

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.
Petitioner

v.

BROADPHONE LLC
Patent Owner

Patent No. 8,594,698

DECLARATION OF DR. KEVIN C. ALMEROOTH

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I, Kevin C. Almeroth, declare as follows:

I. INTRODUCTION

1. I have been retained by Samsung Electronics Co., Ltd. (“Petitioner”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office (“PTO”) against Broadphone LLC (“Patent Owner” or “PO”) regarding U.S. Patent No. 8,594,698 (“the ’698 patent”) (Ex-1001).¹ I have been asked to consider whether the prior art discloses or suggests the features recited in claims 1-7, 9-13, 15, 16, and 21 (“the challenged claims”) of the ’698 patent. My opinions are set forth below.

2. I am being compensated at my standard rate for my work in this proceeding. My compensation is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other interest in this proceeding.

¹ Where appropriate, I refer to exhibits that I understand are to be attached to the petition for *Inter Partes* Review of the ’698 patent.

II. BACKGROUND AND QUALIFICATIONS

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

4. I hold three degrees from the Georgia Institute of Technology: (1) a Bachelor of Science degree in Information and Computer Science (with minors in Economics, Technical Communication, and American Literature) earned in June 1992; (2) a Master of Science degree in Computer Science (with specialization in Networking and Systems) earned in June 1994; and (3) a Doctor of Philosophy (Ph.D.) degree in Computer Science (Dissertation Title: Networking and System Support for the Efficient, Scalable Delivery of Services in Interactive Multimedia System, minor in Telecommunications Public Policy) earned in June 1997. During my education, I took a wide variety of courses as demonstrated by my minor. My undergraduate degree also included a number of courses more typical of a degree in

electrical engineering including digital logic, signal processing, and telecommunications theory.

5. One of the major concentrations of my research over the past 30+ years has been the delivery of multimedia content and data between computing devices, including through various network architectures. In my research, I have studied large-scale content delivery systems, and the use of servers located in a variety of geographic locations to provide scalable delivery to hundreds or thousands of users simultaneously. I have also studied smaller-scale content delivery systems in which content is exchanged between individual computers and portable devices. My work has emphasized the exchange of content more efficiently across computer networks, including the scalable delivery of content to many users, mobile computing, satellite networking, delivering content to mobile devices, and network support for data delivery in wireless networks.

6. In 1992, the initial focus of my research was on the provision of interactive functions (*e.g.*, VCR-style functions like pause, rewind, and fast-forward) for near video-on-demand systems in cable systems; in particular, how to aggregate requests for movies at a cable head-end and then how to satisfy a multitude of requests using one audio/video stream broadcast to multiple receivers simultaneously. This research has continually evolved and resulted in the

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

7. An important component of my research has been investigating the challenges of communicating multimedia content, including video, between computers and across networks including the Internet. Although the early Internet was used mostly for text-based, non-real time applications, the interest in sharing multimedia content, such as video, quickly developed. Multimedia-based applications ranged from downloading content to a device to streaming multimedia content to be instantly used. One of the challenges was that multimedia content is typically larger than text-only content, but there are also opportunities to use different delivery techniques since multimedia content is more resilient to errors. I have worked on a variety of research problems and used a number of systems that were developed to deliver multimedia content to users. One content-delivery method I have researched is the one-to-many communication facility called “multicast,” first deployed as the Multicast Backbone, a virtual overlay network supporting one-to-many communication. Multicast is one technique that can be used on the Internet to provide streaming media support for complex applications like video-on-demand,

distance learning, distributed collaboration, distributed games, and large-scale wireless communication. The delivery of media through multicast often involves using Internet infrastructure, devices and protocols, including protocols for routing and TCP/IP.

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

9. In the IMJ, the number of channels varied depending on the capabilities of the server including the available bandwidth of its connection to the Internet. If one of the channels was idle, the requesting user would be able to watch their selection immediately. If all channels were streaming previously selected content, the user's selection would be queued on the channel with the shortest wait time. In the meantime, the user would see what content was currently playing on other channels, and because of the use of multicast, would be able to join one of the

existing channels and watch the content at the point it was currently being transmitted.

10. The IMJ service combined the interactivity of the web with the streaming capabilities of the Internet to create a jukebox-like service. It supported true Video-on-Demand when capacity allowed, but scaled to any number of users based on queuing requested programs. As part of the project, we obtained permission from Turner Broadcasting to transmit cartoons and other short-subject content. We also connected the IMJ into the Georgia Tech campus cable television network so that students in their dorms could use the web to request content and then view that content on one of the campus's public access channels.

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

12. As a parallel research theme, starting in 1997, I began researching issues related to wireless devices and sensors. In particular, I was interested in showing how to provide greater communication capability to “lightweight devices,” *i.e.*, small form-factor, resource-constrained (*e.g.*, CPU, memory, networking, and power) devices. Starting in 1998, I published several papers on my work to develop a flexible, lightweight, battery-aware network protocol stack. The lightweight protocols we envisioned were similar in nature to protocols like Bluetooth, Universal Plug and Play (UPnP) and Digital Living Network Alliance (DLNA).

13. From this initial work, I have made wireless networking—including ad hoc, mesh networks and wireless devices—one of the major themes of my research. My work in wireless networks spans the protocol stack from applications through to the encoding and exchange of data at the data link and physical layers.

14. At the application layer, even before the large-scale “app stores” were available, my research looked at building, installing, and using apps for a variety of purposes, from network monitoring to support for traditional computer-based applications (*e.g.*, content retrieval) to new applications enabled by ubiquitous, mobile devices. For example, my research has looked at developing applications for virally exchanging and tracking “coupons” through “opportunistic contact” among mobile wireless devices (*i.e.*, communication among devices moving into

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

15. Toward the middle of the protocol stack, my research has also looked to build wireless infrastructure support to enable communication among a set of mobile devices unaided by any other kind of network infrastructure. These kinds of networks are useful either in challenged network environments (*e.g.*, when a natural disaster has destroyed existing infrastructure) or when suitable support for network communication never existed. The deployment of such networks (or even the use of traditional network support) are critical to support services like disaster relief, catastrophic event coordination, and emergency services deployment.

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

For wireless protocols, this research includes functions like network acquisition and channel bonding.

17. One theme in my wireless network research has been cross-layer solutions and innovations. As mentioned above, with greater wireless device use and network support, we envisioned new application paradigms and services, for example, when mobile devices come into contact with each other. Instead of relying on existing infrastructure to relay communication, the devices are able to discover each other and communicate directly. Other examples include discovering and using location information to enhance users' experiences. Network support and novel applications span use a variety of network architectures supporting users on foot, in vehicles, and across varying terrains and environments. Finally, we studied how communication efficiency can be supported through intelligent handoffs as well as location and movement prediction.

18. Protecting networks, including their operation and content, has been an underlying theme of my research almost since the beginning of my research career. Starting in 2000, I have been involved in several projects that specifically address security, network protection, and firewalls. After significant background work, a team on which I was a member successfully submitted a \$4.3M grant proposal to the Army Research Office (ARO) at the Department of Defense to propose and develop

a high-speed intrusion detection system. Key aspects of the system included associating streams of packets and analyzing them for viruses and other malware. Once the grant was awarded, we spent several years developing and meeting the milestones of the project. A number of my students worked on related projects and published papers on topics ranging from intrusion detection to developing advanced techniques to be incorporated into firewalls. I have also used firewalls, including their associated malware detection features, in developing techniques for the classroom to ensure that students are not distracted by online content.

19. My recent work ties some of the various threads of my past research together. I have investigated content delivery in online social networks and proposed reputation management systems in large-scale social networks and marketplaces. On the content delivery side, I have looked at issues of caching and cache placement, especially when content being shared and the cache has geographical relevance. We were able to show that effective caching strategies can greatly improve performance and reduce deployment costs. Our work on reputation systems showed that reputations have economic value, and as such, creates a motivation to manipulate reputations. In response, we developed a variety of solutions to protect the integrity of reputations in online social networks. The techniques we developed for content delivery and reputation management were

particularly relevant in peer-to-peer communication and recommendations for downloadable “apps.”

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

21. My involvement in the research community extends to leadership positions for several academic journals and conferences. I am the co-chair of the Steering Committee for the ACM Network and System Support for Digital Audio

and Video (NOSSDAV) workshop and on the Steering Committees for the International Conference on Network Protocols (ICNP), ACM Sigcomm Workshop on Challenged Networks (CHANTS), and IEEE Global Internet (GI) Symposium. I have served or am serving on the Editorial Boards of IEEE/ACM Transactions on Networking, IEEE Transactions on Mobile Computing, IEEE Network, ACM Computers in Entertainment, AACE Journal of Interactive Learning Research (JILR), and ACM Computer Communications Review. I have co-chaired a number of conferences and workshops including the IEEE International Conference on Network Protocols (ICNP), IEEE Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON), International Conference on Communication Systems and Networks (COMSNETS), IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS), the International Workshop On Wireless Network Measurement (WiNMee), ACM Sigcomm Workshop on Challenged Networks (CHANTS), the Network Group Communication (NGC) workshop, and the Global Internet Symposium, and I have served on the program committees for numerous conferences.

22. Furthermore, in the courses I taught at UCSB, a significant portion of my curriculum covered aspects of the Internet and network communication including the physical and data link layers of the Open System Interconnect (OSI)

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

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

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

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

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

27. Additional details about my employment history, fields of expertise, courses taught, and publications are further included in my CV (Ex-1003).

28. I am not an attorney and offer no legal opinions, but in the course of my work, I have had experience studying and analyzing patents and patent claims from the perspective of a person skilled in the art.

III. MATERIALS REVIEWED

29. The opinions in this declaration are based on the documents I reviewed, my knowledge and experience, and professional judgment. In forming my opinions expressed in this declaration, I have reviewed the following materials:

- Ex-1001 U.S. Patent No. 8,594,698 (“*Shkedi*”)
- Ex-1004 Prosecution History of U.S. Patent No. 8,594,698
- Ex-1005 U.S. Patent No. 6,269,246 (“*Rao-I*”)
- Ex-1006 U.S. Patent No. 8,477,731 (“*Nanda*”)
- Ex-1007 U.S. Patent Application Publication 2001/0022558 (“*Karr*”)
- Ex-1008 U.S. Patent No. 7,116,987 (“*Spain-II*”)
- Ex-1009 U.S. Patent No. 6,782,265 (“*Perez-Breva-II*”)
- Ex-1010 U.S. Patent No. 6,393,294 (“*Perez-Breva-I*”)
- Ex-1011 U.S. Patent No. 6,944,465 (“*Spain-I*”)
- Ex-1012 T Suzuki, et al., The Moving-body Position Detection Method; JP Patent Application (shown as 63-195800), August 1988
- Ex-1013 M. Hellebrandt, et al., Estimating Position and Velocity of Mobiles in a Cellular Radio Network, IEEE Trans. On Vehicular Technology, Vol. 46, No. 1, pp. 65-71
- Ex-1014 I Gaspard, et al., Position Assignment in Digital Cellular Mobile Radio Networks (*e.g.*, GSM) Derived from Measurements at the Protocol Interface, IEEE Journal, pp. 592-596, March 1997

- Ex-1015 J. Jimenez et al., Mobile Location Using Coverage Information: Theoretical Analysis and Results, COST 259 TD (98), April 1999
- Ex-1016 U.S. Patent No. 7,848,765 (“*Phillips*”)
- Ex-1017 U.S. Patent No. 7,213,057 (“*Trethewey*”)
- Ex-1018 U.S. Patent Application Publication No. 2004/0203768 (“*Ylitalo*”)
- Ex-1019 U.S. Patent Application Publication No. 2009/0075651 (“*MacNaughton*”)
- Ex-1020 U.S. Patent Application Publication No. 2005/0185618 (“*Friday*”)
- Ex-1026 U.S. Patent No. 6,167,274 (“*Smith-I*”)
- Ex-1027 U.S. Patent Application Publication No. 2004/0152471 (“*MacDonald*”)
- Ex-1028 U.S. Patent No. 7,346,359 (“*Damarla*”)
- Ex-1029 U.S. Patent No. 6,052,598 (“*Rudrapatna*”)
- Ex-1030 U.S. Patent Application Publication No. 2004/0236850 (“*Krumm*”)
- Ex-1032 U.S. Patent No. 7,397,424 (“*Houri*”)
- Ex-1033 U.S. Patent No. 7,305,244 (“*Blomqvist*”)
- Ex-1047 U.S. Patent No. 7,312,752 (“*Smith-II*”)
- Ex-1053 U.S. Patent Application Publication No. 2005/0159174 (“*Bar-On*”)
- Ex-1054 U.S. Patent No. 6,957,076 (“*Hunzinger*”)
- Ex-1055 U.S. Patent No. 7,263,441 (“*Janky*”)

Ex-1056	U.S. Patent Application Publication No. 2005/0136845 (“Masuoka”)
Ex-1057	U.S. Patent Application Publication No. 2004/0198386 (“Dupray”)
Ex-1058	U.S. Patent Application Publication No. 2005/0282557 (“Mikko”)
Ex-1059	U.S. Patent No. 7,474,897 (“Morgan-I”)
Ex-1060	U.S. Patent No. 6,714,865 (“Angwin”)
Ex-1061	U.S. Patent No. 7,525,425 (“Diem”)
Ex-1062	U.S. Patent No. 7,433,693 (“Sheynblat-I”)
Ex-1063	U.S. Patent Application Publication No. 2007/0013584 (“Camp”)
Ex-1064	U.S. Patent Application Publication No. 2008/0139219 (“Boeiro”)
Ex-1065	U.S. Patent Application Publication No. 2006/0240841 (“Bhattacharya”)
Ex-1066	U.S. Patent Application Publication No. 2006/0095349 (“Morgan-II”)
Ex-1067	U.S. Patent No. 6,915,123 (“Daudelin”)
Ex-1068	U.S. Patent Application Publication No. 2007/0010956 (“Nerguizian”)
Ex-1069	U.S. Patent Application Publication No. 2005/0195761 (“Alicherry”)
Ex-1070	U.S. Patent Application Publication No. 2007/0133487 (“Wang”)

- Ex-1071 U.S. Patent Application Publication No. 2006/0089153
 (“*Sheynblat-IP*”)
- Ex-1072 U.S. Patent Application Publication No. 2007/0249365
 (“*Jendbro*”)
- Ex-1073 U.S. Patent No. 7,941,656 (“*Hans*”)
- Ex-1074 U.S. Patent No. 7,454,608 (“*Gopalakrishnan*”)
- Ex-1075 U.S. Patent No. 8,948,785 (“*Grindeland*”)
- Ex-1076 U.S. Patent No. 8,725,406 (“*Kitajima*”)
- Ex-1101 U.S. Patent No. 7,792,547 (“*Smith-III*”)
- Ex-1102 U.S. Patent No. 6,937,869 (“*Rayburn*”)
- Ex-1103 U.S. Patent Application Publication No. 2002/0142773
 (“*Rudrapatna IP*”)
- Ex-1104 U.S. Patent No. 6,140,964 (“*Sugiura*”)
- Ex-1105 U.S. Patent Application Publication No. 2005/0272447
 (“*Eckel*”)
- Ex-1108 U.S. Patent No. 6,522,890 (“*Drane*”)
- Ex-1109 U.S. Patent Application Publication No. 2007/0087763
 (“*Budampati*”)
- Ex-1110 U.S. Patent No. 6,195,556 (“*Reudink*”)

and any other materials I refer to in this declaration in support of my opinions.

30. I base my opinions in this Declaration on the materials I reviewed, my experience, knowledge, and professional judgment. My opinions have also been guided by my appreciation of how a person of ordinary skill in the art would have

understood the claims and the specification of the '698 patent at the time of the alleged invention, which I have been asked to consider as September 19, 2006. My opinions reflect how one of ordinary skill in the art would have understood the '698 patent, including the challenged claims, the prior art to the patent and those claims, and the state of the art known to a person of ordinary skill in the art at the time of the alleged invention.

IV. PERSON OF ORDINARY SKILL IN THE ART

31. Based on my knowledge and experience, I understand what a person of ordinary skill in the art would have known at the time of the alleged invention, which I discussed above as being around September 19, 2006. My opinions herein are, where appropriate, based on my understandings as to a person of ordinary skill in the art at that time. In my opinion, based on the materials and information I have reviewed, and based on my experience in the technical areas relevant to the '698 patent, a person of ordinary skill in the art as of the identified effective date of the '698 patent would have had at least a Bachelor's of Science degree in computer science, electrical engineering, or a similar discipline, and two or more years of experience with location determining-based systems and/or processes, such as for example systems/processes for determining mobile device location(s). More education can supplement practical experience and vice versa. I apply this understanding in my analysis herein.

32. All of my opinions in this declaration are from the perspective of one of ordinary skill in the art, during the relevant timeframe (*e.g.*, the time of the alleged invention), which I discussed above as being around September 19, 2006. (*See also my discussions below in Sections V-IX.*)

V. TECHNICAL BACKGROUND

33. As I discuss further below, it is my opinion that the features recited in the challenged claims of the '698 patent are disclosed or suggested in the prior art. Many of the claimed features relate to technologies/techniques that were conventional and known to persons of ordinary skill in the art at the time before the time of the alleged invention of the '698 patent.

34. Below, I present an overview of technologies, techniques, and concepts that were known to a person of ordinary skill in the art prior to and at the time of the alleged invention of the '698 patent. The features, functionalities, and concepts I describe in this technical background section reflect the knowledge of the state of the art that a person of ordinary skill in the art would have had and understood prior to and at the time of the alleged invention of the '698 patent. I rely on, and incorporate as applicable (even if not expressly mentioned below in §IX), the following disclosures and opinions to support my opinions in this Declaration concerning the knowledge, skills, experience, and understanding of technologies, techniques, concepts, etc. in the state of art of a person of ordinary skill in the art near and at the time of the alleged invention (September 19, 2006), including those opinions relating to such a skilled person's understanding as to how the prior art discloses and/or suggests the features/limitations recited in the challenged claims of

the '698 patent and how and why a person of ordinary skill in the art would have been motivated to consider and combine the disclosures and suggestions from one or more prior art references as I explain below in Section IX. In my opinion, the concepts/technologies/techniques discussed below (and where I discuss elsewhere in Section IX) would have been within the knowledge and mindset of a person of ordinary skill in the art at the time.

A. Mobile Device Location Systems/Methods

35. Before the alleged time of invention, information pertaining to the location of a mobile device (cell phones, PDAs, etc.) was desired for a variety of applications. For instance, in the late 90s, the U.S. Federal Communication Commission proposed requirements for cellular telephone carriers to implement wireless telephone location services to assist locating efforts related to 911 calls. (Ex-1056, ¶¶0006, ¶¶0019; *see also* ¶¶0010-18.) And various related emergency and military location services were being developed for mobile devices. For example, U.S. Patent Application Publication No. 2004/0152471 to *MacDonald* (Ex-1027) describes:

The MSC 220 can be configured to perform an A/B number analysis to determine whether a location function is to be performed. For example, the MSC 220 can initiate the location function each time a mobile telephone dials 911. In addition, the

mobile telephone system provider can offer this location function as a service to its customers. In this situation, if the user of the mobile telephone 120 dials a certain number, the MSC 220 can initiate the location function and the location of the mobile telephone could be communicated to the mobile telephone user.

(Ex-1027, FIG. 17, ¶0049.) Also,

For example, if the location function was initiated because of a 911 call from the mobile telephone 120, the MLM 230 will route the location information to the appropriate public service provider. If the location function was initiated because the MSC determined that the cellular telephone number belonged to a fleet company, the location information would be sent to the appropriate fleet company. Further, the location information could be communicated to the mobile telephone 120 itself if the request for location information came from the user of the mobile telephone 120.

(*Id.*, ¶0090.) (*See also id.*, ¶¶0004, 0091-0101, 0106-0108, 0115, FIGS. 3, 11-15).

Additionally, U.S. Patent Application Publication No. 2004/0198386 to *Dupray* (Ex-1057) explained that:

[L]ocation requesting applications that require relatively precise location information are emergency rescue, and certain military related applications (*e.g.*, battlefield data fusion, battlefield

maneuvers and/or military command, control and communication (C3).

(Ex-1057, ¶0023; *see also id.*, Abstract, ¶¶0084, 0115, 0161, 0268.)

36. Beyond location applications for emergency services, a person of ordinary skill in the art would have been aware of other mobile phone location-based applications and features. For example, U.S. Patent Application Publication No. 2005/0282557 to *Mikko* (Ex-1058), confirmed such a skilled person's knowledge of

“[a]pplication programs [that] have been developed that allow a request for the current location of a mobile terminal by another computing device.

(*See, e.g.*, Ex-1058, ¶0007.) *Mikko* also explained that,

Application programs have also been developed that allow a mobile terminal to request its current location. These applications may, for example, request accurate, real-time positioning of the mobile terminal itself in order to connect the terminal user to nearby points of interest, to advise them of current traffic or weather conditions, or to provide routing information.

(*Id.*) (*See also id.*, Abstract, FIGS. 2-4, ¶¶0008-0009, 0015, 0020, 0031, 0033, 0036, 0038, 0040.)

37. U.S. Patent No. 7,848,765 to *Phillips* (Ex-1016) confirmed a person of ordinary skill in the art's understanding and knowledge of:

methods and systems relating to location-based services such as *social networking*, providing *demographic information*, *tracking* mobile devices, providing *business information*, providing an *adaptable user interface*, remotely *effecting a change on a portable electronic device*, providing a *geofence*, *outputting location-based information* on a mobile device, *varying transmissions* to and from a mobile device, providing *location-based alerts*, *verifying transactions* and *tailoring information to the behavior of a user*.

(Ex-1016, Abstract.) (*See also id.*, FIGS. 1-4, 6, 7, 27A-27C, 28-42B, 1:18-5:10, 6:30-7:3, 10:1-12:32, 14:38-44 (user may define a geofence via portable device), 16:41-67, 17:39-20:46, 21:34-22:21, 23:50-25:18, 26:38-27:23.)

38. A person of ordinary skill in the art understood and appreciated that the location of a mobile device was often used to trigger various mobile device functions. U.S. Patent Application Publication No. 2009/0075651 to *MacNaughton* (Ex-1019) confirmed a person of ordinary skill in the art's understanding and knowledge of location determining techniques and technologies that allowed a user to choose zones from which selected tasks may be performed when it is determined mobile device is moved outside or inside a particular zone. (Ex-1019, ¶¶0008-0081,

0164-0171, 0177-0185, 0217-0240; Ex-1055, 1:49, 2:20-3:3, 3:49-4:22, 6:12-7:41 (user designated zones where tasks are performed when it is determined mobile device is moved outside or inside zone).) Likewise, location-based reminder applications were well-known. (*E.g.*, U.S. Patent No. 6,957,076 to *Hunzinger*, 1054, Abstract; U.S. Patent No. 7,305,244 to *Blomqvist*, Ex-1033, 3:44-64, 5:10-37.) It was also known to inform and/or activate software applications and device profiles based on location.

Other functions to be mentioned in this context that can be activated on the basis of the location are starting of a program, changing the settings of a device, for example changing the user profile in a mobile station, re-configuration, or a security function. . . . By means of the method according to the invention it is for example possible to activate an application (program) installed in the device 1 at that stage when the device 1 is positioned close to a predetermined location. Further examples of such applications that can be mentioned are call set-up, sending a text message to indicate for example that the user has arrived to a certain location, activating a map application, etc.

(Ex-1033, 8:52-62; *see also id.*, 5:45-50.)

