “are transmitted during the time slot.” Vendetti, 10:17-24. In Vendetti, the marker transmitters “mark a given zone” by “transmitting the zone identification signal 84 during a single time slot.” Vendetti, 7:43-50. For example, all “marker transmitters M_1 , M_2 and M_3 ” “used to mark a zone” will transmit the zone identification signal and password “during a particular time slot.” Vendetti, 7:43-50. Vendetti's disclosure of the marker transmitter

determining it needs to transmit during a certain time slot, which Vendetti discloses as being associated with a particular zone, as well as associating the password with the particular zone, discloses *determin[ing] whether or not the radio communication defining device is in a predetermined environment*.

134. Thus, Vendetti teaches *the radio communication defining device* (the marker transmitter) *using the first information* (using the received zone identification signal and password) *to determine whether or not the radio communication defining device is in a predetermined environment* (the marker transmitter processing and extracting the received zone identification signal and password to identify the marker transmitter's designated zone and password or, alternatively, determining it needs to transmit at a certain time and transmit a certain password associated with a particular zone).

- d. **[7.3]** *transmitting from the radio communication defining device to a mobile station a distinctive defining signal that at least defines a special area by one or more of: (1) a coverage area of the distinctive defining signal; (2) a portion of the coverage area that intersects with another coverage area of another radio communication defining device; and (3) a sum of the area of coverage and the another area of coverage; and*

135. Limitation [7.3] is met, in the combination, by Vendetti for the same reasons discussed in [1.0]-[1.2].

- e. **[7.4]** *wherein the distinctive defining signal includes second information indicating whether or not the radio*

communication defining device is located in a predetermined environment and

136. As discussed in [1.0] and [1.3] above, in the combination, Vendetti teaches a marker transmitter (*radio communication defining device*) sending a marker signal with a zone identification signal and password for the zone (*distinctive defining signal including second information*) to the mobile unit. As discussed in [1.3] and [7.2] above, the zone identification signal and password indicate *whether or not the radio communication defining device* (the marker transmitter) *is located in a predetermined environment* (a particular zone with boundaries previously defined by the cellular network).

137. This *second information* in the marker signal (*distinctive defining signal*) is distinct from the *first information* because the *first information* is transmitted from the zone computer (*radio transmitting device*) to the marker transmitter (*radio communication defining device*) (*see limitation [7.1]*), while the *second information* is transmitted from the marker transmitter (*radio communication defining device*) to the mobile unit (*mobile station*) (*see limitation [7.3]*), as shown in Figure 3. *See supra* § VI; Figure 3:

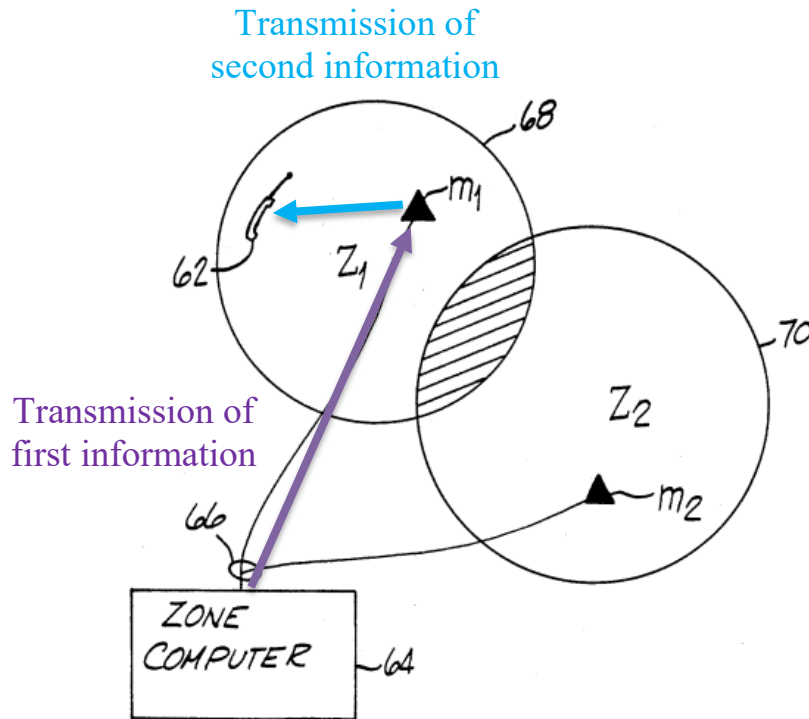


FIG. 3

Vendetti, FIG. 3 (annotated).

138. Both the *first information* and *second information*, via the zone identification signal and password, indicate *whether or not the radio communication defining device* (the marker transmitter) *is in a predetermined environment* (a particular zone) as discussed in [1.3] and [7.2].

139. This understanding of *first information* and *second information* is consistent with the '720 patent. In discussing the *first information*, the '720 patent describes the radio communication defining device having a “means for **obtaining reliable information indicating whether or not the said wireless device is located**

into a predetermined environment.” Ex.1001, 5:34-40. This corresponds to *first information* because it relates to the information received by the radio communication defining device. The ’720 patent also describes the radio communication defining device transmitting a “distinctive wireless signal” that contains **“reliable information confirming that the wireless device is effectively located into a predetermined environment.”** Ex.1001, 3:48-57; *see also* 7:56-61, 8:9-14. This corresponds to *second information* because it relates to the information transmitted by the radio communication defining device. These disclosures in the ’720 patent refer to the same information—“reliable information” indicating the radio communication defining device is located in a predetermined environment—with the *first information* being received by the radio communication defining device and the *second information* being transmitted by the radio communication defining device.

- f. **[7.5] *the second information allowing the mobile station to generate an updating signal that enables presence related services for the mobile station to be adjusted based on one or more of tariffs and service flags generated based on the updating signal.***

140. Limitation [7.5] is met, in the combination, by Vendetti for the same reasons discussed in [1.4]-[1.5].

5. Claim 9

- a. *The method according to claim 7, wherein the distinctive defining signal is coded.*

141. Claim 9 is met, in the combination, by Vendetti.

142. Vendetti discloses that “the marker signal is **Manchester encoded and frequency shift key (FSK) modulated** to aid the mobile units in synchronizing themselves to the marker signal. The details of Manchester encoding and frequency shift key modulation are well known in the art and therefore are not discussed here.” Vendetti, 9:13-19. Vendetti’s marker signal being Manchester encoded and FSK modulated teaches that *the distinctive defining signal is coded*.