39. Other state of art reference describe similar features that confirm what would have been known, appreciated, and understood by a person of ordinary skill

in the art at the time. (*See e.g.*; U.S. Patent No. 7,525,425 to *Diem*, Ex-1061, FIG. 13c, 1:61-2:8, 8:54-9:10, 21:4-13; U.S. Patent No. 7,305,244 to *Blomqvist*, Ex-1033, 1:43-59, 5:46-6:38; U.S. Patent No. 7,346,359 to *Damarla*, Ex-1028, Abstract, FIGS. 4-8, 1:10-4:14, 5:10-16 (MU taken to planned locations where RF samples are taken/record), 5:16-63, 7:23-8:28; U.S. Patent No. 6,052,598 to *Rudrapatna*, Ex-1029, FIGS. 6A-6E ¶¶0033-0034, 0045, 0063, 0071, 0074-0075; U.S. Patent Application Publication No. 2005/0185618 to *Friday*, Ex-1020, Abstract, ¶¶0013, 0029, 0048-0059; U.S. Patent No. 7,213,057 to *Trethewey*, Ex-1017, Abstract (“A method for configuring a mobile computer based on location.”), FIG. 1A-1B, 3, 5, 2:46-3:8, 3:13-4:7, 6:23-8:38; U.S. Patent No. 6,167,274 to *Smith-I*, Ex-1026, Abstract, 3:58-4:56; U.S. Patent Application Publication No. 2004/0152471 to *MacDonald*, Ex-1027, Abstract, ¶¶0012-0023, 0096-0099

40. U.S. Patent Application Publication No. 2004/0203768 to *Ylitalo* (Ex-1018) described a “system, apparatus, and method for automatically or interactively updating a wireless/mobile device's active settings or profile, based on the location of the mobile device.” (Ex-1018, Abstract; *see id.*, FIGS. 1, 5, 6, 7, 8, ¶¶0002-0006, 0071-0081.) U.S. Patent Application Publication No. 2007/0249365 to *Jendbro* (Ex-1072) also described “position determined by means of the received positioning information relating to a current position, and the application requested by the user

of the mobile device, are used in combination by control unit 150 to select a profile which is position-dependent, and to load and execute the selected application using parameters determined in the selected profile.” (Ex-1072, ¶0065; *see also id.*, FIGS. 1-2, ¶¶0060-0073; U.S. Patent No. 7,941,656 to *Hans*, Ex-1073, 19:48-54 (“if the mobile device changes its location, a localized set of application identifiers may be allotted to the mobile device. The change of location may also trigger loading one or more of the newly allotted applications.”), 20:40-23:48, FIG. 6; U.S. Patent No. 7,454,608 to *Gopalakrishna*, Ex-1074, 5:33-57 (“At step 240, the appropriate applications are determined and launched according to user's preferences for the location classification.”), FIG. 1, 5:32-6:43; U.S. Patent No. 8,948,785 to *Grindelan*, Ex-1075, 1:12-29 (“[T]here is an increasing interest in developing location-based applications, i.e., applications that make use of mobile station location information. These location-based applications may simply track or monitor the locations of mobile stations, or they may provide information or services to mobile stations based on their locations.”), Abstract, 2:36-58, 5:10-6:60, 7:38-9:22.)

41. Map/direction and geofencing applications were also popular for determining when a user/mobile device arrived at a location, providing directions, sending coupons based on location, etc. before the alleged time of invention. (*E.g.*, U.S. Patent No. 6,714,865 to *Angwi*, Ex-1060, 6:41-63 (“[A]n application (305),

such as a route finder application....”), FIGS. 1A-1C, 3, 5, 1:10-3:21; Ex-1076, 1:7-12 (“The present invention relates to a mobile communication (or communications) terminal such as a cellular (or mobile) phone for showing map data in accordance with position data, and relates to a map display system including the mobile communication terminal and a server for storing map data.”), Abstract, FIGS. 5-8, 7:52-11:50; Ex-1016, 24:5-14 (“the location of the portable electronic facility 300 with respect to the geofence 900 may result in the transmission of information 1702 to the portable electronic facility 300. The information may relate to a coupon, the weather or traffic conditions).”)

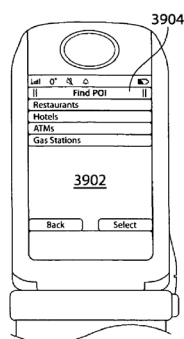


Fig. 39A



Fig. 39B

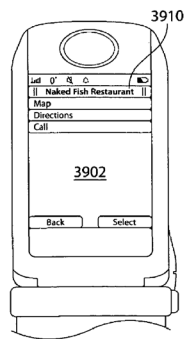


Fig. 39C

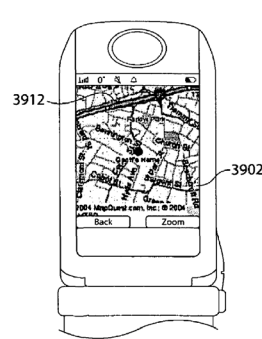


Fig. 39D

(Ex-1016, FIGS. 39A-D.)

42. Thus, before the alleged time of invention, a person of ordinary skill in the art would have appreciated that “[l]ocation-based services [were] an emerging area of mobile applications that leverage[ed] the ability of new devices to calculate their current geographic position and report that to a user or to a service.” (U.S.

Patent No. 7,474,897 to *Morgan-I*, Ex-1059, 1:66-2:12; *see also id.*, FIGS. 1-3, 1:50-4:35.)

43. A person of ordinary skill in the art would have appreciated the benefits, needs, and different ways mobile device location features/services were applied. (*See, e.g.*, U.S. Patent No. 6,714,865 to *Angwin*, Ex-1060, 3:12-20 (“There is a need for a technique whereby an application running on a device (such as a route finder application) can determine the device’s position by using a familiar co-ordinate system, irrespective of the technology providing the position information. More specifically, there is a need for a client side service that is available for applications such as browser services.”), FIGS. 1A-1C, 3, 5, 1:10-3:21; U.S. Patent No. 6,957,076 to *Hunzinger*, Ex-1054, 1:57-2:49, 3:44-6:30.) In fact, *Morgan-I* (Ex-1059) informed a person of ordinary skill in the art that:

Mobile email, walkie-talkie services, multi-player gaming and call following are examples of how new applications are emerging on mobile devices. In addition, users are beginning to demand/seek applications that not only utilize their current location but also share that location information with others. Parents wish to keep track of their children, supervisors need to track the location of the company's delivery vehicles, and a business traveler looks to find the nearest pharmacy to pick up a

prescription. All of these examples require the individual to know their own current location or that of someone else.

(Ex-1059, 1:50-65.)

44. The known approaches for determining whether a mobile device was at a particular location included the familiar and then-used global positioning system (“GPS”) operated by the U.S. Government that leveraged dozens of satellites as reference points for location services. (Ex-1059, 1:65-2:27.) A person of ordinary skill in the art would have understood and appreciated that mobile devices at the time were known to be configured with GPS technologies and processes to use GPS information for location services/applications. (Ex-1061, 1:47-57 (“[M]obile devices have been equipped with GPS receivers, which enable the users to know where they are located at any given time.”), 1:61-2:8, 8:54-9:10, 21:4-13, FIG. 13c; Ex-1011, 1:20-49.)

45. Cell phone signal information was also known to be used to locate mobile devices. In what was understood as location fingerprint techniques, “[t]ypically, the position of a mobile station [was] determined by comparing a RF data sample collected by the mobile station to fingerprint data in the database. The mobile station’s position [was] determined to lie in the area corresponding to a fingerprint data point of highest correlation to the RF data sample.” (U.S. Patent

No. 7,433,693 to *Sheynblat-I*, Ex-1062, 1:25-34, FIGS. 1-6, Abstract, 1:11-2:10, 2:29-4:65, 4:65-5:64.) “Cell tower triangulation [was] another method used by wireless and cellular carriers to determine a user or device’s location.” (Ex-1059, 2:28-38.) “These various known location techniques...include[d] collecting ranging measurements such as, for example, a time of arrival (TOA), a time difference of arrival (TDOA), an observed time difference (OTD), or the like.” (U.S. Patent Application Publication No. 2007/0013584 to *Camp*, Ex-1063, ¶0007; *see also id.*, ¶0003, 0009-10.)

46. Various hybrid approaches to mobile device location techniques that involved both the use of GPS information and cell phone signal information were also known to those of ordinary skill in the art at the time. (U.S. Patent Application Publication No. 2008/0139219 to *Boeiro*, Ex-1064, ¶0002 (“Hybrid location methods are known to exploit different localization techniques, such as satellite measures (using *e.g.* the GPS-Global Positioning System--navigation system) and cellular measures (*e.g.*, based on the measure of the electromagnetic field). These known methods use suitable algorithms that, based upon two or more pluralities of measures acquired by the terminal, are intended to globally improve the performance of the positioning, in terms of accuracy, availability, and so on.”), Abstract, FIGS. 1-2, ¶0030; U.S. Patent No. 7,397,424 to *Houri*, Ex-1032 5:1-14 (“Specifically,

when the GPS device 12 receives an accurate positioning signal, switch 16 would allow this GPS signal to be directed to the computing device 10 so that the computing device would consider its position that determined by the GPS signal. On the other hand, when the GPS device 12 is unable to provide an accurate GPS signal, switch 16 would allow a positioning signal derived from the wireless positioning system 14, and based on input from the computing device 10 at that time, to be directed to the computing device 10 and the computing device 10 would consider its position that indicated by this positioning signal.”), 4:59-67, 5:59-6:50, 7:52-8:3, 16:23-63.)

47. Location determining systems were known to be configured to determine when a user or mobile device arrived at or left a given/selected location. (E.g., Ex-1016, FIGS. 6, 27A-27C, 28-42B, 14:17-16:9, 19:4-42, 21:34-22:21, 23:50-25:18, 26:38-27:23; Ex-1033, 3:44-64 (“The position data can also contain information for example on the radius, wherein when the user arrives in the area determined by the coordinates and the radius, a predetermined function is performed.”), 6:9-17 (“Thus, the person carries a device 1 according to a preferred embodiment of the present invention in which the position conditions of the location-based functions are monitored in the manner presented in this description. When said person arrives to a certain location or leaves a predetermined location or area, information thereon is transmitted from the device of the person to the monitoring

device.”); Ex-1054, 4:21-41, 5:13-22, 5:51-62 (“For example, the user may select that the reminder be triggered only when exiting the region, entering the region or in both cases 425.”); Ex-1062, 1:26-33 (“The mobile station’s position is determined to lie in the area corresponding to a fingerprint data point of highest correlation to the RF data sample.”); Ex-1028, 12:55-13:18 (discussing fingerprint location techniques to determine whether a user has entered or exited a given area).)

48. With respect to user interfaces, a person of ordinary skill in the art was aware of and understood that in many mobile device location systems, users were able to use a device to mark locations in advance that could later be detected when the user or their device arrived at or left the chosen location. *Hunzinger* (Ex-1054) described examples of user-friendly interfaces that enabled a user to select locations and actions to be performed corresponding to those locations.

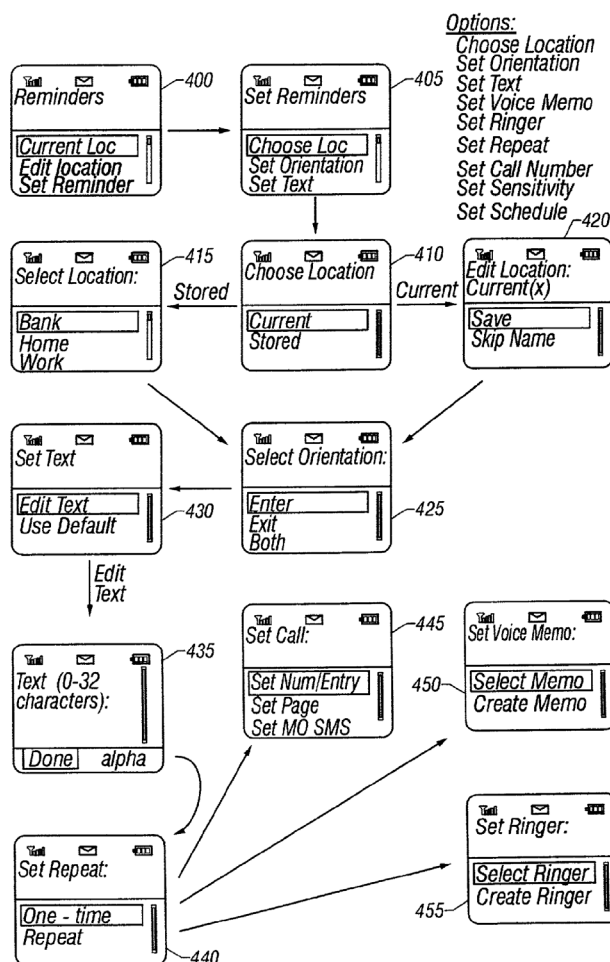
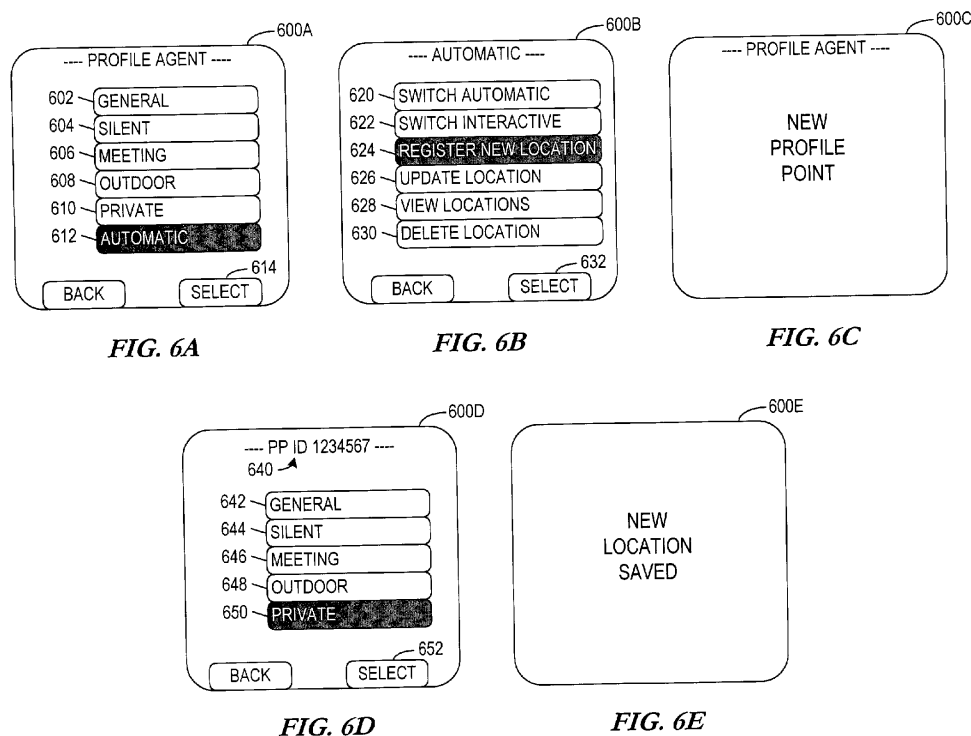


FIG. 4

(Ex-1054, FIG. 4; *see also id.*, FIG. 2, 1:38-2:6, 2:10-44, 3:4-67, 4:1-46, 5:22-6:22.)

U.S. Patent Application Publication No. 2004/0203768 to *Ylitalo* (Ex-1018) described similar features where profiles were associated with designated locations from which a user could assign using user-friendly interface mechanisms.



(Ex-1018, FIG. 6; *see also id.*, FIGS. 1, 5, 7, 8, Abstract, ¶¶0002-0006, 0071-0081.)

B. Using Radio Frequency Fingerprints/Signatures to Detect/Determine Location

49. As I mentioned above, the use of radio frequency (RF) fingerprints and associated comparisons was known for detecting mobile device location. The basic concept behind RF fingerprinting for location determination was known. For example, U.S. Patent Application Publication No. 2006/0240841 to *Bhattacharya* (Ex-1065) confirmed a person of ordinary skill in the art's understanding that at a given location:

[T]he values of the traits that vary with the location of wireless terminal...[may] represent a 'fingerprint' or 'signature' for that

location.... For example, suppose that under normal conditions the traits have a first set of values when wireless terminal...is at a first location, and a second set of values when wireless terminal...is at a second location. Then when wireless terminal...is at an unknown location and the traits at that unknown location match the second set of values, it is more likely that wireless terminal...is at the second location.

(Ex-1065, ¶0074.) Similar to the unique characteristics of a human fingerprint, it was understood that “[e]very radio device and associated surrounding environment produces a unique signal fingerprint” at a given location. (U.S. Patent Application Publication No. 2006/0095349 to *Morgan-II*, Ex-1066, ¶0050.)

50. It was also known that various signal information could be monitored to generate a unique RF fingerprint for a given location. U.S. Patent No. 6,915,123 to *Daudelin* (Ex-1067) explained that,

A fingerprint refers to a snapshot of the signal characteristics of a receive signal 107. The signal characteristics may include one or more of the following: propagational delay, antenna identifier, and signal quality indicator (*e.g.*, signal-to-noise ratio or a short-term average of signal strength).

(Ex-1067, 5:16-27; *see also id.*, Abstract, FIG. 2, 5:40-51, 8:66-9:43; U.S. Patent Application Publication No. 2007/0010956 to *Nerguizian*, Ex-1068, ¶0008 (“To

constitute a ‘signature’ pattern or a fingerprint, several types of information can be used such as, received signal strength (RSS), received angular power profile (APP) and received power delay profile (PDP) or channel impulse response (CIR).”), ¶¶0007-17.)

51. The use of signal strength measurements for fingerprint-based location services was understood and known years before the alleged time of invention. U.S. Patent Application Publication No. 2005/0195761 to *Alicherry* (Ex-1069) explained, “[f]or example, RADAR (see, P. Bahl et al., ‘RADAR: An In-Building RF-Based User Location and Tracking System’, IEEE Info Com, March 2000...[was] a [then] well-known technique for tracking indoor environments where a single fingerprint of an entire region is constructed and the location of a particular node is determined based on the signal strength observed at its location.” (Ex-1069, ¶0006.) Signal strength information (*e.g.*, the measured power level of a received signal from wireless signal sources, such as base stations, etc.) was commonly used with location fingerprints at the relevant time. (*E.g.*, Exs. 1006, 1008-1011; Ex-1026, Abstract, FIGS. 1-3, 5, 2:13-3:12, 3:30-4:49; Ex-1028; Ex-1070, Abstract, FIGs. 4-5, ¶¶0010-13, 0036-0038; Ex-1071, FIGS. 2-6.)

52. It was also known at the time various ways for using fingerprint information to determine whether a mobile device was at or near a particular

location. For example, a person of ordinary skill in the art was aware and was able to develop systems/processes that compared RF fingerprint information for a currently monitored device location to previously saved fingerprint information that was collected/generated for given locations. (*E.g.*, Ex-1071, ¶0004 (“Typically, the position of a mobile station is determined by comparing a RF data sample collected by the mobile station to fingerprint data in the database.”).) If currently monitored information matches or was close to a reference fingerprint, proximity to a location was determined. (*E.g.*, Ex-1028, 6:34-37 (“The MU RF fingerprint is compared or matched to the reference RF fingerprints 3000 produced in the survey process.”); Ex-1068, ¶0007 (“The first phase consists of recording a set of fingerprints as a function of the user's location, covering the entire zone of interest. During the second phase, a fingerprint is measured by a receiver and compared with the recorded fingerprints of the database. A pattern matching algorithm (positioning algorithm) is then used to identify the closest recorded fingerprint to the measured one and hence to infer the corresponding user's location.”).) A person of ordinary skill in the art would have been aware of and capable of developing, programming, and/or implementing various algorithms for performing fingerprint comparisons/analysis. (*See e.g.*, Ex-1068, ¶0013 (“Several geolocation systems, using fingerprinting techniques, have been deployed in both indoor and outdoor environments. The main

differences between these systems are the types of fingerprint information and the types of pattern matching algorithms.”)

53. It was also known and appreciated by a person of ordinary skill in the art that reference fingerprints used for location determination were often stored in some form of a database, including in memories in a mobile device or in a server or other remote system/device. (Ex-1028, 16:43-45 (“Reference RF fingerprints must be stored in some form of database. They are most likely stored in the infrastructure, but could be stored on the MUs themselves.”).)

54. In sum, a person of ordinary skill in the art would have been aware of, experienced with, and capable of configuring, modifying, programming, etc. systems and processes that provided the conventional features I mentioned above, including those associated with the then-conventional approach of using RF fingerprint snapshots and corresponding comparisons to determine whether a mobile device was currently at, near, or left a previously selected location. (*E.g.*, Exs. 1006, 1008-11, 1026, 1028, 1070, 1071.) Such fingerprint-based location processes (among others) were often considered in applications where GPS location determinations may not have been possible or practical and because such location determining processes would leveraged existing mechanism, components, network infrastructures, and software programming skills to implement. (*E.g.*, Ex-1011,

3:34-46, 15:19-29.) At the same time, a person of ordinary skill in the art would have been aware and capable of developing, configuring, and/or implementing location determining systems that leveraged GPS technologies to collect geographical information for purposes of maintaining/building a fingerprint database. (*See e.g.*, Ex-1032, Ex-1032, Abstract, 1:15-31, 3:23-4:26, 4:59-67, 5:59-6:39.)

VI. OVERVIEW OF THE '698 PATENT

55. I understand from my review that the '698 patent issued on November 26, 2013, from U.S. Patent Application No. 13/448,309 filed April 12, 2012. (Ex-1001, cover.)

56. The Abstract of the '698 patent describes:

At least one portable RF communications device in conjunction with at least two fixed-location service-area antenna stations respectively capable of RF communication with the at least one device performs the steps of: (I) using a portable device at a selected location to measure RF communications signals from the plurality of local fixed-location service-area antenna stations and electronically storing at least two of the respective reception signal strength measurements; and (II) monitoring a portable device location by causing the device to measure reception signal strength associated with local fixed-location service-area antenna stations signals, and to electronically compare these measurements with the stored at least two measurements.

(Ex-1001, Abstract; *see also id.*, 6:18-32, 18:3-55, 24:13-42.)

57. The '698 patent indicates that

When it is described according embodiments of the instant invention that a cell phone measures a signal-strength from a surrounding cell, it means that the cell phone measures the

strength of the signal sent by that cell's base station antenna.

These measurements are from the perspective of the location of the reception device (the cellular telephone, ubiquitous computer, etc.) and substantially form an instance of an antenna space reception fingerprint[.]....

(*Id.*, 17:41-49.) “Once the cell phone records the signal strengths measured by the cell phone from surrounding cells at a desired location, the combination of the *recorded signal strengths from surrounding cells are used as the coordinates of the desired location.*” (*Id.*, 18:48-52.) The signal strengths are respectively stored in unique radio frequency snapshots referred to as “fingerprints.” (*Id.*, 16:40-48.) “The user will stand in the location where he would like something to take place every time he reaches that place (a desired location)” and “[u]sing his cell phone he will choose the action that he wants to take place.” (*Id.*, 18:17-20.)

58. “After the cell phone records the desired location coordinates (the combination of signal strengths from surrounding cells), the cell phone will check its location as reflected by the signal strengths from surrounding cells....” (*Id.*, 18:56-59.)

If the current location's surrounding cell IDs are different from the desired location's surrounding cell IDs then the cell phone does not need to continue the comparison, the current location is

clearly not the desired location. *When the signal strengths* from the cells surrounding the current location *are identical* to the signal strengths measured by the cell phone from the exact same cells (same cell IDs) at the desired location *then the cell phone is determined to have returned to the desired location (i.e. current location=desired location)* and the location based application which is pending the return of the cell phone to the desired location will be activated.

(*Id.*, 19:4-15.)

VII. CLAIM CONSTRUCTION

59. I understand that claim terms are typically given their ordinary and customary meanings, as would have been understood by a person of ordinary skill in the art at the time of the alleged invention. For purposes of this declaration, I have been asked to apply the plain and ordinary meaning of the terms in the challenged claims (although I may address other interpretations that I have been asked to consider below in my analysis of those claims in Section IX). My opinions concerning the interpretation of the challenged claim terms is based on the time of the alleged invention I have been asked to consider (*e.g.*, September 19, 2006). I understand that in considering the plain meaning of the claims, one must consider the language of the claims, the specification, and the prosecution history of record. I have done so to support my opinions in this declaration where appropriate.

60. For instance, while the plain meanings of the challenged claim terms are applicable for purposes here, I explain below how the claimed “at least one number based on” (limitation 1(b)) is met under its plain meaning and in context of representations concerning that term during prosecution. (Ex-1004, 166 (representing “the ‘number based on...’ is intended to refer to the output of any ‘formula,’ including but not limited to a difference formula,...or ‘determinations that

are based on derivatives, integrals, statistical metrics, mathematical normalizations, correction functions, [or] heuristic convolution functions.”).)

VIII. OVERVIEW OF THE PRIOR ART

A. *Spain-I* (Ex-1011)

61. I understand that *Spain-I* is an issued United States patent. (Ex-1011, Cover.) My understanding is that *Spain-I* was filed November 18, 2002, and issued September 13, 2005. (*Id.*) For purposes of my analysis, I have been asked to assume *Spain-I* (and its incorporated disclosures) is prior art.

62. I also understand that *Spain-I* is a continuation-in-part (CIP) of *Perez-Breva-II* (Ex-1009), *Perez-Breva-I* (Ex-1010), and *Rao-I* (Ex-1005). (Ex-1011, Cover.) *Spain-I* incorporates by reference each of those patents (*id.*, 1:5-14) and the disclosures in Exhibits 1012-1015 (*id.*, 15:1-16). Thus, I understand and have been asked to assume that the disclosures of Exhibits 1005, 1009-1010, and 1012-1015 are considered part of the disclosure of *Spain-I*. While I reference *Spain-I* to support my opinions regarding the challenged claims, I also refer to disclosures in the incorporated prior art references of *Perez-Breva-II* (Ex-1009), *Perez-Breva-I* (Ex-1010), and *Rao-I* (Ex-1005).²

² My opinions regarding how the prior art disclose or suggests the limitations of the challenged claims in §IX below would not change if the disclosures in Exhibits 1005, 1009-1010, and 1012-1015 were not considered part of *Spain-I*.