6. Claim 10

- a. *The method according to claim 7, wherein the predetermined environment comprises one or more of: (1) one or more specific geographic locations; (2) a physical environment; (3) an environment defined by an operator of a mobile telephone network associated with the mobile station; and (4) an area defined by a fixed network.*

143. Claim 10 is met, in the combination, by Vendetti for the same reasons discussed in claim 5 above. See § IX.D.3.

7. Claim 12

- a. *receiving first information in a radio communication defining device via communication with a fixed network*

to which the radio communication defining device is physically connected[.]

144. Claim 12 is identical to claim 7, except for how the recited radio communication device receives the *first information*. Claim 7 requires **wirelessly receiving**, in a radio communication defining device, first information from a radio transmitting device, whereas claim 12 requires **receiving** first information in a radio communication defining device **via communication with a fixed network to which the radio communication defining device is physically connected**.

145. In the combination, Vendetti teaches *receiving first information in a radio communication defining device via communication with a fixed network to which the radio communication defining device is physically connected*. As discussed in [7.1], Vendetti teaches a marker transmitter (a radio communication defining device) receiving “**zone identification signals**” and “**passwords**” (collectively, *first information*) “from the zone computer.” Vendetti, 9:50-54; *see also* 7:58-63. Vendetti further discloses that the zone computer communicates with the marker transmitter via “a communications link 58” that is “**a telephone line, fiber optic cable** or microwave link that directly connects the zone computer with the marker transmitter” (*receiving...via communication with a fixed network to which the radio communication defining device is physically connected*). Vendetti, 8:68-9:4.

146. Vendetti discloses the remaining limitations of claim 12 for the same reasons discussed in [7.0] and [7.2]-[7.5].

8. Claim 15

- a. *The method according to claim 12, wherein the predetermined environment comprises one or more of: (1) one or more specific geographic locations; (2) a physical environment; (3) an environment defined by an operator of a mobile telephone network associated with the mobile station; and (4) an area defined by the fixed network.*

147. Claim 15 is identical to claim 5, except option 3 of claim 15 additionally discloses the bolded language: *an environment defined by an operator of a mobile telephone network associated with the mobile station*. Vendetti discloses claim 15 for the same reasons discussed in claim 5 above. Additionally, Vendetti discloses that “[t]he boundaries of the zones Z_1 and Z_2 are drawn on a map of the cellular service area **according to the marketing needs of the cellular service provider.**” Vendetti, 5:61-63. Vendetti’s cellular service provider “contract[s]” with the “user of a mobile unit” to allow different rates for different zones. Vendetti, 4:39-46. Because the cellular service provider provides different rates to the mobile unit, the cellular service provider is *an operator of a mobile telephone network associated with the mobile station*.

X. GROUND 2: CLAIM 2 IS UNPATENTABLE AS OBVIOUS OVER THE COMBINATION OF VENDETTI, GRANBERG, AND KRAUFVELIN

A. Summary of Kraufvelin

148. Kraufvelin describes a system for “signalling...information that is generated based on the geographical location of the mobile station in response to a predetermined event such as entering or leaving a geographical area.” Kraufvelin (Ex.1006), [0001]. Kraufvelin’s invention may be used to “send information and/or offer services to a mobile station only in a particular defined geographic area and/or to a certain type of subscriber in a particular geographical area. Kraufvelin, [0012].

149. In Kraufvelin, a mobile station “monitor[s] for an event indicative of a change in the presence status of the mobile station relative to said area of interest” and “signal[s] a notification in response to detection of such event.” Kraufvelin, [0015]-[0018]. The event includes a subscriber “ENTERing the area” or “LEAVEing the area.” Kraufvelin, [0080]. The mobile station may also have “permanent area event reporting” where “the mobile does not send a repeated area arrival report or leaving area report for a cell belonging to the same service area more than once in a predetermined time interval e.g. every 10-15 minutes, 24 hours” or an “area arrival report (AAR)” where “[t]he mobile only sends an area arrival report (AAR) after it has been camping on, or using, the relevant cell for a predetermined time period, e.g. 2 minutes.” Kraufvelin, [0101].

B. Reasons to Combine Vendetti, Granberg, and Kraufvelin

150. In my opinion, a POSITA would have been motivated to combine the teachings of Kraufvelin with the combination of Vendetti and Granberg for several reasons as discussed further below. Combining Kraufvelin's various disclosed timing for location updates with Vendetti and Granberg's teachings related to sending an updating signal to a network node based on a mobile station's location would have been obvious, beneficial, and predictable. Vendetti describes sending an updating signal periodically. *See* § IX.D.2 (claim 2 above). Likewise, Kraufvelin teaches sending an updating signal periodically, and also teaches sending an updating signal in other instances, such as upon entry or exit of a special area and when the mobile station remains in a special area. Based on the teachings of Kraufvelin, a POSITA would have been motivated to utilize all the techniques disclosed in the prior art for more accurate location detection.

1. Kraufvelin is analogous art to the '720 patent.

151. As a threshold matter, Kraufvelin is analogous art to the '720 patent. The '720 patent provides location-based services by "monitoring the presence of a mobile station in at least one special area." Ex.1001, Abstract. Kraufvelin is within the same field of endeavor because it relates to "send[ng] information and/or offer[ing] services to a mobile station only in a particular defined geographic area"

based on “monitoring...a change in the presence status of a target mobile station relative to an area of interest.” Kraufvelin, [0012], [0023].

152. Further, Kraufvelin is reasonably pertinent to a particular problem with which the inventor of the '720 patent was involved. The '720 patent was concerned with monitoring the location of a mobile station within a geographical area and providing location-based services. Ex.1001, Abstract (“Method for monitoring the presence of a mobile station in at least one special area...”), 4:13-34 (enabling or disabling tariffs or services to a mobile station based on its presence in a special area). Kraufvelin similarly offers solutions for monitoring mobile devices within special areas. Kraufvelin, [0001] (“The present invention relates to...signalling... information that is generated based on the geographical location of the mobile station in response to a predetermined event such as entering or leaving a geographical area.”), [0012] (“A location-based application may be interested in when a specific subscriber is entering or leaving a geographical area,” for example, to “send information and/or offer services to a mobile station only in a particular defined geographic area”).