63. *Spain-I* discloses a “method for determining the location of MU 10 which (a) works in areas where GPS coverage is not typically available, and (b) does not require any infrastructural modifications.” (Ex-1011, 3:35-41.) A mobile unit (“MU”) (red below) is operable to perform location-determining processes based on comparisons operations, where the MU works in conjunction and communicates with a plurality of antenna stations that are capable of RF communication with the MU. (Ex-1011, FIGS. 1-2 (annotated below), 9-10, 1:18-49, 3:5-34, 3:41-4:63, 5:20-6:34, 7:58-8:44, 9:25-13:15, 13:16-14:37, 15:19-35; *see also* Ex-1005, FIGS. 1-2, FIGS. 4-5, Abstract, 1:26-34, 1:40-57, 2:8-11, 2:33-36, 2:30-3:9, 3:29-61, 4:59-63, 5:40-56; Ex-1010, Abstract, FIGS. 1-2, 5-10, 1:10-60, 2:23-5:41, 7:1-54, 8:42-11:29; Ex-1009, Abstract, FIGS. 1-2, 9-10, 1:14-64, 2:25-6:50, 7:4-8:14, 8:46-11:17; *see my below analysis in §§IX.A.1(a)-(b).*)

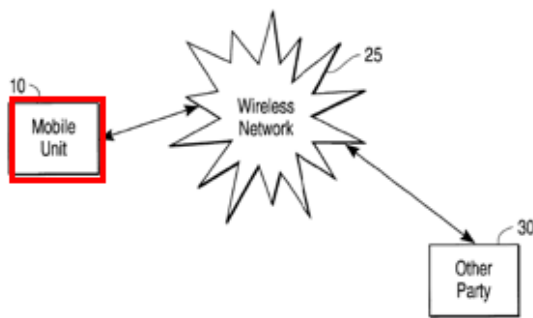


FIG. 1

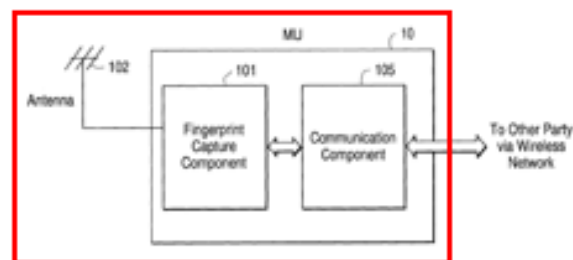


FIG. 2

64. *Spain-I* explains that the MU communicates with base stations during operation. (*E.g.*, Ex-1011, 4:7-22, 1:25-28, 10:35-41, 11:57-65.) And at selected

location(s), the MU collects identifier information (*e.g.*, station ID) and measures signal strengths associated with communication signals received from stations in range of the MU capable of RF communications with the mobile device at those location(s). (Ex-1011, 3:42-4:63, 5:20-6:8, 7:58-8:8, 10:43-46, 11:41-46, 13:16-14:37; Ex-1005, 4:16-37, 5:40-56, 6:34-51; Ex-1010, 3:4-4:9, 4:32-44, 4:63-5:24, 7:1-18, 10:4-32; Ex-1009, 2:61-5:21, 7:40-57, 9:15-10:37.)

65. The MU creates/stores fingerprints including station identifier information and measured signal strengths corresponding to the received communication signals from the stations when the MU is certain locations. (Ex-1011, FIG. 9, 3:41-4:6, 4:5:20-6:30, 7:58-8:8, 10:48-11:26, 11:41-46, 13:16-55; Ex-1005, FIG. 4, 3:29-61, 4:23-27, 4:59-5:9, 5:40-6:12, FIG. 4, Ex-1009, FIG. 9, 5:1-21, 7:4-21, 9:15-54; Ex-1010, FIG. 9, 5:5-57, 7:1-36, 9:10-49.) Collections of fingerprints are stored in a database used for the disclosed location-determination processes. (Ex-1011, FIG. 10, 10:48-11:27, 13:56-14:37, Ex-1005, FIG. 5, 6:13-61; Ex-1009, 9:55-10:47; Ex-1010, FIG. 10, 9:50-10:32.)

66. “When a location estimate of the MU is desired (either by itself or by the Other Party), it [MU] activates component 101 (FIG. 2), which captures predetermined information from a predetermined portion of the RF spectrum.” (Ex-1011, 4:42-46; Ex-1005, 3:29-39; Ex-1009, 3:60-63; Ex-1010, 3:56-60.) The MU

creates a fingerprint associated with a current monitored location by measuring *e.g.*, signal strengths received from identified service stations. (Ex-1011, 5:20-6:8, 7:64-8:44, 9:25-10:27, Ex-1005, 3:29-4:24; Ex-1009, 3:63-4:44, 5:7-21; Ex-1010, 3:60-4:44, 5:5-19.) The fingerprint may be generated “using *many different parameters*, either *individually or in combination*.” (Ex-1011, 4:55-56; Ex-1005, 3:40-42; Ex-1009, 4:4-5; Ex-1010, 4:1-2.) This includes *signal strengths* of received signals and “the identity of the signal source (*e.g.*, channel number of *station code*)” (Ex-1011, FIG. 4, 4:56-63; Ex-1005, 3:42-49; Ex-1009, 4:6-11, Ex-1010, 4:3-8.) Indeed, the MU is “equipped with appropriate circuitry to determine the strength of the received signal” and the “location of the transmitter is broadcast in the signal and is extracted in the MU” (Ex-1011, 5:28-32, 3:55-58, 5:20-28 (MU captures signals and their parameters); Ex-1005, 3:57-61, 4:16-18; Ex-1009, 3:7-24, 4:34-44; Ex-1010, 3:4-21, 4:32-44.)

67. The MU performs processes to determine whether the MU is currently “at a particular location or not” (Ex-1011, 4:23-25³; Ex-1005, 3:10 18.) For

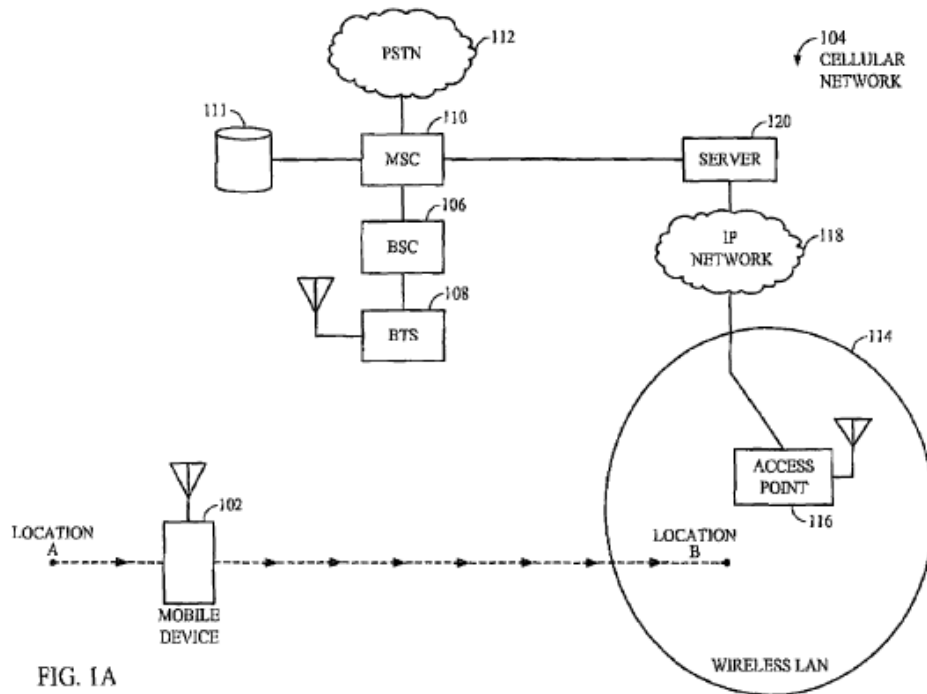
³ *Spain-I* explains elsewhere that the MU can initiate the location estimate processes (Ex-1011, 4:43–47 (“location estimate of the [MU] is desired (either by the [MU] itself or by the location server)”).)

instance, the MU compares fingerprint information for a current monitored location with previously generated/stored fingerprint information relating to other locations to determine a “closest” match. If the relevant compared information matches (or is close), the MU determines the MU is at or in proximity of the location associated with the matching fingerprint in the database. (Ex-1011, 5:61-6:8.) *Spain-I* discloses various processes for determining closeness between compared fingerprint information and for making such analysis more efficient. (Ex-1011, FIGS. 9-10, 5:61-6:8, 7:58-67, 8:1-26 (closest matching fingerprint), 8:27-10:27, 10:29-13:15 (reducing set of fingerprint information for comparison), 14:10-37 (measuring signal characteristics at predetermined locations and interpolating fingerprints between “sampled locations”), 17:15-19; Ex-1005, 3:29-4:37, 4:65-5:9, 5:10-40, FIGS. 4-5, 5:40-6:47, 6:48-61; Ex-1009, 3:40-4:46, 5:1-21, 7:4-9:14, *see also id.*, 5:44-7:3; Ex-1010, 3:37-4:44, 4:64-5:19, 7:1-9:10.)

B. Nanda (Ex-1006)

68. I understand that *Nanda* is an issued United States patent. (Ex-1006, Cover.) My understanding is that *Nanda* was filed February 15, 2006, and issued July 2, 2013. (*Id.*) For purposes of my analysis, I have been asked to assume *Nanda* is prior art.

69. *Nanda* describes systems/processes similar to *Spain-I*, which determine whether a mobile device is “in the vicinity of” a location by comparing fingerprint information. (*Id.*, 2:16-59, 5:50-7:28.) In particular, *Nanda* describes a mobile device 102 that moves through a wireless network (WAN 104) including plurality of BTSs 108 (base stations), and one or more wireless LANs 114, each including an access point 116. (*Id.*, FIG. 1A (below), 3:48-4:14, 5:9-14.)



70. As exemplified in connection with FIG. 1A, mobile device 102 searches for beacon signals transmitted from access point 116 as it moves through WAN 104 from location A to B. (*Id.*, 4:24-64.)

71. In the event device 102 cannot detect a beacon or receives a probe request (*e.g.*, when at location A above), the device “attempts to access the WAN 104” when it is determined it is close to WLAN 114 by acquiring a pilot signal from BTS 108. (*Id.*, 4:38-48.) At that point, a radio connection may be established between device 102 and BTS 108 “by means well known in the art,” which the device may use with the BTS 108 to register with a mobile switching center (MSC) 110. (*Id.*, 4:48-52.) FIG. 1B below shows a larger WAN having multiple BTSs 108, 122, 124, 126 in coverage area cells, and multiple LANs 129, 131, 114 with respective access points 128, 130, 116. (*Id.*, 5:15-18), including a coverage area for access point 116 and LAN 114 (140). (*Id.*, 5:41-49.)

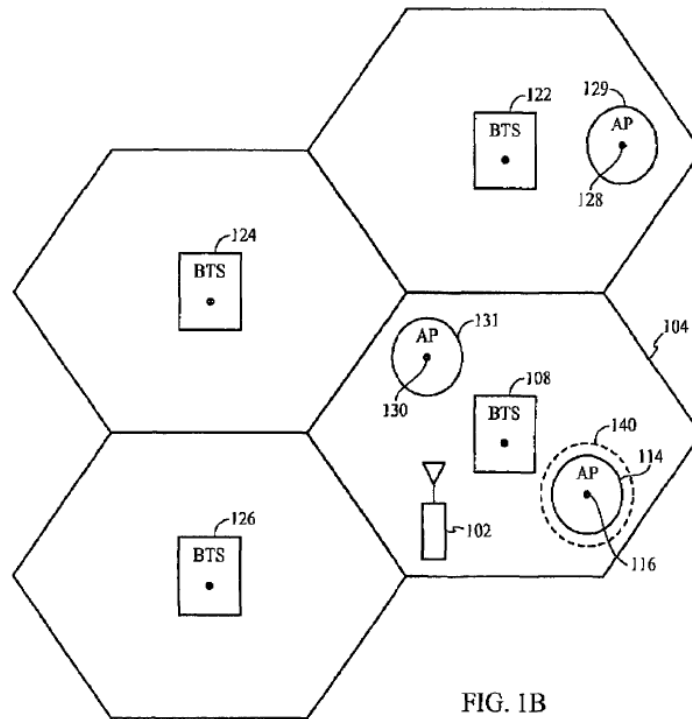


FIG. 1B

72. *Nanda* discloses features that limit searching for signals from access points only when mobile device 102 is determined to be within a LAN/access point coverage area. (Ex-1006, 5:41-49.) Device 102 monitors beacon and pilot signals from the base stations of WAN to measure primary and neighbor signal strengths. (*Id.*, 5:50-57.) Device 102 can observe up to n base stations with measurable signal strengths (characterized as vectors $X_1 \dots, X_n$) originating from a particular identified base station. (*Id.*, 5:57-67, 5:67-6:3 (“neighbors base stations may be identified by frequency channel or other **base station identifier and a signal strength associated with each base station**”).) The vectors can include information that “identifies a

source and at least one characteristic of the reference signal, *e.g.*, pilot or paging signal.” (*Id.*, 6:3-11; *id.*, 6:12-34 (signal strength and base station identifier).)

73. Such information may be used to provide a fingerprint of a location of mobile device 102. (*Id.*, 6:52-58 (“[i]f locations within the area 140 have a certain known fingerprint, then the ***mobile device can determine its current fingerprint and compare it to the known fingerprint to determine whether the mobile device is located within the area 140.***”).) Other attributes, and combinations thereof, may be used as a fingerprint (*id.*, 6:58-66) given “a fingerprint is a collection of attributes of a first communication network that changes based on location and can be used by the mobile device to determine the proximity of a second communication network” and can include characteristics of the transmitters of the second networks (*e.g.*, MAC ID, band, channel, access point RSSI information (*e.g.*, signal strength)) (*id.*, 7:6-14). Such attributes may be calculated in different ways, such as instant signal strength measurements or multiple measurements may be averaged together or otherwise combined in some statically significant manner in order to generate the fingerprint. (*Id.*, 7:19-28.)

74. *Nanda* explains with reference to Figure 3A (below),

Once the mobile device has connected with the access point, the user may, in step 304, signal to the device to capture the current

fingerprint. This step may typically be user-initiated because the user may want only certain wireless LANs to be stored in the fingerprint database such as those wireless LANs that the user normally subscribes to or connects.

(Ex-1006, 9:61-10:7.)

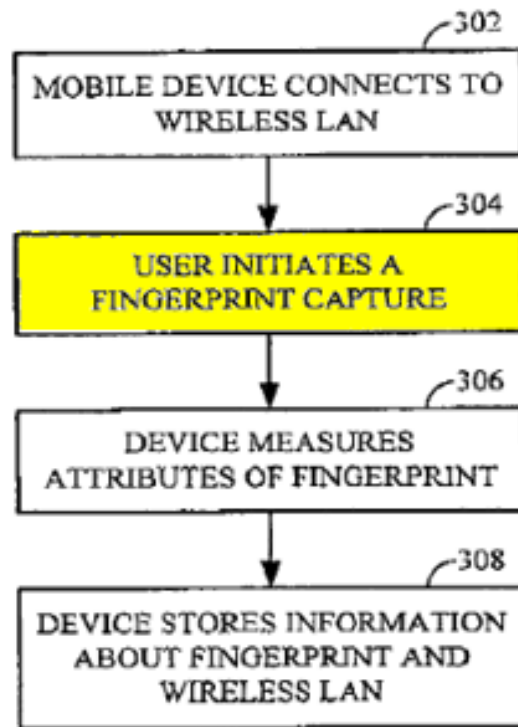


FIG. 3A

C. *Damarla* (Ex-1028)

75. I understand that *Damarla* is an issued United States patent. (Ex-1028, Cover.) My understanding is that *Damarla* was filed July 29, 2004, and issued

March 18, 2008. (*Id.*) For purposes of my analysis, I have been asked to assume *Damarla* is prior art.

76. *Damarla* discloses various techniques that were applicable to location determination systems for mobile units. (*Id.*, Abstract (“The invention provides a novel method for preparing a wireless environment for location determination of a wireless mobile unit, and for location determination of a wireless mobile unit.”).) *Damarla* also discloses RF fingerprinting techniques, similar to *Spain-I*’s and *Nanda*’s RF fingerprinting systems. (*Id.*, FIG. 4.) For instance, *Damarla* discloses.

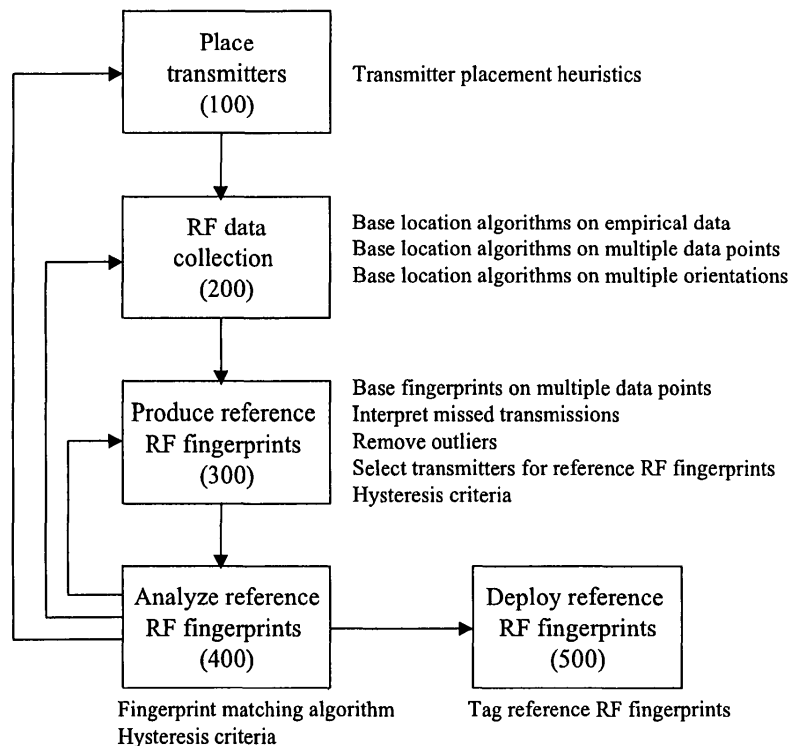


Figure 4

(*Id.*, FIG. 4.)

77. *Damarla* discloses updating signal strengths of reference RF fingerprints to address known problems with changing RF environments. For example, *Damarla* discloses that “if a permanent environment change affecting RF propagation were made (*e.g.*, taking down a wall or moving a large metal shelf),” for example, an “RF data collection step should be repeated.” (*Id.*, 5:63-6:1.) When an RF data collection step is repeated to addresses changes in an environment and improve the accuracy of a location system, *Damarla* discloses that “[a] MU [mobile unit] is taken to various planned locations in the environment.” (*Id.*, 5:10-16.) “At each location” for this process, “RF samples are taken and recorded. Each sample records information about the RF environment (*e.g.*, signal strength of transmissions from various sources) and is associated with a timestamp and location.” (*Id.*, 5:10-16.) Figure 4 (above) illustrates the collection of updated RF data and production of updated reference RF fingerprints in steps 200 and 300. (*Id.*, FIG. 4.)

78. After a single mobile unit collects the fingerprint information, *Damarla* discloses that updated “reference RF fingerprints are deployed 500” to mobile units that are able to determine their location based on the fingerprint information. (Ex-1028, 5:57-62 (“[T]he reference RF fingerprints are deployed 500 to the computing infrastructure used to support location determination in the environment. This infrastructure could be a server that delivers reference RF fingerprint information to

MUs, or it could be the MUs themselves.”), 16:57-58 (“Fingerprint matching could be performed by a MU or infrastructure”), 5:10-6:1.) The updated RF fingerprints include signal strength information from various transmission sources that a mobile unit monitored. (*Id.*, 5:10-62, 14:22-23 (“transmitter signal strengths are the information in each RF fingerprint”).) The mobile units can then determine their location by “compar[ing]” current fingerprint and corresponding signal strength information to the reference fingerprints. (*Id.*, 6:13-49, 16:23-63.)

D. *Budampati* (Ex-1109)

79. I understand that *Houri* is an issued United States patent application publication. (Ex-1109, Cover.) My understanding is that *Budampati* was filed October 18, 2005, and was published April 19, 2007. (*Id.*) For purposes of my analysis, I have been asked to assume *Budampati* is prior art.

80. *Budampati* discloses “[a] secure wireless network system” that “includes one or more wireless receivers that receive communications from wireless devices,” wherein “[t]he wireless receivers, or access points, include sensors that detect the location of a wireless device sending communications to the wireless receiver.” (*Id.*, Abstract.) *Budampati* discloses a location determining system/process where wireless network access is controlled based on “the location of the wireless device.” (*Id.*, ¶¶0003, 0016-0020.) Time of arrival information is

used to assist in location determinations. (*Id.*, ¶¶0054-0055.) Among other features, *Budampati* describes fingerprint matching/comparisons process using time of arrival signal characteristics. For instance, *Budampati* recognized the possibility to conduct measurement campaigns to determine received signal strengths (RSS), time of arrival (TOA), and angle of arrival (AOA) observed from different base stations for different locations, which “led to the development of a class of location fingerprinting techniques” where for a “[g]iven fingerprint, e.g., a set of **measured** RSS, **TOA**, **and/or** AOA, the algorithm searches a database of location fingerprints for the closest match” where “[t]he algorithm then returns the location of that closest match as the location of the transmitter.” (*Id.*, ¶0061.) The location fingerprint database is populated by recorded fingerprints generated by “analyzing the received signal patterns corresponding to each [service-area] cell.” (*Id.*)

E. *Blomqvist* (Ex-1033)

81. I understand that *Blomqvist* is an issued United States patent. (Ex-1033, Cover.) My understanding is that *Blomqvist* was filed January 21, 2004, and issued December 4, 2007. (*Id.*) For purposes of my analysis, I have been asked to assume *Blomqvist* is prior art.

82. *Blomqvist* discloses methods for efficiently detecting the location of a mobile device. (*Id.*, Abstract, 1:43-2:16, 2:63-3:12.) *Blomqvist* also discloses a

device 1 (mobile phone) similar to the mobile devices disclosed by *Spain-I* and *Nanda*. (*Id.*, FIG. 2, 5:10-60.) The device can automatically trigger a function when a specified location is detected. (*Id.*, FIG. 2, 5:10-60.)

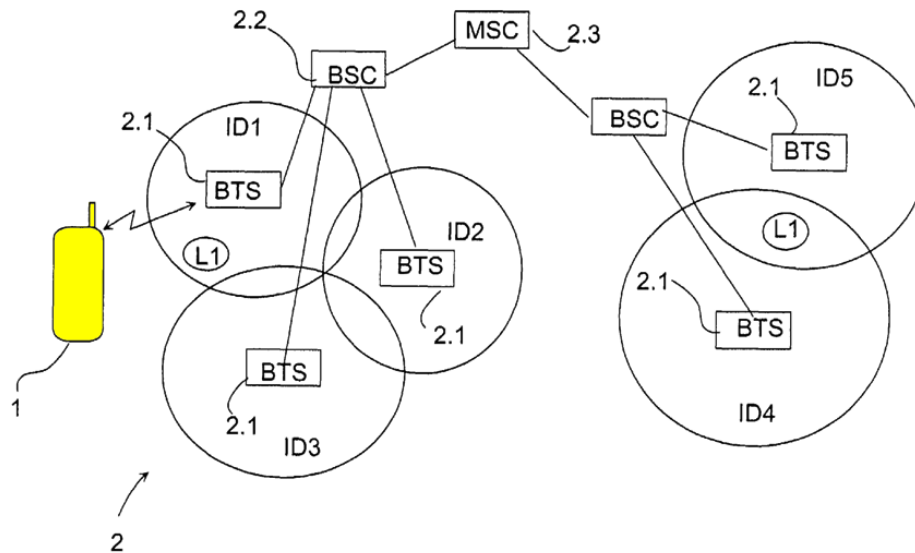


Fig. 2

(*Id.*, FIG. 2 (annotated).)

83. *Blomqvist* describes processes that aim to reduce the need to perform positioning processes, which reduces loading of the processor of the mobile device and possible loading of the network the device operates in. (*Id.*, 2:63-3:12.) For instance, *Blomqvist* discloses monitoring processes in which location positioning only starts taking place when the mobile device detects that it switched to a new cell base station. (*Id.*, 4:35-45 (“[A]t least one property of the wireless communication

network and changes in the same are monitored. In the following, cell identifiers and changes in them are used”). *Blomqvist* explains that,

FIG. 1b shows another example situation in which the method according to a preferred embodiment of the invention is applied. Also in this situation, position data is determined in the location-based function. Advantageously at least this position data is transmitted to the communication network 2, in which it is determined (for example in a network centre 2.3) in the area of which cell or cells this location is situated. ***Information on the identifiers of such a cell or cells is transmitted to the device 1, in which the information is stored into the memory 1.1 for example into the information of said location-based function. In the device 1, the changing of the cell identifier is monitored as disclosed hereinabove in connection with the description of the method according to the first embodiment of the invention. At that stage when the serving base station changes, i.e. the cell identifier changes, the device 1 examines the information on the location-based functions on the basis of the new cell identifier. If one or several cell identifiers that have been determined for a location-based function match with the cell identifier of the new serving base station, i.e. the device 1 is probably in the vicinity of such a location in which the execution of a location-based function is determined, positioning is conducted.*** At that stage when the positioning

shows that the device 1 is in the area determined for said location-based function, said location-based function is conducted.