153. Thus, Kraufvelin is analogous art to the '720 patent.

2. A POSITA would have been motivated to combine the teachings of Kraufvelin with the teachings of Vendetti and Granberg.

154. In my opinion, a POSITA would have been motivated to modify the combination of Vendetti and Granberg to send location updates for additional events of interest, such as upon a mobile station's entry or exit into a special area and when a mobile station remains in a special area, as taught by Kraufvelin.

155. *First*, Kraufvelin teaches a system that sends location updates in multiple instances, including sending updating signals periodically, when the mobile station enters or exits from the special area, and when the mobile station remains in the special area. Kraufvelin, [0080], [0101]. Kraufvelin explains that “[d]ifferent kinds of services are possible” when a location-based application tracks “when a subscriber is entering or leaving a geographical area.” Kraufvelin, [0012]. Kraufvelin also recognizes that it is useful “to have information if a mobile station is located within a particular defined geographical area.” Kraufvelin, [0012]. Thus, Kraufvelin teaches that multiple options are desirable,

156. *Second*, a POSITA would have been motivated to modify Vendetti and Granberg's teachings to provide a mobile station that additionally sends an updating signal regarding its location upon entry or exit of a special area and when it remains in a special area to ensure accurate location of the mobile station for providing location-based tariffs and services. This is particularly useful since mobile stations

are, by their very nature, mobile. By enabling the system to track the mobile station at all times (as would occur in the combined teachings), the system can provide the most accurate tariffs and services based on location.

157. A POSITA would have had a reasonable expectation of success in modifying the combination of Vendetti and Granberg to further provide an updating signal upon entry or exit of a special area and when the mobile station remains in a special area. Kraufvelin expressly teaches that it was known in the art to provide a system where a mobile station can provide location updates periodically, when the mobile station enters into or exits from the special area, and when the mobile station remains in the special area. Kraufvelin, [0080], [0101]. Moreover, Vendetti already teaches transmitting an updating signal from the mobile station to the mobile service provider. Kraufvelin merely adds additional events for when the updating signal is sent. This modification is well within the knowledge and skill of a POSITA at the time of invention, as Kraufvelin demonstrates. Kraufvelin, [0080], [0101].

C. Detailed Analysis of Claims

1. Claim 2

- a.** *The method according to claim 1, wherein the sending of the updating signal is uncorrelated to any mobile station phone call establishment, the updating signal being sent at least one of (i) periodically, (ii) at times recent to when the mobile station enters into or exists [sic] from the*

special area, and (iii) when the mobile station remains in the special area.

158. As discussed above, claim 2 is disclosed by the combination of Vendetti and Granberg. Claim 2 is additionally met by the combination of Vendetti, Granberg, and Kraufvelin.

159. As discussed with respect to claim 2 in § IX.D.2 above, Vendetti teaches *wherein the sending of the updating signal is uncorrelated to any mobile station phone call establishment, the updating signal being sent... (i) periodically.* And as discussed in [1.2] in § IX.D.1.c, Vendetti teaches *a special area.*

160. In the combination, Kraufvelin additionally renders obvious *wherein the sending of the updating signal is uncorrelated to any mobile station phone call establishment, the updating signal being sent at least one of (i) periodically, (ii) at times recent to when the mobile station enters into or exists from the special area, and (iii) when the mobile station remains in the special area.*

161. First, Kraufvelin teaches sending the updating signal *(i) periodically.* In Kraufvelin, a mobile station may determine it has entered a cell of the area of interest 5 and then send “**a DTAP LCS-AreaEventReport...to the MSC/SGSN**” (*the updating signal*). Kraufvelin, [0082]. If the mobile station is stationary for an extended period of time, “[i]n case of permanent area event reporting,” the mobile station will send the LCS-AreaEventReport at “**a predetermined time interval, e.g. every 10-15 minutes, 24 hours.**” Kraufvelin, [0101]. Thus, regardless of whether

the mobile station has entered or exited the area of interest, for example if the mobile station has remained in the same cell for a long period of time, the mobile station may be configured to send an updating signal (i.e., the contents of DTAP LCS AreaEventInvoke report) at regular intervals of time, which corresponds to *the updating signal being sent...(i) periodically*.

162. Second, Kraufvelin teaches *the updating signal being sent...(ii) at times recent to when the mobile station enters into or exists from the special area*. Kraufvelin's mobile station may also send the report when it enters or exits the area of interest 5 (*a special area*), including "[a]n area event LCS report indicating a positive match...i.e. the subscriber is **ENTERing the area**" or "indicating a negative match...i.e. the subscriber is **LEAVEing the area**." Kraufvelin, [0080].

163. Third, Kraufvelin also teaches *the updating signal being sent...(iii) when the mobile station remains in the special area*. Kraufvelin explains that the mobile station may generate and send the report not immediately after entering a cell of the area of interest, but "**after it has been camping on, or using, the relevant cell for a predetermined time period, e.g. 2 minutes**." Kraufvelin, [0101]. Kraufvelin's disclosure of a mobile device sending an area arrival report after it has been camping on or using a cell for a predetermined time period corresponds to *the updating signal being sent...(iii) when the mobile station remains in the special area*.

164. *Fourth*, in each of the examples discussed in Kraufvelin, the transmitted report is either triggered by time ((i) *periodically*) or relative to a certain location ((ii) *when the mobile station enters into or exists from the special area* and (iii) *when the mobile station remains in the special area*). Because Kraufvelin's report is transmitted based on time or location, Kraufvelin teaches *the sending of the updating signal is uncorrelated to any mobile station phone call establishment*.