(*Id.*, 6:46-64; *see id.*, FIG. 1b (below), 7:19-26 (“the cell identifier is also compared with the stored cell identifiers”).)

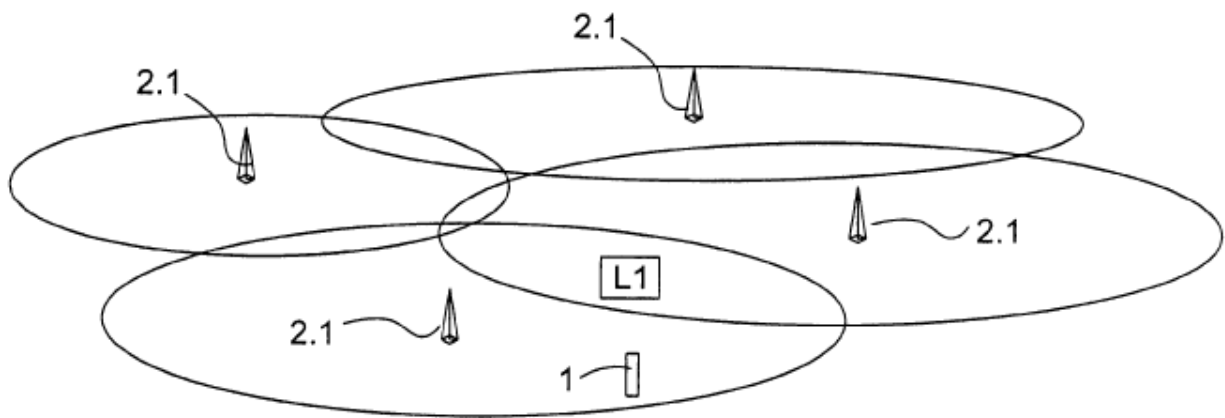


Fig. 1b

84. *Blomqvist* thus discloses that location determination does not need to occur at all times and instead can occur less frequently at appropriate locations based on cell ID information. (*Id.*, 2:20-3:19.)

85. *Blomqvist* also discloses an application for a device 1 (mobile phone) that utilizes a reminder service. (*Id.*, FIG. 1, 5:10-37.) After the location of the

device has been determined and “[w]hen the application has received information on the arrival in the determined location, the application implements the determined function, for example presents a message in text format.” (*Id.*, FIG. 1, 5:10-37.) *Blomqvist* also discloses that “[o]ther functions to be mentioned in this context that can be activated on the basis of the location are starting of a program.” (*Id.*, 5:46-60.) Thus, the mobile device 1 is configured to start a program or perform another function when a mobile device is a specified location. (*Id.*, FIG. 1, 5:10-60.)

F. *Hunzinger* (Ex-1054)

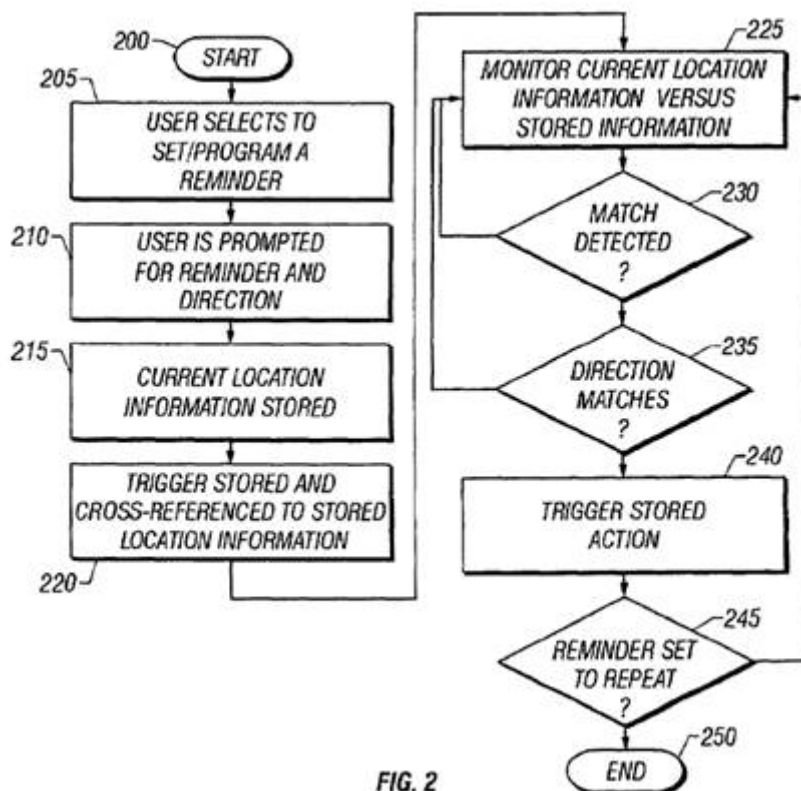
86. I understand that *Hunzinger* is an issued United States patent. (Ex-1054, Cover.) My understanding is that *Hunzinger* was filed November 15, 2001, and issued October 18, 2005. (*Id.*) For purposes of my analysis, I have been asked to assume *Hunzinger* is prior art.

87. *Hunzinger* discloses a location determining system/process where a user of a mobile device may set actions/alerts/reminders, etc. that are performed based on a determined location of the device.

A system allows users of wireless mobile terminals to set reminders, alerts, or other actions to be triggered based on location or dynamics. Such location information may include, but is not limited to, a specific location description such as latitude, longitude and a radius describing a generally circular

region in which the terminal is located. The system monitors the location information until the programmed conditions are satisfied. Once the location condition is satisfied the system of the present invention triggers the programmed reminder.

(Ex-1054, Abstract; *see also id.*, FIGS. 1A-4, 1:38-2:6, 2:10-44, 3:4-67.) Figure 2 (which I show below) exemplifies a process for location reminder programming, monitoring and triggering procedures, executed on the mobile device that can have “position location technology.” (*Id.*, FIG. 2, 3:49-55.)

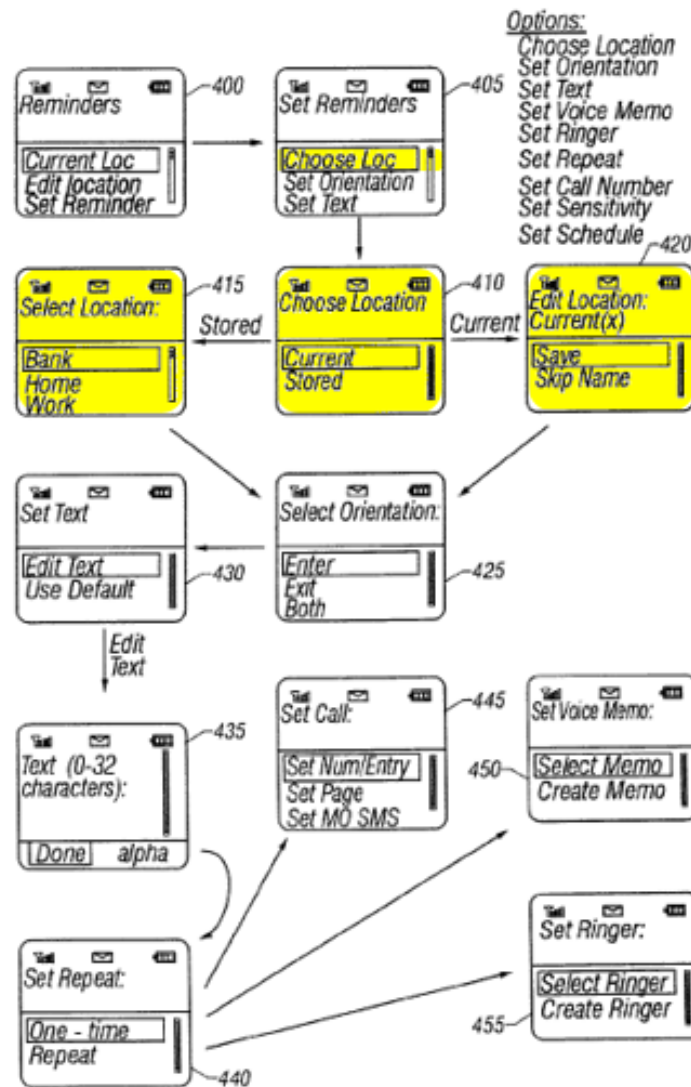


88. Location related information (“‘remembered’ locations”) and trigger or action information is stored in the mobile device, which also has position-monitoring functions that “compares one or more ‘remembered’ locations with current location information.” (*Id.*, 2:56-60.) The user may use a stored or current location, and the device can use location information such as “station ID...other signal conditions...or other location identifying information” where it is “only necessary that information allow the terminal to *recognize whether or not it has left or returned to the same location.*” (*Id.*, 4:1-12.) Location information can include a “set area [that] may be defined several ways: a point with a radius, network parameters, a geographic geopmetric shape, etc.” but “it is not necessary that the mobile [device] knows the exact location...as long as it can store and recognize it.” (*Id.*, 4:12-18.) “The *location area characteristics may be settable by the user* or be adapted according to the precision, accuracy or availability of location information.” (*Id.*, 4:18-20.)

89. The mobile device “stores the location trigger and action information and a reference to the current location 220” so that it can monitor “the current location until it is outside of the ‘set’ location area.” (*Id.*, 4:21-24.) For instance the mobile may detect it has transitioned out of the area described by the stored location information or that the current location matches the stored location information 230. (*Id.*, 4:24-31.) Thus, where the mobile device “exit[s] the location, it may not

trigger the stored action but rather return[s] to continue monitoring...until the current location again matches or is similar to the stored location.” (*Id.*, 4:21-38, 4:44-46 (triggering stored action when detecting device has “reentered the vicinity of the stored-location, i.e., entering the location described by the stored location information”).) (*See also id.*, 4:51-5:22.)

90. Figure 4 (which is annotated below) depicts exemplary user interface features associated with a user controlled options for programming location actions to be executed when a programmed reminder is triggered based on a corresponding location. (*Id.*, 5:22-40.)



91. As highlighted above, the “user may select the current location and provide a text name to be associated with it 420.” (*Id.*, FIG. 4, 5:51-52.) The “user may also selected to be reminded only upon leaving an area or entering an area independently or exclusively.” (*Id.*, 5:53-61.) The reminder action can take many forms, including displaying a text message, voice memo play-back, call to a number,

playing a ringer, download information/content, etc. (*Id.*, 5:62-6:7.) *Hunzinger* also discloses that location precision and accuracy can be improved “through multiple measurements or through refinement of the measurements” including “averaging multiple measurements or fixes [as] is *well known in the art.*” (*Id.*, 6:8-22.)

IX. THE PRIOR ART DISCLOSES OR SUGGESTS ALL RECITED FEATURES OF CLAIMS 1-7, 9-13, 15, 16, AND 21 OF THE '698 PATENT

92. Below I provide a summary of the prior art combinations that I address in more detail below.

- *Spain-I* in view of *Hunzinger* and *Nanda* discloses and/or suggests the features of claims 1-7, 9-10, 12-13, and 21;
- *Spain-I* in view of *Hunzinger*, *Nanda*, and *Damarla* discloses and/or suggests the features of claims 4 and 6-7;
- *Spain-I* in view of *Hunzinger*, *Nanda*, and *Budampati* discloses and/or suggests the features of claim 11; and
- *Spain-I* in view of *Hunzinger*, *Nanda*, and *Blomqvist* discloses and/or suggests the features of claims 15-16.

A. *Spain-I* in View of *Hunzinger* and *Nanda* Discloses and/or Suggests the Features of Claims 1-7, 9-10, 12-13, and 21

93. It is my opinion that *Spain-I* in view of *Hunzinger* and *Nanda* discloses and/or suggests all of the features recited in claims 1-7, 9-10, 12-13, and 21 of the '698 patent.

1. Claim 1

[pre] **A location-determining method, operable by a first portable RF communications device, the method comprising:**

94. I have been asked to assume that the preamble of claim 1 is limiting. Under that assumption, it is my opinion that *Spain-I* (including its incorporated disclosures)⁴ discloses these limitations (including as modified as discussed below). (See my below analysis in §§IX.A.1(a)-(b) and above in §VIII.A.)

95. *Spain-I* discloses a “method for determining the location of MU 10 which (a) works in areas where GPS coverage is not typically available, and (b) does not require any infrastructural modifications.” (Ex-1011, 3:35-41.) A mobile unit (“MU”) (e.g., “a first portable RF communications device”) that is operable to perform location-determining processes based on signal comparisons (e.g., “signal-comparison based location-determining method”) where the MU works in conjunction and communicates with a plurality of fixed-location service-area antenna stations substantially continuously operating and capable of RF communication with the MU. (Ex-1011, FIGS. 1-2 (annotated below), 9-10, 1:18-49, 3:5-34, 3:35-41 (“new method for determining the location of MU 10 which (a) works in areas where GPS coverage is not typically available, and (b) does not require any infrastructural modifications”), 3:41-4:63, 5:20-6:34, 7:58-8:44, 9:25-

⁴ See my above analysis in §VIII.A (discussing how the disclosures of Exhibits 1005, 1009–1010, 1012–1015 are part of the disclosure of *Spain*).

13:15, 13:16-14:37, 15:19-35; *see also* Ex-1005 (*Rao*), FIGS. 1-2, FIGS. 4-5, Abstract, 1:26-34, 1:40-57, 2:8-11, 2:33-36, 2:30-3:9, 3:29-61, 4:59-63, 5:40-56; Ex-1010 (*Perez-Breva-I*), Abstract, FIGS. 1-2, 5-10, 1:10-60, 2:23-5:41, 7:1-54, 8:42-11:29; Ex-1009 (*Perez-Breva-II*), Abstract, FIGS. 1-2, 9-10, 1:14-64, 2:25-6:50, 7:4-8:14, 8:46-11:17; *see my below analysis in §IX.A.1(a)-(b).*)

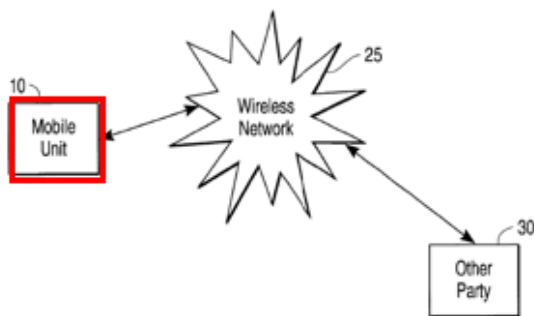


FIG. 1

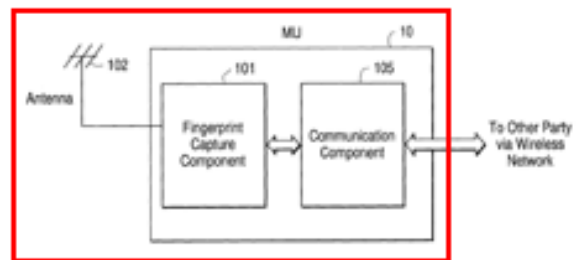


FIG. 2

(Ex-1011, FIGS. 1-2 (annotated to exemplify a MU in red (where in FIG. 2 the antenna 102 is as an example included with such a RF portable communications device)).

96. *Spain-I* explains that:

- The MU communicates with base stations during operation. (Ex-1011, FIGS. 1-2, 3:9-4:6, 7-22 (“the communication link between the mobile unit and location server is through the base stations and base station controllers of the cellular network”), 1:25-28 (“cell from which the

mobile unit is communicating”), 10:35-41 (“cell sites, Cell Site A, Cell Site B, and Cell Site C, that are responsible for providing service to the mobile units”), 11:57-65 (“Cell A is the serving cell (*i.e.*, the cell currently handling the communications traffic to and from the mobile)”).)

- When at selected location(s), the MU performs processes that collect identifier information (*e.g.*, station ID(s)) and measures signal strengths associated with communication signals received from antenna stations in range of the MU capable of RF communications with the mobile device while at those location(s). (*Id.*, 3:42-4:63, 5:20-6:8, 7:58-8:8, 10:43-46, 11:41-46, 13:16-14:37; Ex-1005, 4:16-37, 5:40-56, 6:34-51; Ex-1010, 3:4-4:9, 4:32-44, 4:63-5:24, 7:1-18, 10:4-32; Ex-1009, 2:61-5:21, 7:40-57, 9:15-10:37.)
- The MU creates and stores fingerprints based on the collected/measured information, including station identifier information and measured signal strengths corresponding to the received communication signals from the stations. (Ex-1011, FIG. 4 (station IDs, signal strengths), 3:41-4:6, 4:5:20-6:30, 7:58-8:8, 10:48-

11:26, 11:41-46, 13:16-55; Ex-1005, 3:29-61, 4:23-27, 4:59-5:9, 5:40-6:12, FIG. 4, Ex-1009, FIG. 9 (station ID and signal strengths), 5:1-21, 7:4-21, 9:15-54; Ex-1010, FIG. 9, 5:5-57, 7:1-36, 9:10-49.) A collection of the fingerprint structures may be stored in a fingerprint database used for subsequent location-determination processes, where the database may be stored locally on the MU or remotely. (Ex-1011, FIG. 10, 5:61-66, 6:9-32, FIG. 3, 10:48-11:27, 13:56-14:37, Ex-1005, FIG. 5, 6:13-61; Ex-1009, 9:55-10:47; Ex-1010, FIG. 9, 9:50-10:32.)

- “When a location estimate of the MU is desired (either by itself or by the Other Party), it [MU] activates component 101 (FIG. 2), which captures predetermined information from a predetermined portion of the RF spectrum.” (Ex-1011, 4:42-46; Ex-1005, 3:29-39; Ex-1009, 3:60-63; Ex-1010, 3:56-60.) The MU creates a fingerprint associated with a current monitored location by measuring *e.g.*, signal strengths received from identified service stations. (Ex-1011, 5:20-6:8, 7:64-8:44, 9:25-10:27, Ex-1005, 3:29-4:24; Ex-1009, 3:63-4:44, 5:7-21; Ex-1010, 3:60-4:44, 5:5-19.) The fingerprint may be generated “using *many different parameters*, either *individually or in combination*.”

(Ex-1011, 4:55-56; Ex-1005, 3:40-42; Ex-1009, 4:4-5; Ex-1010, 4:1-2.) This includes **signal strengths** of received signals and “the identity of the signal source (*e.g.*, channel number of **station code**)” (Ex-1011, FIG. 4, 4:56-63; Ex-1005, 3:42-49; Ex-1009, 4:6-11, Ex-1010, 4:3-8.) Indeed, the MU is “equipped with appropriate circuitry to determine the strength of the received signal” and the “location of the transmitter is broadcast in the signal and is extracted in the MU” (Ex-1011, 5:28-32, 3:55-58, 5:20-28 (MU captures signals and their parameters); Ex-1005, 3:57-61, 4:16-18; Ex-1009, 3:7-24, 4:34-44; Ex-1010, 3:4-21, 4:32-44.)

- The MU performs processes to determine whether the MU is currently “at a particular location or not” (Ex-1011, 4:23-25⁵; Ex-1005, 3:10 18.) To do so, the MU compares the fingerprint information for the current monitored location with the previously generated/stored fingerprint information to determine a “closest” match. If the compared

⁵ *Spain-I* discloses that the MU can initiate the location estimate processes (Ex-1011, 4:43–47 (“location estimate of the [MU] is desired (either by the [MU] itself or by the location server)”).)

information matches (or is close), the MU determines the MU is at or near the location associated with the matching fingerprint in the database. *Spain-I* discloses various processes for determining closeness between compared fingerprint information (e.g., signal strengths corresponding to associated station IDs, etc.) and for making such analysis more efficient. (Ex-1011, FIGS. 9-10, 5:61-6:8, 7:58-67 (signal strength parameters and dynamic changes for fingerprints), 8:1-26 (processes for determining closest matching fingerprint), 8:27-10:27, 10:29-13:15 (processes for reducing set of fingerprint information for comparison), 14:10-37 (measuring signal characteristics at predetermined locations and interpolating fingerprints between “sampled locations”), 17:15-19; Ex-1005, 3:29-4:37, 4:65-5:9, 5:10-40, FIGS. 4-5, 5:40-6:47, 6:48-61; Ex-1009, 3:40-4:46, 5:1-21, 7:4-9:14, *see also id.*, 5:44-7:3; Ex-1010, 3:37-4:44, 4:64-5:19, 7:1-9:10.)

- a) (a) the first portable RF communications device monitoring its location by**
 - (i) receiving communications signals from a first plurality of fixed-location service-area antenna stations capable of RF communication with the first portable RF**

communications device wherein the antenna stations are substantially continuously operating,

- (ii) identifying at least one ID within at least one of the received communications signals, and**
- (iii) measuring a varying signal characteristic other than ID, which signal characteristic is associated with a received communications signal from each of the first plurality of antenna stations; and**

97. It is my opinion that *Spain-I* (including as modified as discussed below) discloses or suggests these limitations. (*See also* my analysis above in §§VIII.A, IX.A.1(pre).) The MU is configured to perform processes for monitoring its location by receiving signals from a plurality of stations (“fixed-location service-area antenna stations”) (as disclosed or modified as I discuss below and/or IX.A.1(b)(ii)(4)), determining at least one ID within at least one received signal (*e.g.*, station ID), and measure signal strengths (varying signal characteristic) associated with a received signal from the plurality of stations.

98. *Spain-I* discloses that “[w]hen a location estimate of the mobile unit is desired (either by the mobile unit itself or by the location server), it activates component 101 (FIG. 2), which captures predetermined information from a predetermined portion of the RF spectrum.” (Ex-1011, 4:42-46; Ex-1005, 3:29-39;

Ex-1009, 3:60-63; Ex-1010, 3:56-60.) The MU creates a fingerprint associated with a current monitored location by measuring *e.g.*, signal strengths (varying signal characteristic) received from identified service stations. (Ex-1011, 5:20-6:8, 7:64-8:44, 9:25-10:27, Ex-1005, 3:29-4:24; Ex-1009, 3:63-4:44, 5:7-21; Ex-1010, 3:60-4:44, 5:5-19.) The fingerprint may be generated “using *many different parameters*, either *individually or in combination*.” (Ex-1011, 4:55-56; Ex-1005, 3:40-42; Ex-1009, 4:4-5; Ex-1010, 4:1-2.) This includes *signal strengths* of received signals and “the identity of the signal source (*e.g.*, channel number of *station code*)” (Ex-1011, FIG. 4, 4:56-63; Ex-1005, 3:42-49; Ex-1009, 4:6-11, Ex-1010, 4:3-8.) The MU obtains “multiple pieces of information or from multiple portions of the [RF] spectrum” from the communication signals received from surrounding stations in range. (Ex-1011, 3:55-58, 4:43-54, 5:20-22; Ex-1005, 3:29-37, 3:4-9.) The MU is “equipped with appropriate circuitry to determine the strength of the received signal” and the “location of the transmitter is broadcast in the signal and is extracted in the MU.” (Ex-1011, 5:28-32, 3:55-58, 5:20-28 (MU captures signals and their parameters); Ex-1005, 3:57-61, 4:16-18; Ex-1009, 3:7-24, 4:34-44; Ex-1010, 3:4-21, 4:32-44.) The MU creates a fingerprint associated with a current monitored location by extracting station ID information and measuring *e.g.*, signal strengths received from identified service stations (varying signal characteristic other than

ID). (Ex-1011, 5:20-6:8, 7:64-8:44, 9:25-10:27, Ex-1005, 3:29-4:24; Ex-1009, 3:63-4:44, 5:7-21; Ex-1010, 3:60-4:44, 5:5-19.)

99. The MU obtains “multiple pieces of information or from multiple portions of the [RF] spectrum” from communication signals from a source (*e.g.*, station). (Ex-1011, 3:55-58, 4:43-54, 5:20-22; Ex-1005, 3:29-37, 3:4-9.) The MU is capable of capturing information from the received signals and is “equipped with appropriate circuitry to determine the strength of the received signal.” (Ex-1011, 5:28-32, Ex-1005, 3:57-61.)

100. As I discussed above for limitation 1(pre), when at a current monitored location (*e.g.*, a location from where the MU initiates a location determination process), the MU captures information from the RF spectrum to create fingerprint information based on *parameters (individually or in combination)*, such as *signal* strength measurements and the identity of the signal source from which the signals emanated (*station code*). (Ex-1011, FIGS. 9 (below)-10, 4:55-63 (fingerprint may use different parameters (“individually or in combination”) (*e.g.*, signal strengths and station ID, 5:20-32, 5:33-6:8, 7:64-8:44, 9:25-10:27, 13:16-33, Ex-1005, 3:29-61, 5:51-56; Ex-1009, 4:4-11; Ex-1010, 4:1-8.) Figure 9 (below) exemplifies a fingerprint structure, which is generated by “identifying at least one ID within at least one of the received communications signals” (blue below) and measuring “the

signal strengths associated with a received communications signal from the first plurality of antenna stations” (yellow), like that claimed.