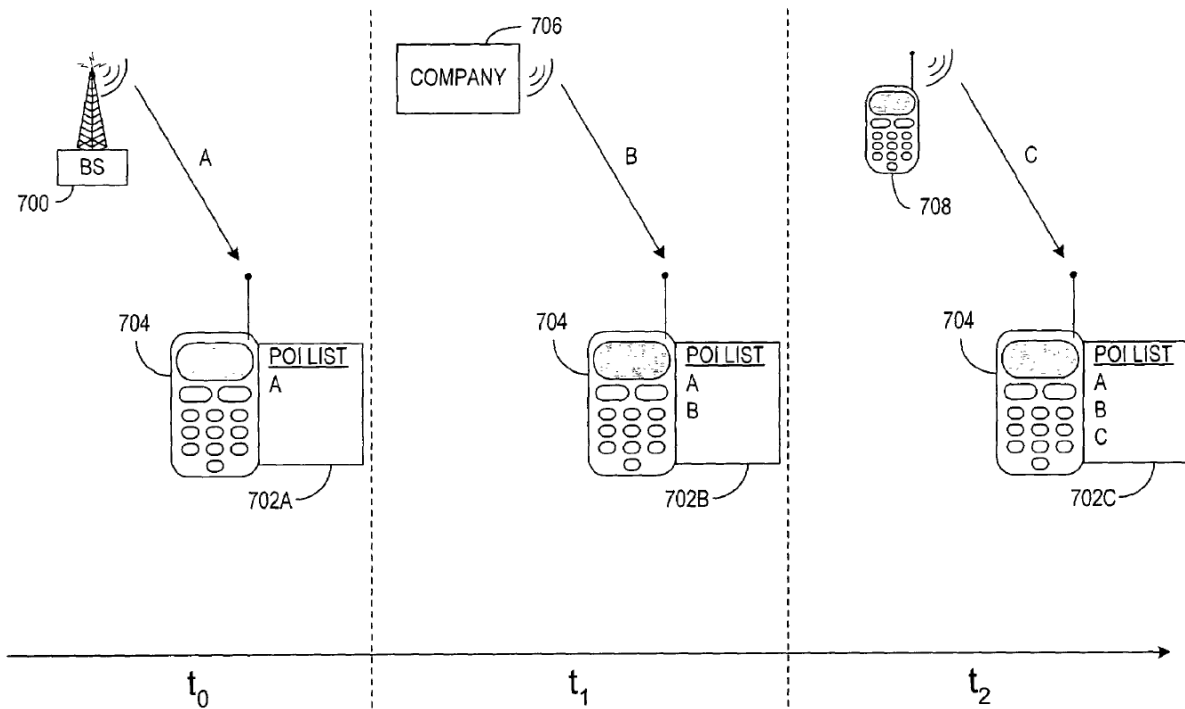
165. Thus, the combination of Vendetti, Vimpari, and Kraufvelin renders obvious *wherein the sending of the updating signal is uncorrelated to any mobile station phone call establishment* (sending a report based on time or location), *the updating signal being sent at least one of (i) periodically* (sending a report based on a predetermined time interval), *(ii) at times recent to when the mobile station enters into or exists from the special area* (sending a report when the mobile device enters or leaves an area), and *(iii) when the mobile station remains in the special area* (sending a report after the mobile device has been in a cell for a predetermined time period).

XI. GROUND 3: CLAIMS 4, 6, 11, AND 16 ARE UNPATENTABLE AS OBVIOUS OVER THE COMBINATION OF VENDETTI, GRANBERG, AND HUOMO

A. Summary of Huomo

166. Huomo relates to a system and method “for facilitating location-based triggering of actions, applications, services, and the like on wireless devices.”

Huomo (Ex.1016), Abstract. Huomo's locations are defined using "base station identifiers in a cellular network" or "identifier[s]" "provided by an access point" using a "short-range wireless service, such as Bluetooth, Wireless Local Area Network (WLAN), etc." Huomo, [0010]. Figure 7 provides an example of Huomo's system. As shown in Figure 7, "[a]t a first time," "the mobile terminal user is within a cellular network cell, and receives an identifier 'A' from a base station 700." Huomo, [0053]. Later, "[t]he user may then travel to a new location," "at which time a company 706, such as a retail store, provides a radio frequency identifier 'B' to the mobile terminal 704." Huomo, [0053].



Huomo, FIG. 7.

167. A mobile terminal receives the identifiers associated with “Points of Interest (POI).” Huomo, [0036]. “One or more actions, applications, services, etc. may then be linked to each POI.” Huomo, [0036]. For example, “a user’s re-entry into an area/cell 110, 112, 114 where a POI has been stored can automatically invoke an application(s) or other action(s) in accordance with the invention.” Huomo, [0036].

B. Reasons to Combine Vendetti, Granberg, and Huomo

168. In my opinion, a POSITA would have been motivated to combine the teachings of Huomo with the combination of Vendetti and Granberg for several reasons as discussed further below. Combining Huomo's teachings related to defining locations using both cellular network and short-range wireless technologies with Vendetti and Granberg teachings would have been obvious, beneficial, and predictable. Vendetti describes defining locations within a cellular network for tracking the location of a mobile device. *See, e.g.*, § IX.D.1.c (limitation [1.2] above). Likewise, Huomo teaches defining locations within a cellular network, as well as using short-range wireless technologies, for tracking the location of a mobile device. Based on the teachings of Huomo, a POSITA would have been motivated to utilize both cellular and short-range wireless technologies for more accurate location detection.

1. Huomo is analogous art to the '720 patent.

169. As a threshold matter, Huomo is analogous art to the '720 patent. Like the '720 patent, Huomo is in the same field of endeavor because it relates to systems and methods for monitoring the location of a wireless device for providing location-based services. Huomo, Abstract ("A system, apparatus, and method for facilitating location based triggering of actions, applications, services, and the like on wireless devices").

170. Additionally, Huomo is reasonably pertinent to a particular problem with which the inventor of the '720 patent was involved (i.e., monitoring the location of a wireless device and providing location-based services). Huomo offers solutions for “provid[ing] location-based service and application triggering for users” “without imposing heavy burdens on the network infrastructure.” Huomo, Abstract, [0005]. Accordingly, Huomo is analogous art.

2. A POSITA would have been motivated to combine the teachings of Huomo with the teachings of Vendetti and Granberg.

171. In my opinion, a POSITA would have been motivated to modify Vendetti and Granberg’s teachings to include zone identification using both cellular network and short-range wireless technologies, similar to the system taught by Huomo. Huomo teaches that “[i]n the cellular network context, the accuracy of the identified location substantially corresponds to the size of the cell,” and it is “desirable to further regulate which actions will be automatically invoked while in a particular cell, by further distinguishing subsections of a cell using a smaller scale wireless service such as Bluetooth, a WLAN, etc.” Huomo, [0041]. In particular, Huomo teaches it being desirable to trigger services, for example, based on “a retail store” in a mall or “obtain information specific to” “a particular airline.” Huomo, [0057]-[0058]. Based on Huomo’s explicit teachings, a POSITA would have been motivated to apply Huomo’s teachings for the desirable benefit of using short-range

wireless technologies to mark smaller and more precise zones, for example, within a mall or airport.