400	Fingerprint Structure					
401	Time of Capture:					
403	Station ID:	I1	I2	I3	...	In
405	Frequency:	F1	F2	F3	...	Fn
407	Tuning Parameters:	P1	P2	P3	...	Pn
409	Transmitter Location:	L1	L2	L3	...	Ln
411	Signal Strength 1:	S11	S12	S13	...	S1n
413	Signal Strength 2:	S21	S22	S23	...	S2n
415	...	...	...	...	...	...
417	Signal Strength m:	Sm1	Sm2	Sm3	...	Smn

Fig. 9

(Ex-1011, FIG. 9, 13:16-28; Ex-1005, FIG. 4, 4:13-23, 5:40-6:11; Ex-1009, FIG. 9; Ex-1010, FIG. 9.) “Each column in FIG. 9 is information pertaining to a particular frequency or carrier. A *Station ID field 403 indicates the unique identifying code of a broadcasting station from which the signal emanated*”⁶ and may be “filled by the MU using information received in the signal.” (Ex-1011, 5:20-32, 5:55-60,

⁶ Emphasis is added in this declaration unless noted otherwise.

13:27-33 (MU extracts parameter information from signal and determines strength of received signal for generating fingerprint); Ex-1005, 3:57-61, 4:16-21, 5:51-64.)

101. Figure 9 exemplifies the results of how the MU obtains station ID information and measures signal strengths for the signals received from surrounding antenna stations when the MU is at a current location (and also does similar operations when at selected location as I discuss below in §IX.A.1(b)). For instance, a person of ordinary skill in the art would have understood that each fingerprint structure can include multiple signal strength number(s) (SS1-SSm) which were measured by the MU from signals received from respective stations that have recognized and collected station IDs. Such a skilled person would have understood that signal strengths may vary, as known in the art. (Ex-1011, 3:42-54 (signal characteristics vary across RF spectrum but for any given location, preselected signal parameters may be measured unique to that location), 7:58-8:8, (capturing fingerprints at different times to minimize interference with other stations), 13:51-44 (signal strength sampled multiple times for each frequency/carrier and filled in

by MU); Ex-1005, 2:40-52, 4:59-5:9, 6:7-12; Ex-1006, Abstract, 7:19-28 (signal strength “vary because of environmental variability”), 10:19-22⁷.)

102. A person of ordinary skill in the art would have thus understood, in context of *Spain-I*’s disclosures that the signals received from the first antenna stations in range of the MU at a current monitored location include an ID for respective transmitting stations, which is extracted from the received signals. (See my above analysis regarding *Spain-I* (and incorporated disclosures) and in §VIII, IX.A.1(pre).) Indeed, the MU can fill in the station ID “***using information received in the signal.***” (Ex-1011, 9:31-33; Ex-1005, 5:52-64.) Further, *Spain-I* explains the fingerprint may include transmitter location information that may be used if the MU wants to “capture the signal emanating from a particular transmitter.” (Ex-1011, 9:45-47, 4:33-36, FIG. 9; Ex-1005, FIG. 4, 3:57-61, 6:2-7, FIG.4, 3:57-61.)

103. Accordingly, for reasons above and below *Spain-I* discloses the MU monitoring its location by (for example):

⁷ Ex-1006 (*Nanda*) is referenced here to demonstrate a person of ordinary skill in the art’s state-of-art knowledge at the time. *Nanda* is also relied upon below as an asserted reference for other claim features. (See my below analysis in §IX.A.1(b).)

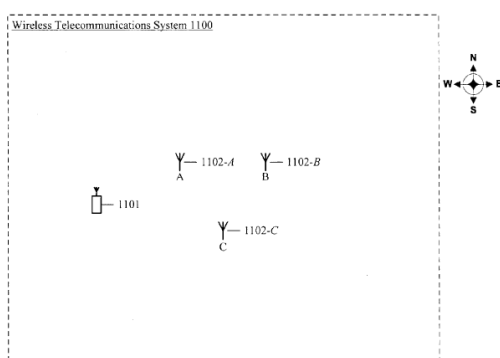
- “receiving communications signals from a first plurality of fixed-location service-area antenna stations capable of RF communication with the first portable RF communications device wherein the antenna stations are substantially continuously operating” (see my above analysis; *e.g.*, Ex-1011, FIGS. 1-3, 9-10, 6:9-30 (MU capturing fingerprint of its “current location”), 3:5-16, 3:42-4:62, 5:55-6:8; Ex-1005, FIGS. 1-4, 1:40-54, 2:5-16, 2:32-3:5, 3:29-4:22, 4:38-50; *see* my above analysis in §§VIII.A, IX.A.1(pre).)
- “identifying at least one ID” (*e.g.*, station ID/source identifying information) “within at least one of the received communications signals” (*e.g.*, extracted and stored as part of fingerprint) (see my above analysis; *e.g.*, Ex-1011, FIG. 9 (Station ID), 4:55-62 (station code—identity of signal source), 5:54-60 (MU extracts parameters from the “appropriate signals”), 13:29-49; Ex-1005, FIG. 4, 3:40-47, 3:57-60, 4:16-21, 5:51-58, 6:2-7; *see* my above analysis in §§VIII.A, IX.A.1(pre).)
- “measuring a varying signal characteristic other than ID, which signal characteristic is associated with a received communications signal from

each of the first plurality of antenna stations” (see my above analysis; *e.g.*, Ex-1011, FIG. 9 (S11-Smn), 3:42-4:63, 5:20-32, 13:49-55 (signal strength sampled multiple times); Ex-1005, 2:40-3:3; 3:57-61, 4:16-21, 4:65-9, 6:7-11; *see* my above analysis in §§VIII.A, IX.A.1(pre).)

104. A person of ordinary skill in the art would have understood in the context of *Spain-I* that the “station(s)” providing the communication signals received by the MU are substantially continuously operating fixed-location service-area antenna stations, like that claimed since that they include base stations that communicate with the MU using RF communication signals within respective service areas, consistent with known wireless network infrastructures. For example, such a skilled person would have understood that *Spain-I* recognizes that any location has a unique RF spectral fingerprint, and the MU includes an antenna that is configured to receive RF signals from signal sources (stations) in a wireless communication network consistent with that known in the art. (Ex-1011, FIG. 2, 4:7-22 (MU antenna 102 and communication link between MU and location server is “though the base stations...of the cellular network”); *id.*, 3:42-4:6, 1:18-48 (discussing conventional cellular “base stations”), 3:55-4:6 and 7:58-67 (television/radio broadcast stations), 5:33-54 (television signals having “better coverage of the cell than other signals”), 4:59-61 (station code identifying signal

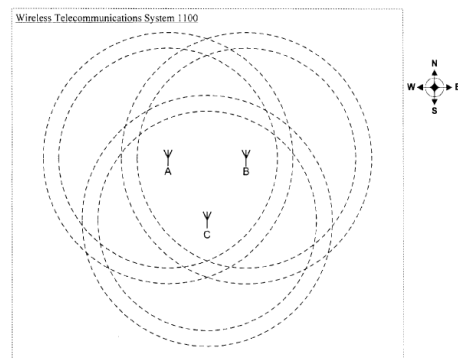
source), 13:27-31 (“Station ID field 403 indicates the *unique identifying code of a broadcasting station* from which the signal emanated”), FIG. 9, 6:31-39 (“base station signal strengths”); Ex-1005, 1:10-19, 1:26-34, 2:40-3:3, 3:4-9, 3:50-61, FIGS. 2, 4, 4:59-63, 5:51-56; Ex-1009, 3:25-39, 4:9-10, 5:44-51, 7:4-21, 9:26-54; Ex-1010, 1:31-41, 3:22-36, 4:1-7, 5:46-49, 7:1-18, 9:21-49.) Such a skilled person would have understood, by the MU having an antenna to receive the communication signals, that the source of such signals (*e.g.*, stations) would likewise have antennas to transmit the RF signals from which the MU collects ID information and measures corresponding signal strengths. Indeed, *Spain-I* discusses coverage areas served by antenna base stations (with identity codes) that communicate RF signals with a MU in the context of processes for reducing fingerprint samples for comparison. (Ex-1011, FIGS. 11, 14 (below), 12-13, 15-19, 10:29-13:15.)

FIG. 11



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FIG. 14



105. A person of ordinary skill in the art would have recognized such discussions of antenna base station coverage areas are applicable to the features

relating to the location-determination processes performed by the MU in terms of the signal sources (*e.g.*, antenna stations) as discussed above (and below) regarding *Spain-I*. (See also my below analysis in §§IX.A.1(a)-(b).) Such communication-related operations were consistent with known wireless network infrastructures similar to those described by *Spain-I*. (Ex-1007, ¶¶0185 (describing wireless cell sites including base stations 122 that are “(“standard high traffic, fixed location base stations used for voice and data communications with a plurality of MSs 140” (mobile stations (*id.*, ¶0183))), 0237 (described a based station as a fixed BS 122).)) Consistent with such understandings, it is my opinion that a person of ordinary skill in the art would have understood the “station(s)” in *Spain-I* to be fixed and serve particular areas using an antenna to facilitate wireless communications with the MU when in the coverage/service area for that station, consistent with conventional wireless network infrastructures. (Ex-1007, ¶¶0009-0020, 0032, 0053, 0193, FIG. 3, 236, 250.) Accordingly, a person of ordinary skill in the art would have understood the stations described by *Spain-I* are fixed-based service area antenna stations like those claimed.

106. For similar reasons, a person of ordinary skill in the art would have understood the fixed-location antenna “stations” described by *Spain-I* would have been **substantially continuously operating** in order for wireless communications

and related signal strength measurement processes to take place as described by *Spain-I*, consistent with the operation/functions of such conventional networks and associated equipment/components in order to provide the wireless communications used to facilitate the location-determining processes as described by *Spain-I*. The system operates in, or works with, a conventional wireless network with base stations, and without such substantially continuous operation, the location-determining processes disclosed by *Spain-I* would not perform as disclosed. For example, without the stations operating substantially continuously operating, RF communications would not be performed as known in such wireless systems, and thus, for example, measured signal strengths may become stale, which may compromise the integrity of the location determining process described by *Spain-I*. *Spain-I* looks to provide accurate location determinations based on the signal parameters (e.g., station IDs and signal strengths). (See my discussions of *Spain-I* above; e.g., Ex-1011, 8:1-8, 9:64-67, 10:64-67, 13:16-55, 14:1-3.) As such, *Spain-I* discloses substantially continuously operating fixed-location service-area antenna stations that communicate RF signals with the MU and are “substantially continuously operating,” as claimed.

107. Nonetheless, I have also been asked to assume a scenario wherein *Spain-I* does not disclose such features. As to that scenario, it is my opinion that a

person of ordinary skill in the art would have been motivated to configure *Spain-I*'s MU system and related processes to operate in conjunction with “substantially continuously operating” “fixed-location service-area antenna stations” that communicate RF signals with the MU consistent with conventional wireless network infrastructures like those described by *Spain-I*. Such a skilled person would have understood from the disclosures in *Spain-I*, and based on their knowledge/experience in the art, that the infrastructure in which the MU operates includes conventional wireless networking technologies/techniques. (Ex-1011, 1:16-50, 3:8-54, 10:34-11:26; Ex-1007, FIG. 3, ¶¶0009-0020, 0032, 0053, 0193, 236, 250; Ex-1027, FIGS. 1-2, 16, ¶¶0002-0021, 0042-0045, 0102-0103.) *Spain-I* discusses conventional mobile communications technologies that include wireless cells (Ex-1011, 1:18-49; Ex-1005, 1:8-37), operations in portions of the RF spectrum including television and radio transmission signals (Ex-1011, 3:55-4:6; Ex-1005, 2:53-3:3) and cellular communication networks (Ex-1011, 4:7-22, 5:33-51, Ex-1005, 3:62-4:12, 5:28-33), all known to operate with substantially continuously operating antenna stations providing wireless communications to mobile devices. Accordingly, for the scenario where *Spain-I* does not teach such antenna station features, a person of ordinary skill in the art would have understood such features were suggested and a skilled person would have been motivated to configure *Spain-*

I's processes and system(s) to operate in conjunction with such fixed-location service-area antenna stations from which communication signals were received by the MU and processed in accordance with *Spain-I*'s disclosed processes. Such a skilled person would have had the knowledge and skills to configure, and a reasonable expectation of success in implementing, such features to facilitate wireless communications like those discussed by *Spain-I*, especially where such configuration/implementation would have involved known technologies and techniques within the skills and knowledge of a person of ordinary skill in the art. (Ex-1011, 1:16-50, 3:8-4:22, 5:33-51, 10:34-11:26; Ex-1005, 1:8-37, 2:53-3:3, 3:62-4:12, 5:28-33; *see also* Ex-1007, FIG. 3, ¶¶0009-0020, 0032, 0053, 0193, 236, 250; Ex-1027, FIGS. 1-2, 16, ¶¶0002-0021, 0042-0045, 0102-0103.) A person of ordinary skill in the art was thus well aware of such antenna stations and would have been motivated to configure *Spain-I*'s MU to operate in conjunction with similar continuously operating antenna stations (like those claimed). Indeed, such a skilled person would have understood there was a narrow spectrum of design choices in terms of network antenna stations (in terms of operating substantially continuously). As such, such a person would have not only understood how to implement such features in the *Spain-I* system/processes, but would have understood the advantages and disadvantages associated with various options, and considered them when

deciding to configure the system/process with such antenna stations like those claimed.

108. Moreover, it is my opinion that a person of ordinary skill in the art would have been motivated to implement such features for reasons that I explained below in §IX.A.1(b)(ii)(4). (*See* also my below analysis in §IX.A.1(b).)⁸

b) (b) the first portable RF communications device determining if a first monitored location, monitored in accordance with part (a), is within proximity of a location chosen by a user of the first portable RF communications device, as a result of electronically comparing

(i) the at least one ID at the first monitored location with at least one ID at the location chosen by the user and

(ii) at least one number based on the varying signal characteristic of the communications signals from each of the first plurality of antenna stations at the first monitored location with at least one number based on corresponding varying signal characteristics of the communications signals from each of the first

⁸ Even if *Spain-I* were interpreted to not disclose all the features in limitation 1(a), it is my opinion that a person of ordinary skill in the art would have been motivated to implement them in view of *Nanda* and *Hunzinger* for reasons similar to those I discuss below for limitation 1(b) (§IX.A.1(b)).

**plurality of antenna stations at the location
chosen by the user.**

109. It is my opinion that *Spain-I* in view of *Hunzinger* and *Nanda* discloses and/or suggests these limitations.

110. As I explained, *Spain-I* discloses that the MU performs processes to determine whether the MU is currently “at a particular location or not.” (Ex-1011, 4:23-25, 4:43-47 (“location estimate of the [MU] is desired (either by the [MU] itself or by the location server)”)⁹; Ex-1005, 3:10-18; §§IX.A.1(pre)-1(a).) To do so, the MU electronically compares fingerprint information for the MU’s current monitored location (*e.g.*, where the MU is located when location determination/monitoring is initiated/performed) with previously generated/stored fingerprint information (*e.g.*, generated/collected at particular location(s) of the MU and stored in a fingerprint database) to determine a “closest” match. (*See* §§IX.A.1(a), IX.A.1(b)(ii).) As I noted, fingerprint information can include station identifier information and signal strength measurement values for communication signals communicated from signal

⁹ *Spain-I* explains elsewhere that the MU can initiate the location estimate processes (Ex-1011, 4:43–47 (location estimate of the [MU] is desired (either by the [MU] itself or by the location server)”).)

sources surrounding and in range of the MU when the fingerprint information is collected/generated. If the comparison results in a match (or close match as I discuss further below), the MU determines that the MU is at, and/or otherwise within the proximity of, the location corresponding to the matching fingerprint information in the database. (Ex-1011, 5:55-6:4 (“corresponding location in the database is then chosen as the location of the mobile unit”); 8:1-26; *see also* my discussions above in §IX.A.1(pre)-1(a).)

111. The MU is configured to perform various processes for determining closeness between compared fingerprint information and making such analyses more efficient. (Ex-1011, FIGS. 1-3, 9-10, 5:61-6:8, 7:58-67 (signal strength parameters and dynamic changes for fingerprints), 8:1-26 (determining closest matching fingerprint), 8:27-10:27, 10:29-13:15 (discussing features where a location server aids in the reduction of sample fingerprints to be considered in comparison), 14:10-22 (building fingerprint database built via off-line snapshots at locations), 14:23-31 (building database by taking measurements at predetermined locations and interpolating fingerprints at all locations between *sampled locations*), 17:15-19; Ex-1005, 3:29-4:37, 4:65-5:9, 5:10-40, FIGS. 4-5, 5:40-6:47, 6:34-36, 6:48-51; Ex-1009, 3:40-4:46, 5:1-21, 5:44-9:14; Ex-1010, 3:37-4:44, 4:64-5:19, 7:1-9:10.)

112. A person of ordinary skill in the art would have recognized that *Spain-I* discloses features and processes like those recited in claim 1, including those of limitation 1(b) (e.g., determining whether the MU is at a particular location based on comparing fingerprint information associated with a current monitored location (see e.g., limitation 1(a)) with stored fingerprint information corresponding to locations where the MU was at when such information was obtained, etc.) Such suggestions in *Spain-I* would have led a person of ordinary skill in the art to consider teachings in the art when considering the design, configuration and implementation of *Spain-I*'s system/process for desired applications. As I discuss further below, is my opinion that a person of ordinary skill in the art would have been motivated to configure the *Spain-I* system/processes to implement such features in view of the teachings and suggestions in *Hunzinger* and *Nanda* and a person of ordinary skill in the art's knowledge and experience at the time regarding the state of art. (See my below analysis in §§IX.A.1(b)(ii)(1)-(4); and above in §§IX.A.1(pre-(a)), VIII.B.)

113. It is my opinion that the teachings/suggestions from *Spain-I*, *Hunzinger*, and *Nanda* (and the other prior art I discuss below in other sections) in context of a person of ordinary skill in the art's state-of-art knowledge/skills, etc. at the time, would have guided such a skilled person to design/configure/implement/modify the *Spain-I* system/processes in such a manner

that would have predictably led to a system/process that disclose or suggest features like those recited in the challenged claims I address in this Declaration. Therefore, where I make references to any combination or combined system/process involving such prior art (*e.g.*, “combined” *Spain-I-Hunzinger-Nanda* system/process or “combination” or similar language involving any of the prior art I discuss below—including in other sections), that does not mean or suggest that it is my opinion a person of ordinary skill in the art would have bodily incorporated discussed features from one prior art reference into the other. Rather, I use such language as short-hand for the resulting modified *Spain-I* system/process in light of such teachings/suggestions in the prior art from which such a skilled person would have been motivated and guided as I explain in this declaration.

(1) Determining if a First Monitored Location is Within Proximity of a Location Chosen by a User (Limitation 1(b))

114. It is my opinion that *Spain-I* in view of *Hunzinger* and *Nanda* discloses and/or suggests the claimed “determining if a first monitored location is within proximity of a location chosen by a user of the first portable RF communications device” as claimed in limitation 1(b), in context of its plain language and related descriptions in the specification (Ex-1001) and in the prosecution file history (Ex-1004).

115. Regarding limitation 1(b), the '698 patent describes features where a mobile device determines its location by comparing current location signal strengths with desired location signal strengths (Ex-1001, 18:56-19:7) and when the strengths “are identical,” the “cell phone is determined to have returned to the desired location (i.e., current location=desired location)” (*id.*, 19:8-60; *id.*, 7:10-26, 8:62-9:10, 18:17-24.) During prosecution, the applicant stated “the instant application focuses on...determining whether a mobile device is or is not at a specified location (‘am I there?’)” as opposed to “determining where a mobile device is (‘where am I?’).” (Ex-1004, 167.) *Spain-I* in view of *Hunzinger* and *Nanda* discloses and/or suggests the above-claimed proximity determining features of limitation 1(b) in context of the plain claim language, specification, and file history.

116. As I discussed above, a person of ordinary skill in the art would have understood that *Spain-I* describes that the fingerprints generated and stored in the fingerprint database correspond to location(s) that were selected or predetermined. (See my above analysis in §IX.A.1(pre)-(b)(ii); Ex-1011, FIG. 9, 3:42-4:63, 5:20-32, 13:49-55 (signal strength sampled multiple times); Ex-1005, 2:40-3:3; 3:57-61, 4:16-21, 4:65-9, 6:7-11.) The user of an MU can generate a request for the position of the MU (*e.g.*, whether or not it is at (or near) the same location corresponding to a previously generated fingerprint in the fingerprint database). (See my above

analysis in §§IX.A.1(pre)-1(b)(ii); Ex-1011, 5:61-6:30 (describing in connection with FIG. 3 configurations that the “request [for position of the mobile unit] may be generated by the user carrying the mobile unit” and upon receipt of such request, “the mobile unit captures the fingerprint of its “current location”); Ex-1005, 4:43-47 (“When a location estimate of the mobile unit is desired (either by the mobile unit itself or by the location server), it activates component 101 (FIG. 2), which captures predetermined from a predetermined portion of the RF spectrum.”).)

117. As I explained, *Spain-I* discloses processes to determine if “MU 10 is at a particular location or not.” (§IX.A.1(pre)-1(b)(ii); Ex-1011, 4:23-25; Ex-1005, 3:10-11.) *Spain-I* explains that the desire for obtaining a location estimate can originate from the MU or the location server. (Ex-1011, 4:43-47; Ex-1005, 3:29-31.) To do so, the MU collects fingerprint information (*e.g.*, station IDs) and measures signal strength(s) associated with the signal(s) received from the plurality of stations corresponding to those IDs in order to build the fingerprint database. (Ex-1011, 5:20-6:31, 7:58-8:26, 13:16-14:37; Ex-1005, 3:23-6:56.) Fingerprints can be generated (and associated signal parameters measured/collected) based on signals received at predetermined/chosen locations. (Ex-1011, 4:42-63, 13:27-33, 14:23-31, Ex-1005, 6:48-51.) A person of ordinary skill in the art would have understood that *Spain-I* at least suggests features where generating fingerprints and building the

fingerprint database stems from signal characteristic (*e.g.*, signal strength) measurements and related information collected when the MU was carried by a user to specific locations of the MU.

118. For example, *Spain-I* describes features where a user can request the location of the MU, *albeit* in context of the FIG. 3 embodiment, which uses the location server to store the fingerprint database. (Ex-1011, 6:9-21; Ex-1005, 6:43-46.) “On receipt of the request, the MU captures the fingerprint of its current location,” which is processed and eventually sent to the location server for storage and use in context of the FIG. 3 procedures. (Ex-1011, 6:20-30; Ex-1005, 6:46-47, FIG. 3 (below).)

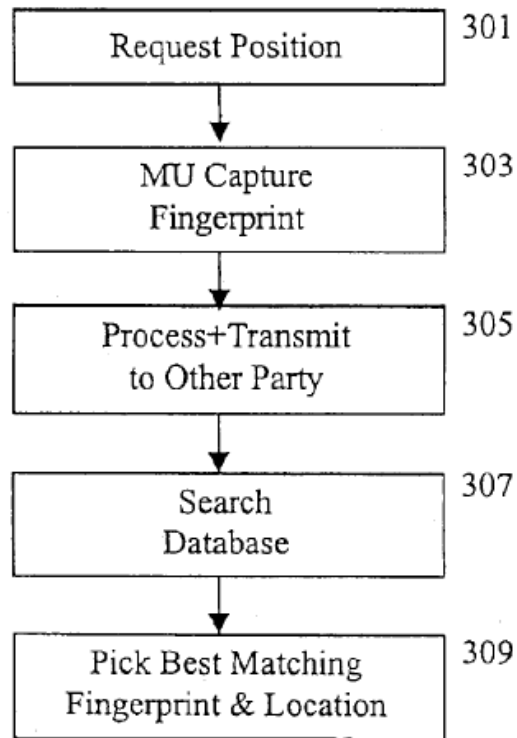


Fig. 3

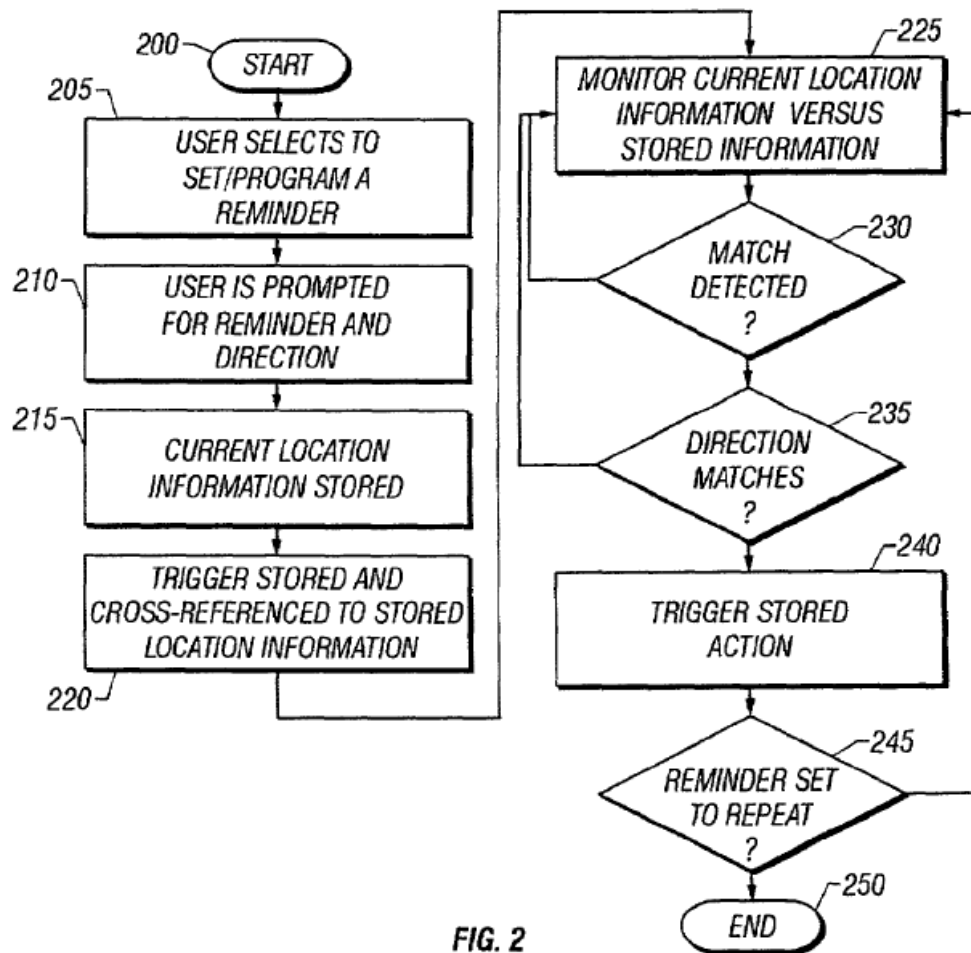
119. While such teachings relate to a remotely stored fingerprint database and performing fingerprint matching processes, they also would have suggested to a person of ordinary skill in the art that the MU may be (or is) configured to receive a user request to measure/collect signal information for generating a fingerprint. *Spain-I* thus suggests the concept generally of user-initiated location-based fingerprint data collection generally and would have taught a person of ordinary skill

in the art the context of such features, and thus led such a skilled person to consider the various ways how to provide for user chosen locations corresponding to fingerprints in the database. A person of ordinary skill in the art would have understood there were numerous ways and reasons for doing so, and thus would have been motivated to consider teachings in the art when considering the teachings of *Spain-I*.

120. For example, the teachings and suggestions in *Spain-I* would have led a person of ordinary skill in the art who was considering/designing/implementing the *Spain-I* system/processes for various applications to consider available ways and options to configure such a system to provide user friendly controls for designating areas/locations and triggering services/actions when the MU enters, is at, or leaves a designated area/location. (See my discussions above in §V.) It is my opinion that such a skilled person would have been motivated to use their state-of-art knowledge and experience, and teachings from the art, when designing, considering, and configuring such a system/processes. In doing so, a person of ordinary skill in the art would have found *Hunzinger* and *Nanda* to be relevant sources of such teachings and guidance. Consequently, such a skilled person would have considered and have been motivated by the teachings of *Hunzinger* (Ex-1054) and those of *Nanda* (Ex-1006) to consider, develop, and configure the *Spain-I*'s system-processes to

determine if the MU's current location was in proximity of a user chosen location, consistent with that claimed (and discussed in the '698 patent and during prosecution (*e.g.*, am I there)), including providing mechanisms for allowing the user to choose location(s) from which the fingerprint information was collected/measured used to build the database and subsequently used for comparison with the current monitored location fingerprint information (as I discussed above and further below in §IX.A.1(b)(2)), and to perform location-based actions/operations selectable by the user, similar to features described by *Hunzinger* and *Nanda*.

121. *Hunzinger* (discussed also above in §VIII.F) discloses a location determining system/process where a user of a mobile device may set actions/alerts/reminders, etc. that are performed based on a determined location of the device. (Ex-1054, Abstract, FIGS. 1A-4, 1:38-2:6, 2:10-44, 3:4-67; *see also* my discussions above in §VIII.F.) Figure 2 (below) exemplifies a process for location reminder programming, monitoring and triggering procedures, executed on the mobile device that can have "position location technology." (*Id.*, FIG. 2, 3:49-55.)

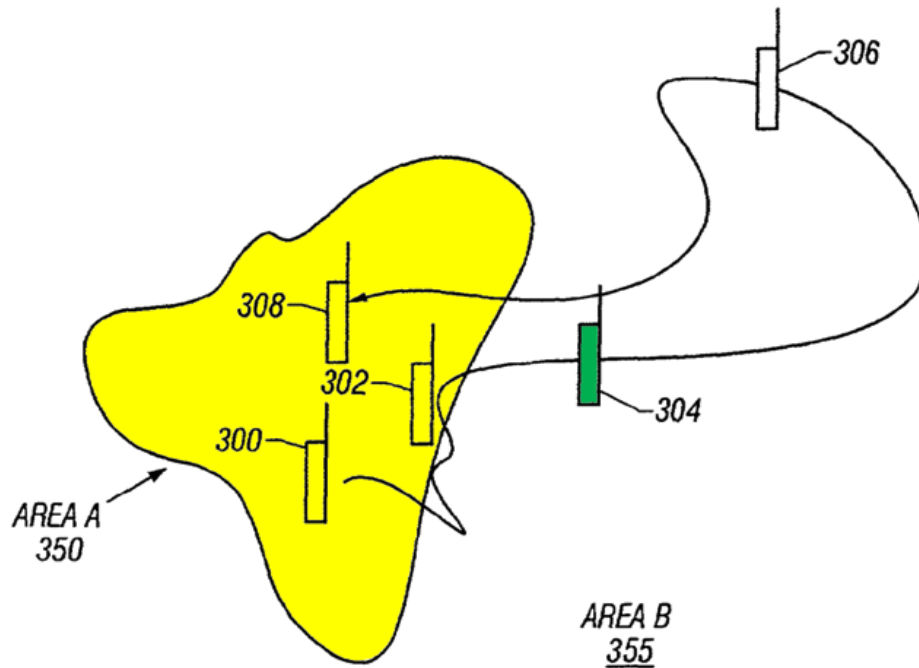


122. *Hunzinger* explains that location related information (“‘remembered’ locations”) and trigger or action information is stored in the mobile device, which also has position-monitoring functions that “compares one or more ‘remembered’ locations with current location information.” (*Id.*, 2:56-60.) The user may use a stored or current location, and the device can use location information such as “station ID...other signal conditions...or other location identifying information” where it is “only necessary that information allow the terminal to *recognize whether*

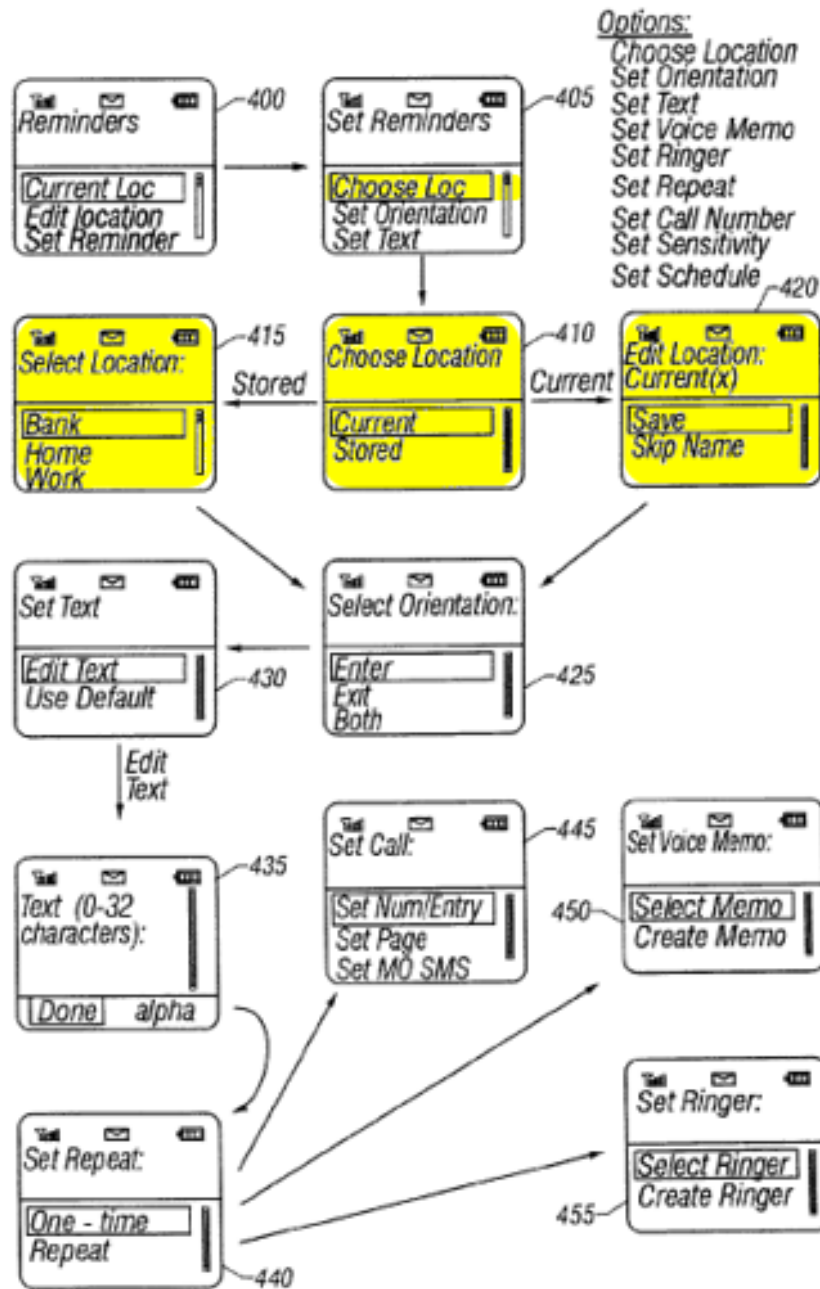
or not it has left or returned to the same location.” (Id., 4:1-12.) Location information can include a “set area [that] may be defined several ways: a point with a radius, network parameters, a geographic geometric shape, etc.” but “it is not necessary that the mobile [device] knows the exact location...as long as it can store and recognize it.” (*Id.*, 4:12-18.) “The *location area characteristics may be settable by the user* or be adapted according to the precision, accuracy or availability of location information.” (*Id.*, 4:18-20.)

123. The mobile device “stores the location trigger and action information and a reference to the current location 220” so that it can monitor “the current location until it is outside of the ‘set’ location area.” (*Id.*, 4:21-24.) For instance, “the mobile may *detect it has transitioned out of the area* described by the stored location information *or that the current location matches* the stored location information 230....” (*Id.*, 4:24-31.) Thus, where the mobile device “exit[s] the location, it may not trigger the stored action but rather return[s] to continue monitoring...until the current location again matches or is similar to the stored location.” (*Id.*, 4:21-38, 4:44-46 (triggering stored action when detecting device has “reentered the vicinity of the stored-location, i.e., entering the location described by the stored location information”).) (*See also id.*, 4:51-5:22.) As an example, *Hunzinger* explains that the mobile terminal can trigger an action (*e.g.*, a reminder)

upon detecting that it “exited Area A 350” and “reached location 304.” (Ex-1054, 4:60-5:22, FIG. 3 (annotated below illustrating example when *Hunzinger* system/process detects that mobile phone exited area 350 (yellow) and reached location 304 (green).)



124. Figure 4 (annotated below) depicts exemplary user interface features associated with a user controlled options for programming location actions to be executed when a programmed reminder is triggered based on a corresponding location. (*Id.*, 5:22-40.)



125. As highlighted above, the “user may select the current location and provide a text name to be associated with it 420.” (*Id.*, FIG. 4, 5:51-52.) The “user

may also select to be reminded only upon leaving an area or entering an area independently or exclusively.” (*Id.*, 5:53-61.) The reminder action can take many forms, including displaying a text message, voice memo play-back, call to a number, playing a ringer, download information/content, etc. (*Id.*, 5:62-6:7.) *Hunzinger* also discloses that location precision and accuracy can be improved “through multiple measurements or through refinement of the measurements” including “averaging multiple measurements or fixes [as] is well known in the art.” (*Id.*, 6:8-22.)

126. Accordingly, *Hunzinger* discloses device location determination technologies/techniques, and similar to *Spain-I*, is in the same technical field as the ’698 patent. (See my discussions above in this section §IX.A.1(b)(ii); see also my above citations/discussions regarding *Hunzinger* and those above in §IX.A.1(pre)-1(b)(ii) regarding *Spain-I*; Ex-1001, Abstract, 1:23-10:25.) Also, a person of ordinary skill in the art would have understood that similar to *Spain-I*, *Hunzinger* discloses features that would have been pertinent to particular problem(s) that the ’698 patent looked to address (and those a person of ordinary skill in the art was trying to address). (See e.g., my citations and discussions above and those in §IX.A.1(b)(ii)(1); see also e.g., Ex-1001, 1:23-10:25, 3:26-35, 5:14-37, 5:54-56; Ex-1011, 1:16-54, 3:18-40, 15:19-29; Ex-1054, 1:13-2:49, 3:44-4:59.) In my opinion, and as I noted above, a person of ordinary skill in the art would have consulted such

teachings and suggestions when considering, designing, and implementing a location-determining process/system, like that described by *Spain-I*.

127. A person of ordinary skill in the art would have recognized and appreciated that *Hunzinger*'s teachings were consistent with technologies and techniques that were known to a person of ordinary skill in the art at the time. (See my discussions above in §V; *see also e.g.*, Ex-1016, Abstract, FIGS. 1:18-4:63, 6:30-7:3, 14:38-44 (discussing well known user defined geofence techniques/technologies), 16:41-67, 17:39-20:46; Ex-1019, ¶¶0008-0081, 0164-0171, 0177-0185, 0217-0240; Ex-1055, 1:49, 2:20-3:3, 3:49-4:22, 6:12-7:41 (user designated zones/tasks); Ex-1061, FIG. 13c, 1:61-2:8, 8:54-9:10, 21:4-13.) Consistent with such knowledge, and the teachings of *Hunzinger*, a person of ordinary skill in the art would have found *Nanda*'s teachings beneficial in considering ways to allow fingerprint data to be collected by a mobile device for use in a fingerprint database. A person of ordinary skill in the art would have been motivated to consider *Nanda* for the additional reasons I discuss below (*see* my analysis below in §IX.A.1(b)(ii)(2)-(4)).

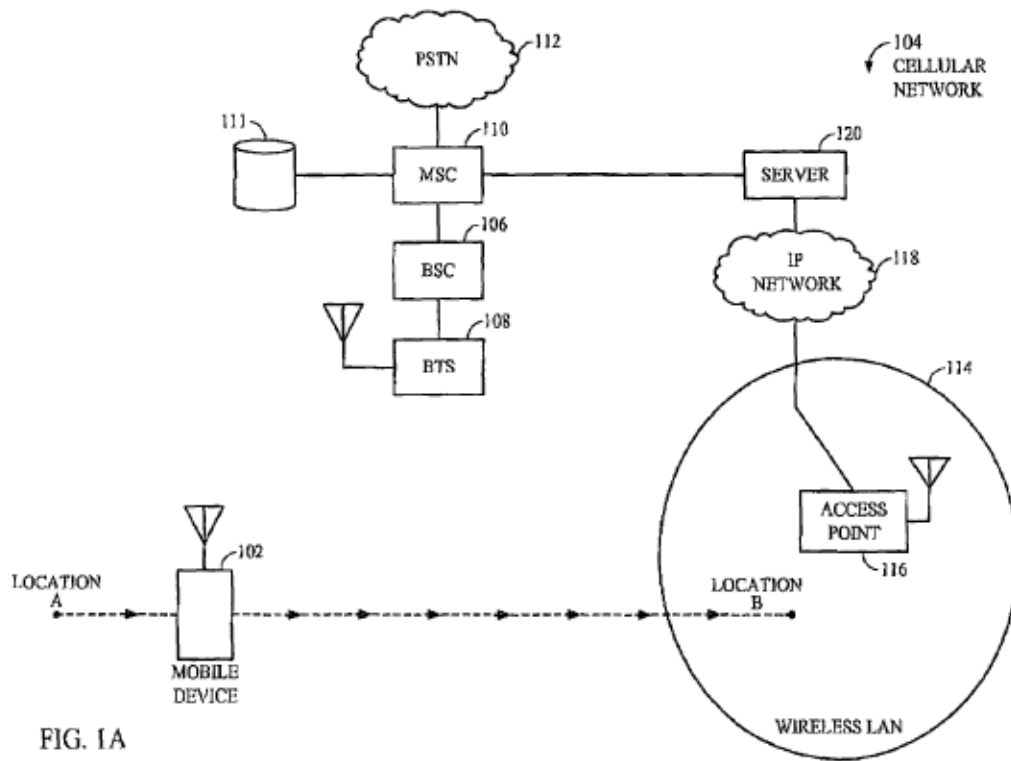
128. In my opinion, a person of ordinary skill in the art would have found *Nanda*'s teachings to further support, and were consistent with, such a person's rationale for considering various ways to configure the *Spain-I* system/process to

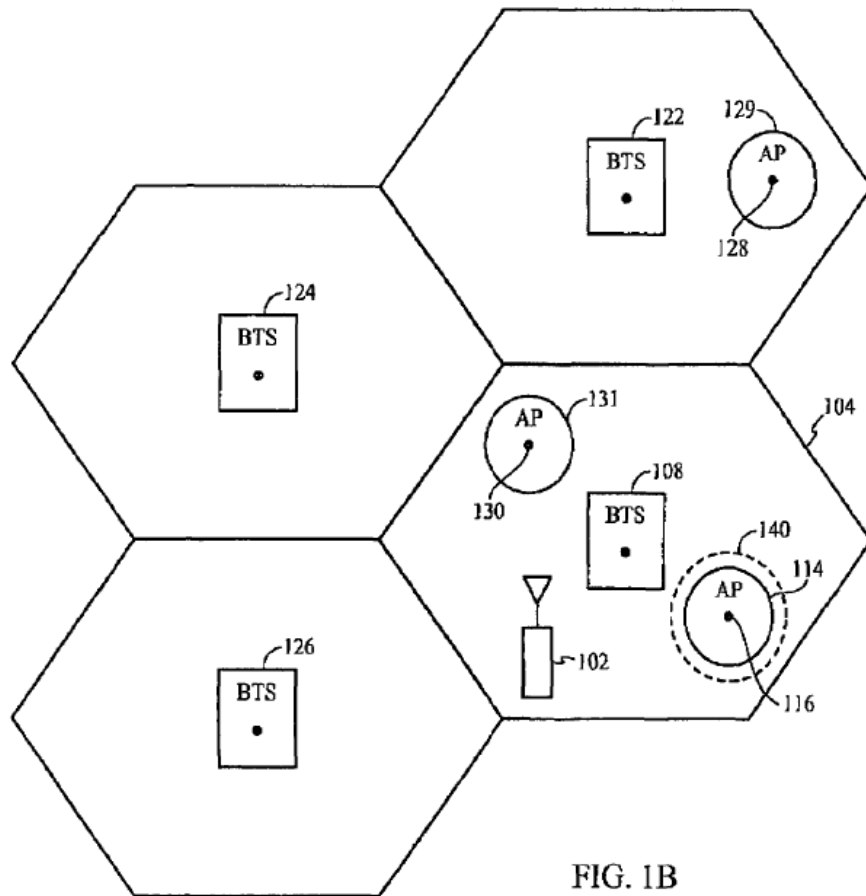
facilitate the collection of fingerprint information in a manner consistent with the suggestions I discussed above. Therefore, in my opinion, *Nanda*'s teachings of similar technologies and techniques known to a person of ordinary skill in the art would have contributed to the motivation and reasons for configuring *Spain-I* as I explain here, including in light of the teachings of *Hunzinger*.

129. I discuss *Nanda* above in §VIII.B. In my opinion, similar to *Hunzinger*, *Nanda* discloses features in the same technical field and address problems similar to those of the '698 patent, and thus would have been consulted by a person of ordinary skill in the art for reasons above and those below (§§IX.A.1(b)(ii)(2)-(4)). It is my opinion that *Nanda* discloses device location determination technologies/techniques in the same technical field as the '698 patent, similar to *Hunzinger* and *Spain-I*. (See my discussions above in §§IX.A.1(pre)-(b)(ii) regarding *Spain-I* and *Hunzinger*; §VIII.A-B, VIII.F; Ex-1001, Abstract, 1:23-10:25.) Also, similar to *Spain-I* and *Hunzinger*, *Nanda* discloses features that were related to problem(s) the '698 patent aimed to address and those a person of ordinary skill in the art were looking to address. (E.g., Ex-1001, 1:23-10:25 (see e.g., 3:26-35, 5:14-37, 5:54-56); Ex-1011, 1:16-54, 3:18-40, 15:19-29; Ex-1005, 1:19-36, 1:43-54, 2:25-39, 6:63-7:4; Ex-1006, 1:21-3:2, 6:12-7:27, 8:14-11:32, 12:14-31.) It is my opinion that such teachings in

Nanda would have been consulted when designing/implementing a location-determining process/system, like that described in *Spain-I*

130. For example, *Nanda* discloses systems and processes that determine whether a mobile device is “in the vicinity of” a location by comparing fingerprint information. (Ex-1006, FIGS. 1A-1B (shown below), 2:16-59, 3:48-4:14, 5:50-7:28.)





131. *Nanda* also explains that device 102 can observe up to n base stations with measurable signal strengths (characterized as vectors $X_1, \dots, X_n$) originating from a particular identified base station. (*Id.*, 5:57-67, 5:67-6:3 (“neighbors base stations may be identified by frequency channel or other **base station identifier and a signal strength associated with each base station**”).) The vectors can include information that “identifies a source and at least one characteristic of the reference

signal, *e.g.*, pilot or paging signal.” (*Id.*, 6:3-11; *id.*, 6:12-34 (signal strength and base station identifier).)

132. Such information may be used to provide a fingerprint of a location of mobile device 102. (*Id.*, 6:52-58 (“[i]f locations within the area 140 have a certain known fingerprint, then the *mobile device can determine its current fingerprint and compare it to the known fingerprint to determine whether the mobile device is located within the area 140.*”).) Other attributes, and combinations thereof, may be used as a fingerprint (*id.*, 6:58-66) given “a fingerprint is a collection of attributes of a first communication network that changes based on location and can be used by the mobile device to determine the proximity of a second communication network” and can include characteristics of the transmitters of the second networks (*e.g.*, MAC ID, band, channel, access point RSSI information (*e.g.*, signal strength)) (*id.*, 7:6-14). Such attributes may be calculated in different ways, such as instant signal strength measurements or multiple measurements may be averaged together or otherwise combined in some statically significant manner in order to generate the fingerprint. (*Id.*, 7:19-28.)

133. Further, *Nanda* describes processes where the mobile device 102 includes algorithms for creating multiple fingerprints for subsequent comparison for determining whether the device is at or near a particular user chosen location. *Nanda*

explains “[f]or example, using the keypad 212, *a user of the mobile device 102 may select a key that causes the mobile device 102 to create a current fingerprint and store that fingerprint in memory 211.*” (Ex-1006, 8:29-36; *id.*, FIG. 2 (below).)

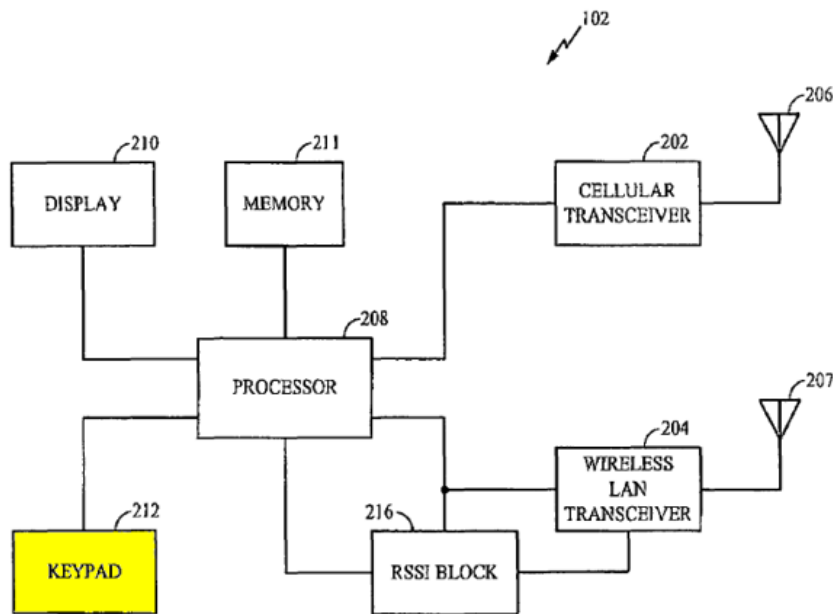


FIG. 2

In discussing Figure 3A, *Nanda* also states that “[o]nce the mobile device has connected with the access point, *the user may, in step 304, signal to the device to capture the current fingerprint*” and that “[t]his step may typically be *user-initiated because the user may want only certain* wireless LANs to be stored in the fingerprint database such as those wireless LANs that the user normally subscribes to or connects.” (Ex-1006, 9:61-10:7.)