172. A POSITA would have had a reasonable expectation of success in modifying the combined teachings of Vendetti and Granberg to use both cellular network and short-range wireless technologies. Huomo expressly teaches that, as of the earliest possible priority date of the '720 patent, it was known to define geographical locations for location-based services using both a cellular network and short-range wireless technologies. Huomo, [0010] (“[R]eceiving wireless service area identifiers includes receiving base station identifiers in a cellular network” as well as receiving an identifier “provided by an access point serving [a] wireless service area,” where the wireless service “may be a short-range wireless service, such as Bluetooth, Wireless Local Area Network (WLAN), etc.”), [0041] (explaining that “[i]n the cellular network context, the accuracy of the identified location substantially corresponds to the size of the cell” but that it may be desirable to “further distinguish[] subsections of a cell using a smaller scale wireless service such as Bluetooth, a WLAN, etc.”). Moreover, both Vendetti and Huomo describe use in similar, and thus compatible, settings. Vendetti’s system may indicate “public zones” such as “airports or shopping malls.” Vendetti, 5:2-4. Huomo also teaches that points of interest may include “a retail store or mall” or “transportation services” such as “airports.” Huomo, [0057]-[0058].

173. Thus, it is my opinion that a POSITA would have found it obvious to modify the combined Vendetti and Granberg teachings to use both cellular network and short-range wireless technologies, like the system taught by Huomo.

C. Detailed Analysis of Claims

1. Claim 4

- a. *The method according to claim 1, wherein the frequency of the updating signal is different from the frequency of the distinctive defining signal.*

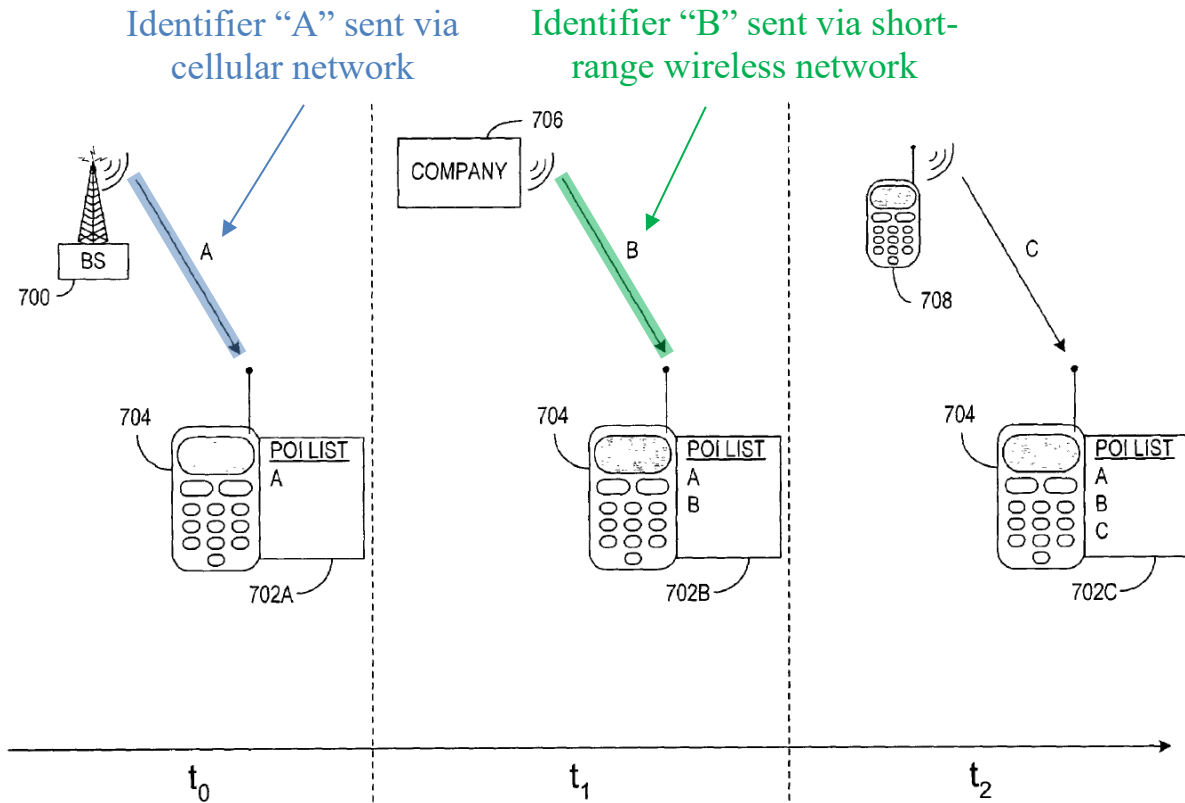
174. Claim 4 is met, in the combination, by Vendetti and Huomo.

175. As discussed in limitations [1.0] and [1.4] above, Vendetti discloses a *distinctive defining signal* through the marker signal transmitted from the marker transmitter to the mobile unit, and an *updating signal* through the signal sent from the mobile unit to the MTSO. As also discussed in limitation [1.4], Vendetti's *updating signal* is sent through cellular communications. Although Vendetti leaves frequency implementation details up to the POSITA, Huomo provides a well-known example such implementation details.

176. Huomo discloses a system that provides location-based services using “cellular network” communications as well as “smaller-scale wireless services” corresponding to “short-range wireless services, such as Wireless Local Area Networks (WLAN), Bluetooth, or other radio technologies.” Huomo, [0028], [0040]. Huomo explains that “[a]t a first time,” “the mobile terminal user is within a cellular network cell, and receives **an identifier ‘A’ from a base station 700**”

(*distinctive defining signal*). Huomo, [0053]. Later, “[t]he user may then travel to a new location,” “at which time a company 706, such as a retail store, **provides a radio frequency identifier ‘B’ to the mobile terminal 704**” (*distinctive defining signal*). Huomo, [0053]; *see also* [0041] (using different short-range for different services even when within the same broader cell of a cellular network to distinguish).

177. Huomo teaches that a wireless device (*mobile station*) may receive “base station identifiers in a cellular network” as well as an identifier “provided by an access point serving” a “short-range wireless service” area. Huomo, [0010]. Figure 7 shows the different signals received by Huomo’s mobile terminal:



Huomo, FIG. 7 (annotated).