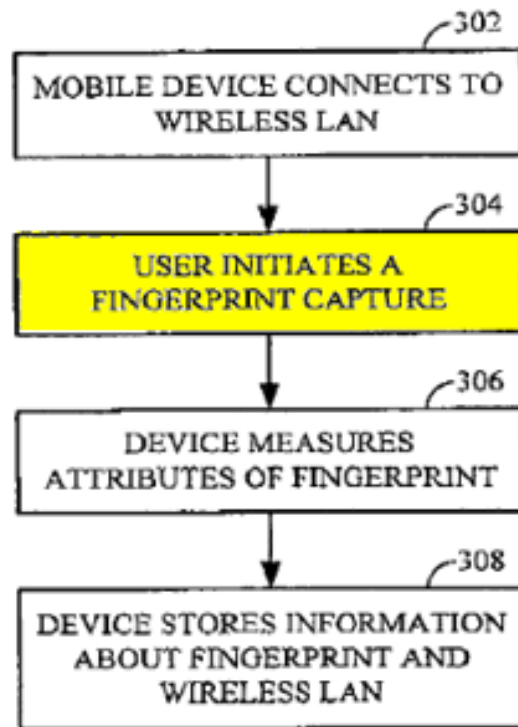


FIG. 3A

134. A person of ordinary skill in the art would have understood that *Nanda* describes features where a user of a mobile device can select when the device will create a current fingerprint while the device is at a particular location and stores that information in memory. When that occurs, the mobile device measures/collects and generates fingerprint information at a location chosen by the user (*e.g.*, a user with the mobile device may be standing a location A when selecting to initiate measurements and fingerprint generation, and thus location A is a location chosen by the mobile device user). The generated and stored fingerprint information

contains signal strengths associated with the signals received from the antenna base stations by the mobile device while the device is at a location chosen by the user, which are compared with fingerprint information of the mobile device's current location to aid in determining whether the device is in the vicinity of such a previously selected/tracked location (*e.g.*, “am I there”—MU is at, entering, or has left a chosen location. (*See* my below analysis in §§IX.A.1(b)(ii)(2).) *Nanda's* disclosures are consistent with those of *Hunzinger* (Ex-1054) and the state of art knowledge at the time. (*See e.g.*, Ex-1054, 3:29-5:22 and Ex-1053, Abstract, FIG. 1, ¶¶0007-0008, 0013¹⁰)

135. A person of ordinary skill in the art would have thus appreciated how *Spain-I* teaches processes that determine if the MU “is at a particular location or not” (Ex-1011, 4:23-25; *id.*, 4:43-47, 5:54-6:8) and that *Nanda* also discloses location determining processes that determine whether a mobile device is “in the vicinity of” a location by comparing fingerprint information, which includes allowing a user to select location(s) where fingerprint-type information is collected/generated and

¹⁰ Consistent with other references I may refer to outside the prior art I identify for discussed combinations, I refer to *Bar-On* (Ex-1053) to demonstrate state of art knowledge of a person of ordinary skill in the art at the time.

stored (Ex-1006, 2:16-59, 5:50-7:28, 8:29-36, 9:65-10:7; *see* my discussions above in §§IX.A.1(b)(ii)(1)-(2)). Such teachings and suggestions (in addition to the other teachings and suggestions that I referenced and discussed above/below) would have led a person of ordinary skill in the art who was considering/designing/implementing the *Spain-I* system/processes for various applications to consider available ways and options to configure such a system to provide controls for designating areas/locations and triggering services/actions when the MU enters, is at, or leaves a designated area/location. (*See* my discussions above in §V.) In view of such teachings and suggestions of *Nanda* and *Hunzinger*, and knowledge in the art, in context of *Spain-I*, it is my opinion that a person of ordinary skill in the art would have been motivated to configure *Spain-I*'s system/processes such that the MU includes mechanisms and associated functionalities/features (consistent/similar to that described by *Hunzinger* and *Nanda*) that would have allowed the MU user to choose specific location(s) from which fingerprint information is collected/measured/generated and stored to build the fingerprint database information.

136. For instance, such a skilled person would have recognized *Spain-I*'s suggestions of providing configurations that allow a user to select locations (even in context of its FIG. 3 embodiment) and found *Hunzinger*'s and *Nanda*'s teachings

relevant and persuasive in considering ways for the system/process to select locations from which such fingerprint information was collected for subsequent use as references against the current monitored location fingerprint information, as I discussed above. For example, as I noted, *Spain-I* discloses features where the user of MU can generate a request for the position of the MU (*e.g.*, whether or not it is at (or near) the same location corresponding to a previously generated fingerprint in the fingerprint database). (*See* my above analysis in §§IX.A.1(pre)-1(b)(ii); Ex-1011, 5:61-6:30 (describing in connection with FIG. 3 configurations that the “request [for position of the mobile unit] may be generated by the user carrying the mobile unit” and upon receipt of such request, “the mobile unit captures the fingerprint of its “current location”); Ex-1005, 4:43-47 (“When a location estimate of the mobile unit is desired (either by the mobile unit itself or by the location server), it activates component 101 (FIG. 2), which captures predetermined from a predetermined portion of the RF spectrum.”).) Such disclosures would have suggested to a person of ordinary skill in the art user selectable location features, and would have led such a person to consider teachings in the art (like *Hunzinger* and *Nanda*) relating to similar features.

137. Thus, *Spain-I*, *Hunzinger*, and *Nanda* describe features that would have led such a skilled person to consider providing user-selectable location

functionalities that facilitated the determination as to whether an MU was within proximity of a chosen location like that recited in limitation 1(b). Such a skilled person would have been motivated for considering and implement such user chosen location features especially given *Hunzinger's* additional details and options for providing user selectable location features, which described mechanisms for providing user-friendly interface capabilities on a mobile device, such as a menu-driven interface that enabled a user to select locations to be attributed to particular actions to be performed upon determination the mobile device is at, entering, or has left such a user-selected location (including those defined by a radius or geofence-type location(s)). (Ex-1054, FIGS. 1A-4, 1:38-2:44, 3:4-67, 4:1-5:22.)

138. A person of ordinary skill in the art would have appreciated that *Hunzinger's* teachings were consistent with location determining technologies/techniques known to such a skilled person at the time, including those relating to geofencing and other user controlled configurations where specific/designated actions may be performed based on a location determined to be within or outside designated locations. (See my discussions above in §V; see also Ex-1016, Abstract, FIGS. 1:18-4:63, 6:30-7:3, 14:38-44 (user may define a geofence via portable device), 16:41-67, 17:39-20:46; Ex-1019, ¶¶0008-0081, 0164-0171, 0177-0185, 0217-0240; Ex-1055, 1:49, 2:20-3:3, 3:49-4:22, 6:12-7:41 (user

designated zones where tasks are performed when it is determined mobile device is moved outside or inside zone); Ex-1061, FIG. 13c, 1:61-2:8, 8:54-9:10, 21:4-13.)

139. In my opinion, such functionalities and features (coupled with the teachings of *Nanda*) would have been in the mind of a person of ordinary skill in the art when considering *Spain-I* (see my discussions of *Spain-Nanda* for claim 1 in §IX.A.1). Such a skilled person would have found benefits in configuring the modified *Spain-I-Hunzinger-Nanda* system/processes such that the MU was programmed/configured with similar user interface capabilities and associated location-based features to allow the MU user to choose the location(s) (used in the fingerprint database) and associate service(s)/actions/tasks, etc. with such location(s), which are performed by the MU upon determining when the current location fingerprint information (*e.g.*, station ID/signal strengths) matches or otherwise.

140. Given the teachings and suggestions of *Hunzinger*, a person of ordinary skill in the art would have appreciated the advantages/benefits of programming/configuring the modified *Spain-I* system/processes to perform location determining processes such that determining whether the MU's current location is within proximity of the user chosen location included determining whether the MU/user is at, has entered, or has left a user chosen location and

executing user selected actions based on such determination, consistent with that taught by *Hunzinger*. (See my above analysis regarding *Hunzinger*.) For example, such a skilled person would have appreciated potential advantages obtained from such modifications, such as expanding the applications of the modified *Spain-I*-system/processes so that particular (and user selected) actions can be triggered depending on how the user decides to configure such location-based functionalities using a user friendly interface on the MU (e.g., launching programs, receiving alerts, reminders, etc. based on a determination that the MU/user is at or has entered a user specified location, or has left such a location). *Hunzinger*'s guidance as to the benefits of such applications (e.g., Ex-1054, 2:10-44, 5:29-6:30) were consistent with such a skilled person's understanding of similar features in the art at the time, such as position tracking, security, communication or information management, service-related and other features, etc. (See my discussions above in §V; see also e.g., Ex-1016, 14:16-16:8; Ex-1055, 2:29-3:3, 7:8-41; Ex-1061, 1:53-2:52, 17:1-20:4; Ex-1019, ¶¶0164-0171.) A person of ordinary skill in the art would have understood that such features would have complemented the service-oriented features contemplated by *Spain-I*, which also would have motivated such a skilled person to consider the teachings and suggestions of *Hunzinger* (and *Nanda*). (Ex-1011, 3:5-16.)

141. For example, *Spain-I* discloses:

The location of the mobile unit is of interest to the location server for several reasons such as provisioning of prompt and efficient personalized services, dispatching emergency assistance personnel, tracking the movements of the mobile unit, etc.

(Ex-1011, 3:8-16.) Also that:

In many instances, *location server 30 is interested in only determining if mobile unit 10 is at a particular location or not.* The resolution of knowing the mobile unit's location is not high (*e.g.*, several meters), but much coarser, such as of the order of several tens of meters. For example, *location server 30 may be interested in knowing if mobile unit 10 is inside a particular building, or a campus or a block.* In such cases it is not necessary to provide very high-resolution information to location server 30.

(*Id.*, 4:23-33.) Accordingly, such a skilled person also would have been aware of similar features in location determining system applications, as suggested by *Spain-I* and known in the art (Ex-1033, 1:43-59, 5:46-6:38; Ex-1016, 1:18-4:63, 6:30-7:3, 16:41-67.)

142. A person of ordinary skill in the art would have thus appreciated benefits in allowing the user to select locations that he/she desires to be

checked/tracked (*e.g.*, allow the MU user to select locations that may be of interest to them so that later the MU can inform the user or perform certain functions when the MU/user is later determined to be within the vicinity of the chosen location (*e.g.*, particular retailer, service vendor, home, office, etc.) Such action-based features/functionalities, coupled with the use of interface mechanisms to facilitate user chosen location functionalities (as I discussed above), would have beneficially expanded the capabilities/functionalities of the *Spain-I* system/process with improved features, resulting in a more marketable, desirable, and/or user-friendly and feature-based location determining system, thus expanding the application options considered by a person of ordinary skill in the art designing/implementing *Spain-I*'s system/process, consistent with *Hunzinger* (*e.g.*, Ex-1054, 2:10-44, 5:29-6:30), *Nanda* (*see* my discussions above), such a person's state of art knowledge (*see* my discussions above in §V; *see also e.g.*, Ex-1016, 14:16-16:8; Ex-1055, 2:29-3:3, 7:8-41; Ex-1061, 1:53-2:52, 17:1-20:4; Ex-1019, ¶¶0164-0171), and features contemplated by *Spain-I* (Ex-1011, 3:5-16).

143. A person of ordinary skill in the art would have considered known tradeoffs, such as balancing costs, processing and other computing resources, beneficial features and expanded applications provided, and the like, in considering the modification. Consequently, in my opinion, in light of such collective

teachings/suggestions from *Spain-I*, *Hunzinger*, and *Nanda* in context of a person of ordinary skill in the art's state of art knowledge, a person of ordinary skill in the art would have been motivated to configure the modified *Spain-I* system/processes where the MU performed processes to determine if a monitored location is within proximity of a location chosen by a user of the MU (*e.g.*, MU/user monitored location is at, has entered, or left a user chosen location), like that claimed. A person of ordinary skill in the art would have leveraged their skills and knowledge to configure the resulting system/processes to include, among other things, modified software and possibly related components in the MU that worked in conjunction with the signals communicated from the antenna stations in a manner consistent with the *Spain-I-Hunzinger-Nanda* system/processes that I discussed above and features similar to those described by *Hunzinger* and *Nanda* (modified to be compatible and operational in the *Spain-I* modified MU system/processes). (Ex-1054, 4:1-5:22; Ex-1011, 4:23-26; Ex-1006, 2:16-59.)

144. A person of ordinary skill in the art would have thus understood that such modifications would have involved use of known technologies and techniques within their knowledge and capabilities. Thus, such a skilled person thus would have been capable of considering, designing, and configuring such modifications, and done so with a reasonable expectation of success in achieving them. In fact,

Hunzinger discusses use of station ID and signal conditions (including signal strength) for location information for determining whether a device has returned to a previously identified location (Ex-1054, 4:1-20, 6:37-49, 7:9-22, 7:29-42, 8:25-38 (see my discussions below in §IX.A.1(b)(ii)(2))) similar to *Spain-I*'s configurations that allowed a user to select when (and thus where) MU location determination is to be initiated (e.g., Ex-1011, 6:9-21) and use of station ID and associated signal characteristic information (*id.*, 13:16-14:31), and the state of art (Ex-1062, 1:26-33 ("The mobile station's position is determined to lie in the area corresponding to a fingerprint data point of highest correlation to the RF data sample."); Ex-1028, 12:55-13:18 (discussing fingerprint location techniques to determine whether a user has entered or exited a given area)). (See also Ex-1011, 3:34-40, 15:19-35.)

145. Thus, it is my opinion that the collective teachings/suggestions of *Spain-I-Nanda-Hunzinger* and a person of ordinary skill in the art's state of art knowledge, would have motivated such a skilled person to configure/modify the *Spain-I* system/processes with beneficial features like those discussed above (e.g., MU interface mechanisms/functionalities allowing a user to choose location(s) from which fingerprint data is collected for building the user chosen locations in the database, and configurations that perform user selected actions to be executed/performed depending on user-selected proximity trigger conditions (at,

entering, left location(s), etc.)). Accordingly, the *Spain-I-Hunzinger-Nanda* combination (including as complemented by the teachings of *Nanda* for reasons mentioned below in §IX.A.1(b)(ii)(2)) discloses/suggests the “determining if a monitored location is within proximity of a location chosen by a user of the first portable RF communication device” (MU) features of limitation 1(b), including where such proximity features encompasses the monitored location being at the user chosen location, and where they include determining that the MU/user has entered or left such location, consistent with that discussed in the specification and/or the prosecution file history of the ’698 patent (as I discussed above).

**(2) Comparing ID and Signal Characteristic
Number(s) and Features**

146. In my opinion, the *Spain-I-Hunzinger-Nanda* combination discloses and/or suggests the comparison features recited in limitations 1(b)(i)-1(b)(ii).

147. The claimed “varying signal characteristic” encompasses at least signal strength. (Ex-1001, 26:33-35 (claim 2).) Also under the plain language of claim 1, the “at least one *number* based on the varying signal characteristic...” encompasses signal strength measurement(s), which is a number (*e.g.*, value), consistent with that described in the ’698 patent (Ex-1001, 6:37-40) (“the majority of the description relates to direct measurements of signal strengths and direct comparisons of those

measurements”), 7:1-4 (“device simply performs such reception measurements and compares these measurements with the remembered signal strength combinations”)) and known in the art.¹¹

148. In line with established techniques known in the art, and the ’698 patent, *Spain-I* discloses the measurement of signal strengths denoted by strength values (in dBm), which are “number(s)” based on the “varying characteristic of the” signals received from the antenna stations like that claimed. (§IX.A.1(pre)-IX.A.1(a); Ex-1011, 12:11-14 (“-11 dBm”), FIG. 9 (SS values). Accordingly, the signal strength values (*e.g.*, SS) in each fingerprint, both for the current monitored location and for the location(s) in the fingerprint database, includes “at least one number” (value(s) based on the varying signal characteristic of the communications signals (signal strength) from each of the first plurality of antenna stations, as described in *Spain-I*. (See my above analysis at §IX.A.1(a)-1(b)(ii)(1); *see also* §IX.A.1(b)(ii)(3).)

149. As I explained above, *Spain-I* discloses processes/systems for comparing fingerprint information associated with a current monitored location with

¹¹ The prior art discloses/suggests these features in context of the file history statements regarding the claimed “number(s)” for reason below. (§IX.A.1(b)(ii)(3).)

stored fingerprint information associated with previously tracked or selected locations. (*See* my above analysis in §§VIII.A, IX.A.1(pre)-1(b)(ii)(1).) As I explained, such locations corresponding to the fingerprint data in the fingerprint database would have been selected by a user of the MU in the modified *Spain-I* system/processes for reasons explained above (*see* my discussions and analysis above in §IX.A.1(b)(ii)(1)). Every fingerprint can be created by utilizing at least one station ID along with the measured signal strengths of the communication signal(s) from the corresponding antenna station(s) when the mobile unit (MU) is positioned at a particular chosen location. (§§IX.A1(pre)-1(b)(ii)(1).)

150. In addition to my above discussions, *Spain-I* discloses various ways to determine whether fingerprint information matches or is “close” to each other. *Spain-I* explains:

The generated fingerprint is compared with the fingerprints in the database and the fingerprint in the database that is closest to the generated fingerprint is selected as the match. The corresponding location in the database is then chosen as the location of the MU. In one embodiment of the invention, the search algorithm takes more than one fingerprint from the database that are closest to the generated fingerprint and interpolates the most plausible location for the MU from the

locations of the chosen fingerprint. (Ex-1011, 5:66-6:8; Ex-1005, 4:22-36.)

“There are many choices for the search algorithm that is required to determine the closest matching fingerprint, as can be appreciated by one skilled in the art of statistical pattern matching,” including choosing “the fingerprint from the database that has the smallest mathematical distance between itself and the captured fingerprint” (e.g., “norm between the two data sets” and “average squared difference between the two fingerprints”). (Ex-1011, 8:8-21; Ex-1005, 5:10-33).

151. A person of ordinary skill in the art would have understood that while *Spain-I* discloses features such as comparing fingerprints and using difference/distance processes to evaluate the closeness of a match between such fingerprint comparisons, *Spain-I* lacks details as to how the fingerprint data is assessed or how such comparisons are performed, including in context of the fingerprints’ underlying parameters (e.g., associated with features like comparing monitored and user chosen location station ID/signal strength number(s)).

152. However, a person of ordinary skill in the art would have understood at the time that there were numerous ways for analyzing fingerprints/signal characteristics to determine location proximity (as *Spain-I* suggests). Therefore, such a skilled person would have had reasons to consider teachings and guidance

from the art, and thus would have been motivated to consider such disclosures when considering *Spain-I* (including in context of the modifications I discussed above relating to *Hunzinger* and *Nanda*). (See my discussions above in §IX.A.1(b)(ii)(1) and in §V; see also e.g., Ex-1019, Abstract, ¶¶0012-0078, 0176-0177, 0333; Ex-1020, Abstract, ¶¶0013, 0029, 0048-0059; Ex-1017, Abstract, 3:64-4:7, 6:23-8:38; Ex-1026, Abstract, 3:58-4:56; Ex-1027, Abstract, ¶¶0012-0023, 0096-0099; Ex-1028, Abstract, FIGS. 4-8, 1:10-4:14, 5:10-16, 5:16-63.) Accordingly, such a skilled person would have been motivated by the collective teachings of *Hunzinger* and *Nanda* to configure the MU in the above modified *Spain-I* system/processes (§IX.A.1(b)(ii)(1)) to determine if the MU's first monitored location (monitored in accordance with that discussed above (§IX.A.1(a))) is in proximity of a user chosen location (**limitation 1(b)**) by electronically comparing at least one station ID and at least one number based on the varying signal strengths of the communication signals (e.g., signal strength values) from each of the first plurality of antenna stations at the first monitored location with the at least one ID and the at least one number based on signal strengths of the communication signals from each of the first plurality of antenna stations at the location chosen by the user, as claimed in **limitation 1(b)**.

153. For example, as I discussed above in §IX.A.1(b)(ii)(1)), *Hunzinger* discloses features where a mobile device includes position location technology and

memory to store remembered location information, monitors the mobile device's current location, and compares remembered locations with current location information to determine whether the device has left or entered a remembered location to execute particular actions.

FIG. 2 is a flow chart illustrating location reminder programming, monitoring and triggering procedures according to one embodiment of the present invention. *The procedure is executed on a mobile terminal with or without position location technology.* The mobile terminal has some type of user-interface that is capable of allowing selecting or programming reminders alerts, or actions. The mobile terminal also includes memory for storing location related information ("remembered" locations) and trigger or action information. *The terminal also includes a position-monitoring function that compares one or more "remembered" locations with current location information.*

(Ex-1054, 3:49-60.) (*See also id.*, 4:21-57.)

154. *Hunzinger* explains that **location information** can include "station ID" and "signal conditions" (*id.*, 4:3-8). In particular, location information can include base station IDs and signal strength data, which are compared to determine whether the mobile device is at, entered, or left a remembered location. *Hunzinger* discusses location information in its claims:

1. A method of providing a terminal with location-based actions in a communications network comprising:

storing at least a ***first set of location information***;

associating a terminal action with said first set of location information; and

executing the associated terminal action when a ***current terminal location information is within a specified range of the first set of location information***;

applying to a ***comparison between the current terminal location information and the first set of location information*** a step selected from the group consisting of hysteresis, delay, proximity threshold, distance threshold, signal condition change threshold.

8. The method of claim 1, wherein said ***location information consists of at least one*** of the elements selected from the group consisting of ***base station identifier, pilot signal strength***, pilot signal pseudo noise offset, multi-path profile, signal conditions, location identification, location name and area name.

(*Id.*, 6:37-49, 7:9-22.) (See also *id.*, 7:29-42, 8:25-38.)

155. *Hunzinger* also describes with reference to FIG. 3 (below) an exemplary monitoring/triggering action where the device “monitors the current location information *compared* to the stored reminder *location information*,” and the

compared location information may include base station ID and pilot signal strength information (*Id.*, 4:60-5:22 (describing reminder triggered when device is at location 300; transitions based on base station ID, pilot, etc.), 4:1-12, 6:37-49, 7:9-22, 7:29-42, 8:25-38.)

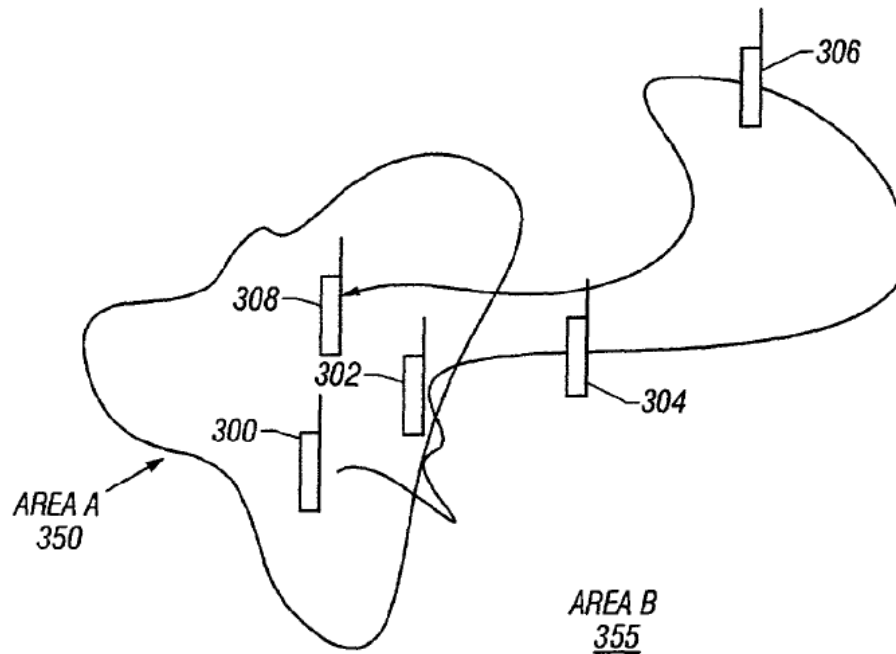


FIG. 3

(*Id.*, FIG. 3; *see also* my discussions of *Hunzinger* above in §IX.A.1(b)(ii)(1).)