178. In combination, Vendetti and Huomo teach a system of location-based services where a mobile station receives a “radio frequency identifier” (*distinctive defining signal*) using “short-range wireless services, such as Wireless Local Area Networks (WLAN), Bluetooth, or other radio technologies,” as taught by Huomo, then sends an *updating signal* using cellular communications, as taught by Vendetti. At the earliest possible priority date of the '720 patent, it was well-known that cellular communications and short-range wireless communications operated at different frequencies. For example, Li explains that cellular systems such as GSM

mobile networks use “frequencies of 900, 1800 and 1900 MHz,” whereas wireless local area networks and Bluetooth typically use “[t]he unlicensed frequency range around 2.4 GHz” or “the 5 GHz range.” Li (Ex.1046), [0007].

179. Thus, the combination of Vendetti’s teachings of a cellular signal transmitted from the mobile unit to the MTSO and Huomo’s teachings of a short-range wireless signal transmitted from the access point to the mobile station, together, renders obvious *wherein the frequency of the updating signal is different from the frequency of the distinctive defining signal.*

2. Claim 6

- a.** *The method according to claim 1, wherein the distinctive defining signal comprises a signal with a frequency that is outside a frequency range allocated for the mobile telephone network.*

180. As discussed in claim 4 in § XI.C.1 above, the combination of Vendetti, Granberg, and Huomo renders obvious a system of location-based services where a mobile station receives a “radio frequency identifier” (*distinctive defining signal*) using “short-range wireless services, such as Wireless Local Area Networks (WLAN), Bluetooth, or other radio technologies,” as taught by Huomo, then sends an *updating signal* using cellular communications, as taught by Vendetti.

181. The combination of Vendetti, Granberg, and Huomo thus renders obvious *wherein the distinctive defining signal comprises a signal with a frequency that is outside a frequency range allocated for the mobile telephone network.* In the

combination, the *distinctive defining signal* is transmitted using short-range wireless communications, which has *a frequency that is outside a frequency range allocated for the mobile telephone network* (the cellular communications). This is because at the earliest possible priority date of the '720 patent, it was well-known in the art that short-range wireless communications, such as Bluetooth and WLAN, operated at a frequency outside the frequency range allocated for cellular networks. *See, e.g., Li, [0007]*.

3. Claim 11

- a. *The method according to claim 7, wherein the distinctive defining signal comprises a signal with a frequency that is outside a frequency range allocated for a mobile telephone network associated with the mobile station.***

182. Claim 11 is met by the combination of Vendetti, Granberg, and Huomo for the same reasons discussed in claims 6 and 7 above.

4. Claim 16

- a. *The method according to claim 12, wherein the distinctive defining signal comprises a signal with a frequency that is outside a frequency range allocated for a mobile telephone network associated with the mobile station.***

183. Claim 16 is met by the combination of Vendetti, Granberg, and Huomo for the same reasons discussed in claims 6 and 12 above.

XII. GROUND 4: CLAIMS 5, 10, 14, AND 15 ARE UNPATENTABLE AS OBVIOUS OVER THE COMBINATION OF VENDETTI, GRANBERG, AND VIMPARI

A. Summary of Vimpari

184. Vimpari relates to a system and method for “locating a mobile station” “in a predetermined area.” Vimpari, 1:4-6. The invention allows for “defining call tariffs” or “defining available services on the basis of the location of the mobile station.” Vimpari, 1:6-8. Vimpari discloses a “guide unit 101” including “a radio transmitter” that emits a signal detectable at “premises 100 and to the immediate vicinity thereof.” Vimpari, 4:23-29, Figure 1:

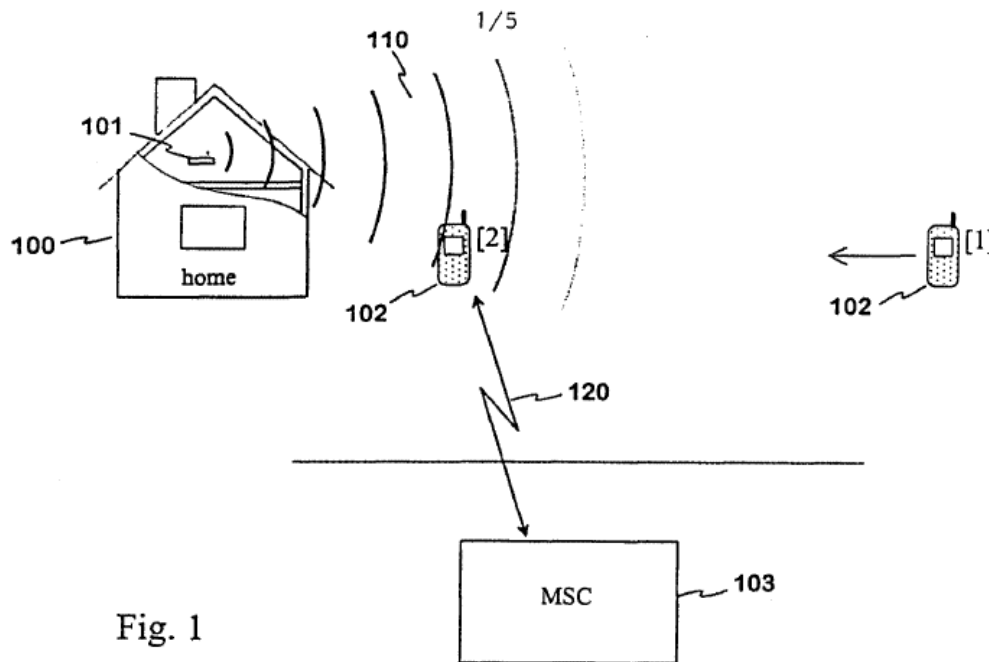


Fig. 1

Vimpari, FIG. 1.

185. The guide unit is “provided with its own SIM module, which contains a secret identity number for verifying the validity of the unit.” Vimpari, 7:24-25. The mobile station is in its “home area” when “the field 110 of the guide unit is observed.” Vimpari, 4:27-5:2, 5:5-9. The mobile station then transmits “a message that it is located in the home area” to “mobile switching centre 103” so that “calls originated from the mobile station 102 are billed according to a tariff that is lower than before the mobile station entered the home.” Vimpari, 5:9-13. When the mobile station is no longer in its home area, it sends a “mobile message” to the mobile switching centre and then the system “returns to normal rates for said mobile station.” Vimpari, 6:21-29.

B. Reasons to Combine Vendetti, Granberg, and Vimpari

186. In my opinion, a POSITA would have been motivated to combine the teachings of Vimpari with the combination of Vendetti and Granberg for several reasons as discussed further below.

1. Vimpari is analogous art to the '720 patent.

187. Vimpari is analogous art to the '720 patent. Vimpari is within the same field of endeavor because, like the '720 patent, Vimpari describes a system and method for monitoring the location of a mobile device and providing location-based tariffs and services. In particular, Vimpari teaches a system capable of “defining call tariffs, or...defining available services on the basis of the location of the mobile

station.” Vimpari, 1:4-8. For example, “lower tariffs could be applied” when a call originates from a subscriber’s home, and “operators could offer special services that are available only when the subscriber is ‘at home.’” Vimpari, 1:9-19; *see also* 10:9-14 (“When using the invention particularly for defining the price/service connected to the phone call, the mobile station can check its location only when making a call and possibly when receiving one. If the checking proves the device to be in the home area, the mobile switching centre can for instance set lower tariffs for the duration of said call, and cancel the discount when the call is terminated.”).

188. Additionally, Vimpari is reasonably pertinent to a particular problem of the ’720 patent (e.g., defining specific areas and providing location-based services). Like the ’720 patent, Vimpari offers solutions “where the location of a mobile station within a determined area can be detected accurately, reliably and by means of fairly simple devices.” Vimpari, 2:13-32; *see also* 1:4-19, 10:9-14. Accordingly, Vimpari is analogous art.

2. A POSITA would have been motivated to combine the teachings of Vimpari with the teachings of Vendetti and Granberg.

189. *First*, a POSITA would have been motivated to add information for verifying the validity of the marker transmitter, like the information taught in Vimpari, with Vendetti and Granberg’s combined marker transmitter teachings. Vendetti recognizes a need to “prevent fraud on the cellular service provider” and

ensure that a mobile unit accurately indicates it is “in its primary zone” to be given the “‘in zone’ rate.” Vendetti, 7:51-58. Vimpari also acknowledges that a “necessary requirement” for providing location-based tariffs and services to a mobile subscriber is that the “location of a mobile phone at home or in some other predetermined place can be accurately detected.” Vimpari, 1:16-19. In addition to Vendetti’s teachings of verifying the mobile unit, Vendetti, 7:51-8:7, Vimpari teaches the desirability of verifying the guide unit/marker transmitter (*radio communication defining device*) when providing location-based tariffs and services, Vimpari, 7:15-32. Thus, applying Vimpari’s technique of providing information at the guide unit to verify the validity of the guide unit would be a simple application of Vimpari’s known technique to improve Vendetti’s similar system in the same way.

190. A POSITA would have had a reasonable expectation of success in applying Vimpari’s teaching of storing of information to verify the validity of the guide unit with the combination of Vendetti and Granberg’s marker transmitter teachings. Vendetti’s marker transmitter includes a “memory 106...used to store temporary variables such as the zone identification signals, passwords and power levels, plus a computer program that drives the marker transmitter.” Vendetti, 9:6-9, Figure 6. Additionally, both Vendetti and Vimpari teach similar systems for providing located-based services, including a marker transmitter/guide unit to indicate the location of a particular area for location-based services, a mobile

unit/mobile station that receives location-based services, and a MTSO/mobile switching centre for providing location-based services. Vendetti, Abstract, 4:30-5:60; Vimpari, 1:4-19, 4:23-5:2, 6:13-29. Because Vendetti's marker transmitter has the appropriate memory structure and operates in a similar system as Vimpari's, a POSITA would have had a reasonable expectation of success in applying Vimpari's storing of information to verify the validity of the guide unit with Vendetti's marker transmitter teachings.

191. *Second*, a POSITA would have also been motivated to apply Vimpari's teaching of charging a different tariff rate for calls placed while the mobile phone is physically connected to a telephone stand in the home to Vendetti's various ways of defining special rate zones. *See, e.g.*, Vimpari, 2:7-12; Vendetti, 4:67-5:7 (primary, secondary, and public zone rates). Both Vimpari and Vendetti are focused on ways to enable differentiated services including variable billing rates or other special features. Vendetti, 2:42-46; Vimpari, 1:15-19. Adding Vimpari's example of using a fixed location to determine to apply a particular rate would have provided additional robustness to Vendetti's system with a well-known implementation that assists with determining that the mobile device truly is at "home." Vimpari, 1:9-25. This would have been nothing more than the combination of known elements (Vendetti's zone-based system teachings, Vimpari's fixed telephone stand), according to known methods (determining to apply a special tariff based on

determined location), to yield predictable results (a special tariff rate applied when at home, as determined from connecting to the telephone stand).

C. Detailed Analysis of Claims

1. Claim 5

- a. *The method according to claim 1, wherein the predetermined environment comprises one or more of: (1) one or more specific geographic locations; (2) a physical environment; (3) an environment defined by an operator of the mobile telephone network; and (4) an area defined by a fixed network.*

192. As I discussed with respect to claim 5 in Ground 1 in § IX.D.3 above, Vendetti discloses claim 5. But claim 5 is also met by the combination of Vendetti, Granberg, and Vimpari under an alternative example of the *fixed network* of option (4).

193. *First*, Vendetti discloses options (1)-(4) as demonstrated in claim 5 of Ground 1. *See* § IX.D.3.

194. *Second*, the combination of Vendetti, Granberg, and Vimpari renders obvious *wherein the predetermined environment comprises... (4) an area defined by a fixed network*. In addition to the various ways Vendetti teaches defining the zones (*predetermined environment*), Vimpari further teaches defining a predetermined environment based on a fixed location of a telephone stand. When a user brings a mobile phone to their home, “the mobile phone is set in a telephone stand provided with an individual SIM...containing subscriber data.” Vimpari, 2:7-9. With the

mobile phone plugged into the stand and the telephone stand is used to make a call, “the mobile network knows that the mobile phone is at home and applies a lower call tariff.” Vimpari, 2:9-12. Thus, Vimpari teaches *a predetermined environment* (the home) that includes a *fixed network* (the user’s home telephone network with the telephone stand as the point of connection).

195. In combination, it would have been obvious to implement Vimpari’s fixed telephone stand teachings with Vendetti’s zone teachings to achieve an additional type of zone in which to apply different tariff rates as both Vendetti and Vimpari teach doing. Vendetti, 4:39-5:7; Vimpari, 1:4-19.

2. Claim 10

- a. *The method according to claim 7, wherein the predetermined environment comprises one or more of: (1) one or more specific geographic locations; (2) a physical environment; (3) an environment defined by an operator of a mobile telephone network associated with the mobile station; and (4) an area defined by a fixed network.*

196. Claim 10 is met, in the combination, by Vendetti, Granberg, and Vimpari for the same reasons discussed in claims 5 and 7 of Ground 1 and claim 5 of Ground 4. *See* §§ IX.D.3-4, XII.C.1.

3. Claim 14

- a. *The method according to claim 12, further comprising storing in a memory of the radio communication defining device one or more parameters useable to*

authenticate the radio communication defining device in the fixed network.

197. The combination of Vendetti and Vimpari renders claim 14 obvious. Vendetti shows a marker transmitter (*radio communication defining device*) having a “**memory 106**” “**used to store temporary variables**” (*storing in a memory of the radio communication defining device one or more parameters*). Vendetti, 9:6-9, Figure 6:

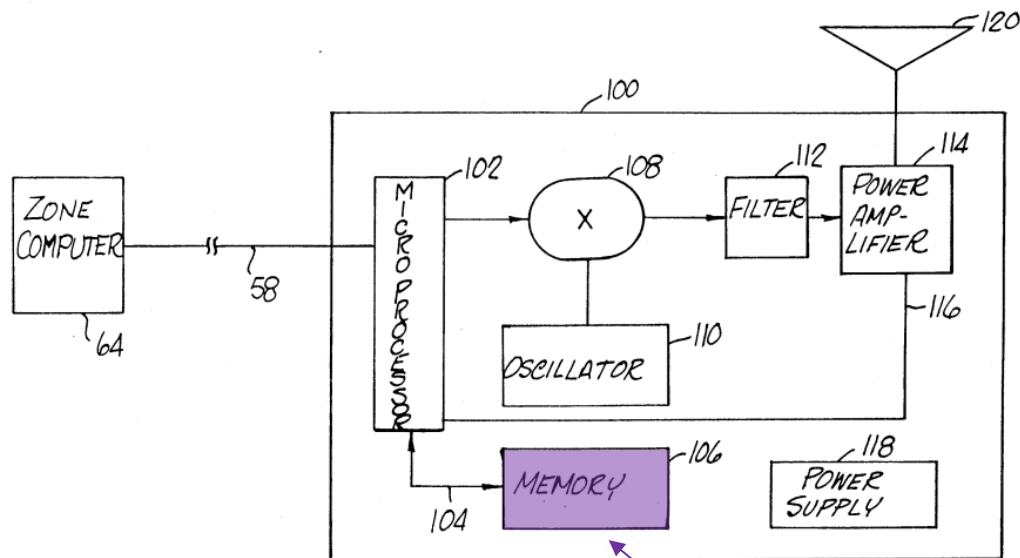


FIG. 6

Radio
communication
defining device
memory

Vendetti, FIG. 6 (annotated).

As explained in claim 12 above, Vendetti’s marker transmitter is physically connected to a fixed network. See § IX.D.7.

198. Vimpari, in turn, discloses a “guide unit” (another example of a *radio communication defining device*) that “is installed permanently in the premises.” Vimpari, 4:23-25. The guide unit transmits a signal that is detectable “only [at] the premises” and “to the immediate vicinity thereof” to indicate a mobile station’s “home area.” Vimpari, 4:25-5:2. The guide unit is “provided with its own SIM module” (*a memory of the radio communication defining device*) “which contains a **secret identity number for verifying the validity of the unit**” (*storing...one or more parameters useable to authenticate the radio communication defining device*). Vimpari, 7:24-25. The secret identity number is used to “calculate[], according to a given algorithm, a response number on the basis of said secret identity number.” Vimpari, 7:25-30. The response number is ultimately sent to the mobile switching centre, which authenticates the guide unit by “compar[ing] the received response number with the one that was earlier calculated in the centre” (*authenticate the radio communication defining device*). Vimpari, 7:25-30. In the combination, Vendetti’s zone computer of the network—which is physically connected to the marker transmitter—would authenticate the marker transmitter because the marker transmitter interfaces with the network through the zone computer (*authenticate the radio communication defining device in the fixed network*). Vendetti, 3:23-26 (“A zone computer is coupled to each of the marker transmitters via a communication link to control the power level at which the marker transmitters transmit.”), 5:23-25

(“The marker transmitters M_1 and M_2 are interfaced with a zone computer 64 via a communication link 66 such as a telephone line or microwave link.”), 8:63-9:47 (explaining that the marker transmitter is coupled to the zone computer, where the zone computer controls the power levels of the marker transmitters and jamming signals to “shape the size of the zone” and “refine the shape of the zones”), 13:5-35 (explaining that the zone computer can “dynamically reconfigure[]” marker transmitters to mark different zones).

199. Thus, the combination of Vendetti, Granberg, and Vimpari teaches *further comprising storing in a memory of the radio communication defining device* (Vendetti’s storing variables in a memory of the marker transmitter and Vimpari’s storing information in a SIM module) *one or more parameters* (Vendetti’s variables and Vimpari’s secret identify number) *useable to authenticate the radio communication defining device* (Vimpari’s secret identity number for verifying the validity of the guide unit) *in the fixed network* (Vendetti’s zone computer physically connected to the marker transmitter authenticating the marker transmitter).

4. Claim 15

- a.** *The method according to claim 12, wherein the predetermined environment comprises one or more of: (1) one or more specific geographic locations; (2) a physical environment; (3) an environment defined by an operator of a mobile telephone network associated with*

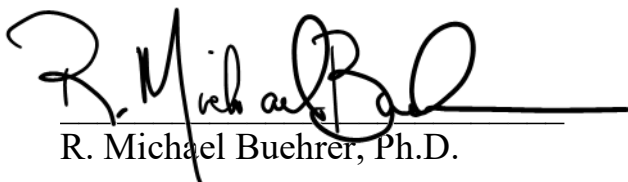
the mobile station; and (4) an area defined by the fixed network.

200. Claim 15 is met, in the combination, by Vendetti, Granberg, and Vimpari for the same reasons discussed in claims 5 and 12 of Ground 1 and claim 5 of Ground 4. *See* §§ IX.D.3, IX.D.7, XII.C.1.

XIII. CONCLUSION

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

Dated: 9/9/25


R. Michael Buehrer, Ph.D.