156. A person of ordinary skill in the art would have appreciated and understood that *Hunzinger's* teachings were consistent with technologies and techniques known to such a person at the time. (*See* my discussions above in

§IX.A.1(b)(ii)(1) and in §V; *see also e.g.*, Ex-1019, Abstract, ¶¶0012-0078, 0176-0177, 0333; Ex-1020, Abstract, ¶¶0013, 0029, 0048-0059; Ex-1017, Abstract, 3:64-4:7, 6:23-8:38; Ex-1026, Abstract, 3:58-4:56; Ex-1027, Abstract, ¶¶0012-0023, 0096-0099; Ex-1028, Abstract, FIGS. 4-8, 1:10-4:14, 5:10-16, 5:16-63.)

157. For example, in considering the teachings of *Nanda* for reasons I discussed above (§IX.A.1(b)(ii)(1)), a person of ordinary skill in the art would have also found and considered teachings relating to comparing signal strength and station ID data fingerprint data in location determining systems that perform processes for determining if a mobile device is in proximity of a location. For example, *Nanda* discloses collecting signal information to generate fingerprints associated with specified locations, which are stored and used to be compared with a current location fingerprint to determine whether the mobile device is located within the proximity of a location associated with a matching fingerprint. (*See* my above discussions regarding *Nanda*, including those in §VIII.B; Ex-1006, FIGS. 3A-3B, 2:43-51, 6:12-66, 7:6-13.) *Nanda* describes configurations where a mobile device 102 executes an algorithm for creating fingerprints and “comparing different fingerprints to one another” and that a fingerprint may be associated with connected wireless LAN access point(s). (Ex-1006, 8:29-55.) Such processes results in stored information—

exemplified in the table below—including antenna station identifiers and corresponding signal strengths.

WAN ID	WLAN SSID	WLAN BSS ID	Signal Strength	Phase
A	I1	A ₁	s ₁ (A ₁) . . . s _n (A ₁)	p ₁ (A ₁) . . . p _n (A ₁)
		A ₂	s ₁ (A ₂) . . . s _n (A ₂)	p ₁ (A ₂) . . . p _n (A ₂)
		A ₃	s ₁ (A ₃) . . . s _n (A ₃)	p ₁ (A ₃) . . . p _n (A ₃)
B	I1	B ₁	S ₁ (B ₁) . . . s _n (B ₁)	
	I2	B ₂	S ₁ (B ₂) . . . s _n (B ₂)	

(*Id.*, 8:29-55, 9:31-10:13; *id.*, 8:56-9:7 (“particular base stations in the WAN may be identified by . . . pilot signal strengths” and access points A₁-A₃ and B₁-B₂ are within coverage of base stations A and B, respectively).)

158. *Nanda* explains that the last two columns of the above table “include the values that comprise the fingerprint itself,” where “the fingerprints for the access points B₁ and B₂ comprise only signal strength information.” (Ex-1006, 9:8-13.) The mobile device may “calculate a fingerprint for its current location and compare it to the information in columns 4 and 5 in the table,” and may limit its fingerprint match to entries corresponding to the WAN ID with which its registered (*e.g.*, “when registered with WAN ID A [or B], only fingerprints associated with WAN ID A [or B] in the table are used for matching”). (*Id.*, 9:17-20.) “[C]omparison of a current fingerprint to a stored fingerprint can be performed in a variety of ways.” (*Id.*, 10:14-16.) Because fingerprints have attributes that may vary (even for the same location),

Nanda describes a comparison process that does not rely on “exact duplicity” for a match. (*Id.*, 10:22-25.) Thus, *Nanda* defines a “deviation amount” to “help control the determination of whether a finger matches a stored fingerprint” (*id.*, 10:36-38), which is shown in the table below as “d” for signal strength deviation.

WAN ID	WLAN BSS ID	Signal Strength	Strength Deviation	Phase	Phase Deviation
A	A ₁	s ₁ (A ₁) . . . s _n (A ₁)	d ₁ (A ₁) . . . d _n (A ₁)	p ₁ (A ₁) . . . p _n (A ₁)	q ₁ (A ₁) . . . q _n (A ₁)
	A ₂	s ₁ (A ₂) . . . s _n (A ₂)	d ₁ (A ₂) . . . d _n (A ₂)	p ₁ (A ₂) . . . p _n (A ₂)	q ₁ (A ₂) . . . q _n (A ₂)
	A ₃	s ₁ (A ₃) . . . s _n (A ₃)	d ₁ (A ₃) . . . d _n (A ₃)	p ₁ (A ₃) . . . p _n (A ₃)	q ₁ (A ₃) . . . q _n (A ₃)

(*Id.*, 10:39-51.) The above table shows identified antenna stations (*e.g.*, A₁, A₂, A₃) respectively associated with signal strength number(s) (*e.g.*, S₁{A₁} . . . S_n{A₁}) and deviations (*e.g.*, (d₁{A₁} . . . d_n{A₁})).

159. Regarding FIG. 3B (“method to compare fingerprints of different locations”) (Ex-1006, 3:18-19), when the MU is controlled to capture a current location fingerprint, a signal strength vector is collected (“X_i. . . X_n”). (*Id.*, 10:51-56, FIG. 3B (320) (below).)

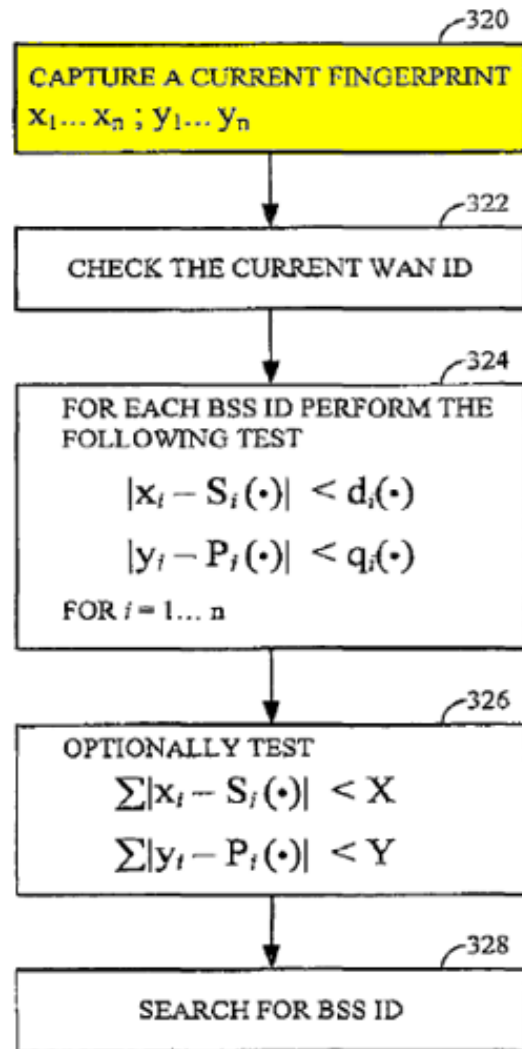
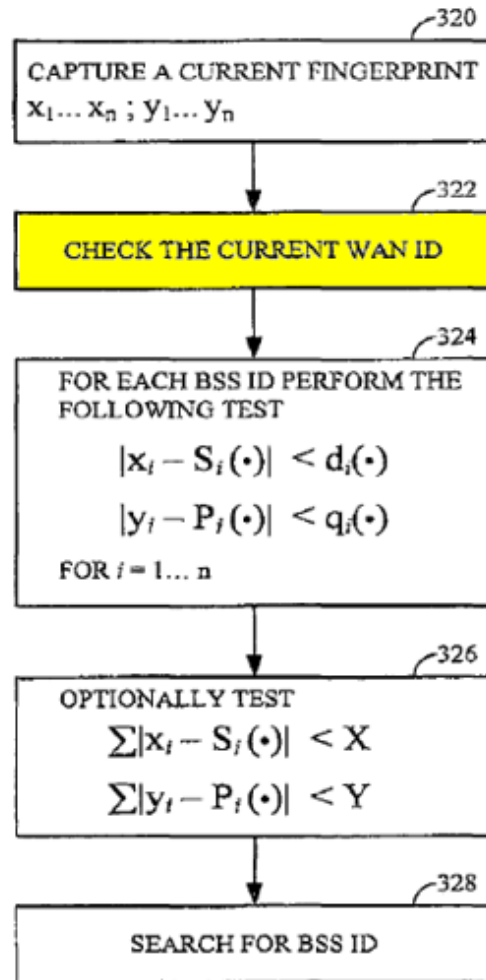


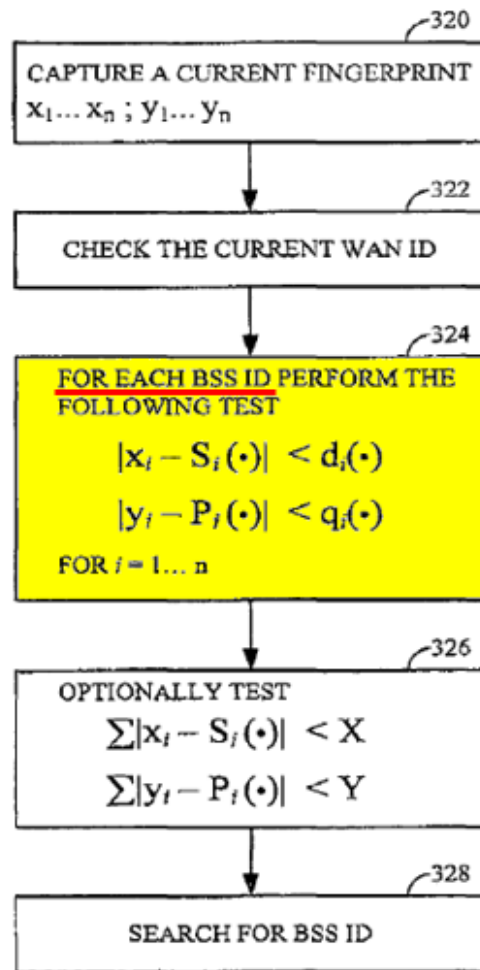
FIG. 3B

160. At step 322, the current WAN ID is checked and identified access point information is determined for the current location (*Id.*, 10:58-60; *id.*, 9:31-38 (discussing information stored in the table of column 8 may vary, including the “combinations of WAN IDs versus access point IDs”), *id.*, 9:38-52 (“... store

information about the corresponding access point (*i.e.*, the BSS ID’), 10:60-61 (“searching database for identifiers of the observable pilots [signals]”).)



161. At step 324, the signal strengths of fingerprint(s) for each BSS ID (access point) within an identified WAN ID (*e.g.*, A or B) is compared to the current fingerprint signal strengths to determine if the difference is below a predetermined threshold.



162. Algorithmically, the process may be performed by:

For $i = 1$ to n :
 determine if $|x_i - s_i(\cdot)| < d_i(\cdot)$
 determine if $|y_i - p_i(\cdot)| < q_i(\cdot)$

where d = deviation value (e.g., a threshold), x_i = signal strength of current signal i , and s_i = stored signal strength. (Ex-1006, 10:62-11:10.) A “match” is determined

when the difference is less than ($<$) a predetermined threshold (d). (*Id.*) *Nanda's* comparisons performed for the WAN IDs (322) and “each BSS ID” (324) indicates a comparison of antenna station IDs since the stored number(s) (“Si”) and current number(s) (“Xi”) are compared for the same BSS ID and associated WAN ID, and thus a person of ordinary skill in the art would have understood *Nanda* to disclose or suggest comparing station identifier information to ensure relevant strength value information are compared (*e.g.*, number(s) corresponding to the same access points and/or WAN base stations (FIG. 3B, Steps 322-324). *Nanda* states that in step 322 “[f]urther search refinements are possible by **searching the database for identifiers of the observable pilots.**” (Ex-1006, 10:60-61.) That is, before the signal strength comparison takes place in step 324, the system compares monitored base station identifiers to identifiers stored in the database. (*Id.*) Moreover, in describing how the fingerprint entries can be refined, *Nanda* discloses how the BSS ID of a received communication signal at a current monitored location is checked against the BSS IDs in the fingerprint database. (Ex-1006, 11:33-41.) If no entry exists for that BSS ID (antenna station), “a current fingerprint can be generated (see FIG. 3A) and then stored.” (*Id.*, 11:42-43.) If a fingerprint entry exists for the access point, then the current fingerprint may be used to refine the stored fingerprint. (*Id.*, 11:43-46.) Refinement can include be made “with reference to the signal strength parameter. .

. or any other attributed that used to create the fingerprint.” (*Id.*, 11:47-56; *see id.*, 11:56-12:13 (strength/deviation values adjusted).

163. A person of ordinary skill in the art would have understood that based on this searching/comparison, the system would then proceed with the signal strength comparisons in step 324 to determine if there is a fingerprint match. (Ex-1006, 10:58-66.) Such signal source identifier comparison features like that disclosed by *Nanda* were well-understood to reduce processing requirements by ensuring a mobile device is generally close to a previously marked location before performing more demanding location processing. (*See* my discussions above in §V; *see also e.g.*, Ex-1033, 2:63-3:19.)

164. *Nanda* discloses an “optional” test (Step 326) that compares the sum of all differences to a “threshold” X to refine whether a “match” is made. (*Id.*, FIG. 3B (step 328 (below), 11:11-18.))

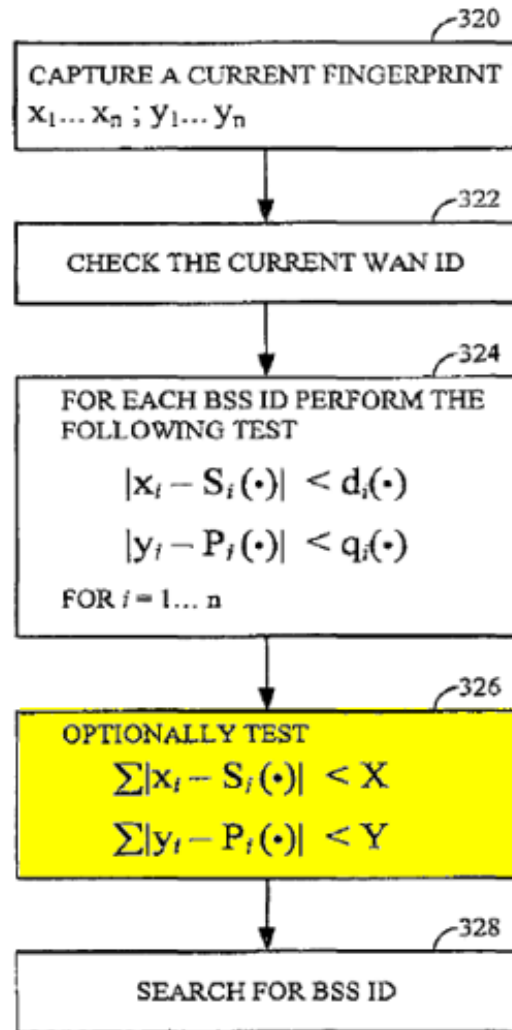


FIG. 3B

165. Thus, *Nanda* discloses and/or suggests a mobile device performing processes that compares stored signal strength number(s) and a corresponding antenna station ID with the current signal strength number(s) and corresponding antenna station ID, similar to the features recited in claim limitations 1(b)(i)-(b)(ii).

166. Based on the teachings and suggestions of *Hunzinger* and *Nanda*, in context of their state-of-art knowledge and *Spain-I*, a person of ordinary skill in the art would have been motivated to modify/configure the *Spain-I* system/processes (as modified above (§IX.A.1(b)(ii)(1))) in such a way that the MU performs location determining processes that include comparing at least one station ID and at least one number based on the signal strengths (*e.g.*, SS value(s)) for the signals that are received from the first antenna stations (*e.g.*, stations in range of the MU when generating fingerprints for the database) for a currently monitored location with at least one station ID and at least one number based on the signal strengths (*e.g.*, SS value(s)) stored in the fingerprint database (relating to user chosen location(s)) (*see* §IX.A.1(b)(ii)(1)). Comparing the station ID information in such a manner would have allowed the MU in the modified *Spain-I* system/processes to use signal strengths corresponding to signals received from the same antenna stations when performing location determining processes (*e.g.*, determining whether the MU is at, entering, or has left, a user chosen location).

167. A person of ordinary skill in the art would have appreciated *Spain-I*'s teachings and suggestions (*see* my above analysis in §§IX.A.1(pre)-1(b)(ii)(1) and above here in this section) in context of the location determining processes disclosed by *Hunzinger* (describing comparing current location information (*e.g.*, base station

ID and signal strengths) with remembered location information (*e.g.*, base station ID and signal strengths)) and those by *Nanda*, which describes processes that compares signal strength number(s) for a current location (*e.g.*, $x_1 \dots x_n$) with signal strength number(s) for previous selected locations (*e.g.*, $s_1 \dots s_n$) for each BSS ID and/or corresponding WAN ID, which ensures the strengths analyzed are associated with the same antenna station (Ex-1006, FIG. 3B, 8:43-30, 10:49-11:19, 10:60-61 (the database is “search[ed]. . . for identifiers of the observable pilots”).)

168. Guided by such teachings/suggestions, a person of ordinary skill in the art would have been led to modify *Spain-I*'s system/processes (*e.g.*, the MU) to perform processes that electronically compares antenna station IDs and signal strength number(s) for the current monitored location of the MU with those for the user chosen location(s) stored in the fingerprint database (as I explained above) in order to determine whether the MU is within the proximity of the user chosen location as I discussed above. Implementing such features would have enhanced accuracy in determining whether the MU is within proximity of a user selected location, as it would provide for analysis of signal strengths of signals received from the same identified antenna stations within communication range of the MU at the respective locations, consistent with the features taught, suggested, and/or

contemplated by *Spain-I* and *Hunzinger* and *Nanda*. (See my discussions below and my above analysis in §§IX.A.1(pre)-1(b)(ii)(1).)

169. A person of ordinary skill in the art would have leveraged their experience and skills, and the teachings of *Spain-I-Hunzinger-Nanda* to, for example, program software (or configure such software and possibly related components) executed/used by the MU to compare station ID information to ensure that the corresponding fingerprint information was available, for facilitating signal strength comparisons, with the current location fingerprint information. This would have predictably resulted in ensuring that the algorithms/software employed to determine whether the MU is in the vicinity of a previously selected location is based on the comparison of signal strength values associated with signals received from the same antenna stations when the MU is at the current monitored location and previously selected location(s). Doing so would have conserved processing resources by avoiding comparison operations if no station IDs matched (such as when the MU has received signals from antenna station(s) that have no corresponding fingerprint information in the fingerprint database. Indeed, ID comparisons (like that taught by *Hunzinger/Nanda*) would have beneficially reduced possible locations being assessed, as contemplated by *Spain-I*. (Ex-1011, 10:20-27.)

170. A person of ordinary skill in the art would have had the skills and rationale in light of the teachings/suggestions of *Spain-I-Hunzinger-Nanda*, and such a skilled person's state-of-art knowledge, to implement the above-modifications with a reasonable expectation of success. For instance, such a skilled person would have understood that such modifications would have involved known technologies/techniques (*e.g.*, programming and use of known computing/electronic components and wireless communication/networking technologies, etc.). The combined teachings of *Spain-I*, *Hunzinger*, and *Nanda* would have thus predictably resulted in the modified system (*e.g.*, MU) being configured to compare station IDs for a monitored location and a user selected location (stored in the database) to ensure signal characteristics from the same stations are analyzed (*e.g.*, which would have included comparing signal strength number(s) for the identified monitored and user selected locations). Consequently, the modified system/process would have determined whether or not a MU is at, or has reached, a particular location like of that claimed. (*See my discussions above in §IX.A.1(b)(ii)(1).*)

(3) At Least One Number Features in Context of Prosecution History Statements

171. I have also been asked to assume a scenario wherein the claimed “at least one number based on...” claim language is interpreted consistent with applicant’s representations during prosecution (*see* my above analysis at §VIII). As to that scenario, it is my opinion that a person of ordinary skill would have been motivated (and would have had good reason) to configure the *Spain-I-Hunzinger-Nanda* system/processes to execute a formula or similar mathematical algorithm/function to the signal characteristic data (*e.g.*, signal strengths) measured for each identified station for the monitored location and also correspondingly for the user selected location(s), from which the comparison is made to determine whether the MU is in proximity of the user selected location (*e.g.*, “am I there”), as I discussed above. (§IX.A.1(b)(ii)(1)-(2).)

172. For instance, *Spain-I* discloses that signal strength may be “sampled multiple times for each frequency in order to smooth out any variations,” thereby suggesting some type of calculation is performed to process and/or generate fingerprint signal strength value(s):

Finally, Signal Strength fields 411, 413, are filled by the mobile unit based on the signal strengths of the received carriers. In one embodiment the **signal strength is sampled multiple times for each frequency in order to smooth out any variations**. At least

one of the Signal Strength fields is required to be filled by the mobile unit.

(Ex-1011, 13:51-55; §§IX.A.1(a)-(b).) *Nanda* further discloses generating a fingerprint based on calculated average strength values. (Ex-1006, FIG. 3B (324-326), 8:29-36, 7:19-28 (measurements “averaged together or otherwise combined in some statistically significant manner in order to generate the fingerprint”), 11:11-18, 6:19-25.) *Hunzinger* also teaches/suggests “averaging multiple measurements...is well known in the art.” (Ex-1054, 6:17-19). Such an averaging technique, as a person of ordinary skill in the art, was applicable to the fingerprints generated for chosen and monitored locations. (Ex-1054, FIG. 4, 1:13-2:49, 3:44-4:59, 6:37-8:44; Ex-1006, FIG. 3B, 8:29-36, 7:19-28, 11:11-18, 6:19-25.)

173. Furthermore, a person of ordinary skill in the art was aware of various techniques for performing calculations via a formula or similar mathematical operation to measured signal characteristic data. (*See, e.g.*, Ex-1029, 2:18-29 (“Power averaged over a certain duration can be estimated to smooth temporary localized fading and other types of multipath fading caused by obstructions, such as buildings and mountains....[P]ower averaging can be achieved by using a ‘rolling window’ of signal strength values to determine the averaged signal strength

values.”); Ex-1030, ¶0087 (“signal strengths, preferably smoothed (*e.g.*, averaged)”).)

174. Thus, *Nanda*’s teachings in context of the suggestions from *Spain-I* and knowledge in the art would have motivated a person of ordinary skill in the art to configure the modified *Spain-I-Hunzinger-Nanda* system/process such that the MU performed processes that applied a formula or similar mathematical operation to refine the signal characteristic data (*e.g.*, signal strengths) to provide adjusted values that compensate for, *e.g.*, outlier data (extreme high or low readings/measurements, etc.), adjust for “environment variability” (Ex-1006, 7:19-28), etc. to increase the accuracy or confidence in the location proximity determinations performed by the modified system/process, consistent with that discussed above (§IX.A.1(b)(1)). A person of ordinary skill in the art would have appreciated that using such formula-based calculations to smooth or average the collected signal characteristic data (*e.g.*, signal strengths) as contemplated by *Spain-I* and *Nanda* would have been a suggested and predictable combination of known techniques/technologies that would have foreseeably resulted in the MU in the modified system/process to use refined signal characteristic number(s) for the above-discussed comparison technique/features used to determine whether the MU first monitored location is within proximity of a chosen location, like that claimed. Accordingly, such

modifications would have involved use of technologies/techniques within the capabilities/knowledge of a person of ordinary skill in the art (as demonstrated by *Spain-I-Hunzinger-Nanda* and state-of-art teachings above), that would have led a person of ordinary skill in the art to have a reasonable expectation of success in implementing them.

**(4) Substantially Continuously Operating
Fixed-Location Service-Area Antenna Stations**

175. As I explained for limitation 1(a), *Spain-I* discloses or suggests that the MU is working in conjunction with the ***substantially continuously operating fixed-location service-area antenna stations*** as claimed. (See my discussions above in §IX.A.1(a).) However, I have also been asked to assume a scenario wherein *Spain-I* does not disclose or does not, by itself, suggest such claimed features. As to that scenario, it is my opinion that a person of ordinary skill in the art would have been motivated to implement them in the above modified *Spain-I* system/processes in view of the teachings of *Nanda* and *Hunzinger*.

176. Upon considering *Hunzinger* and *Nanda* in context of the teachings in *Spain-I*, like that of which I discussed above (§§IX.A.1(b)(ii)(1)-(3)), a person of ordinary skill in the art would have been motivated to configure the *Spain-I* system/processes (including as modified above) in such a way so that the MU works

in conjunction with substantially continuously operating, fixed-location service-area antenna stations capable of RF communication with the MU to expand/complement applications compatible with those contemplated by *Spain-I*.

177. For example, in addition to that I discussed above and in §VIII.B, *Nanda* discloses the well-known use of “*fixed base transceiver station[s] (BTS)*” within cell coverage regions that “communicates with mobile users.” (Ex-1006, 1:49-53, 1:29-49; *see also id.*, FIG. 1B (below), 5:15-49.)

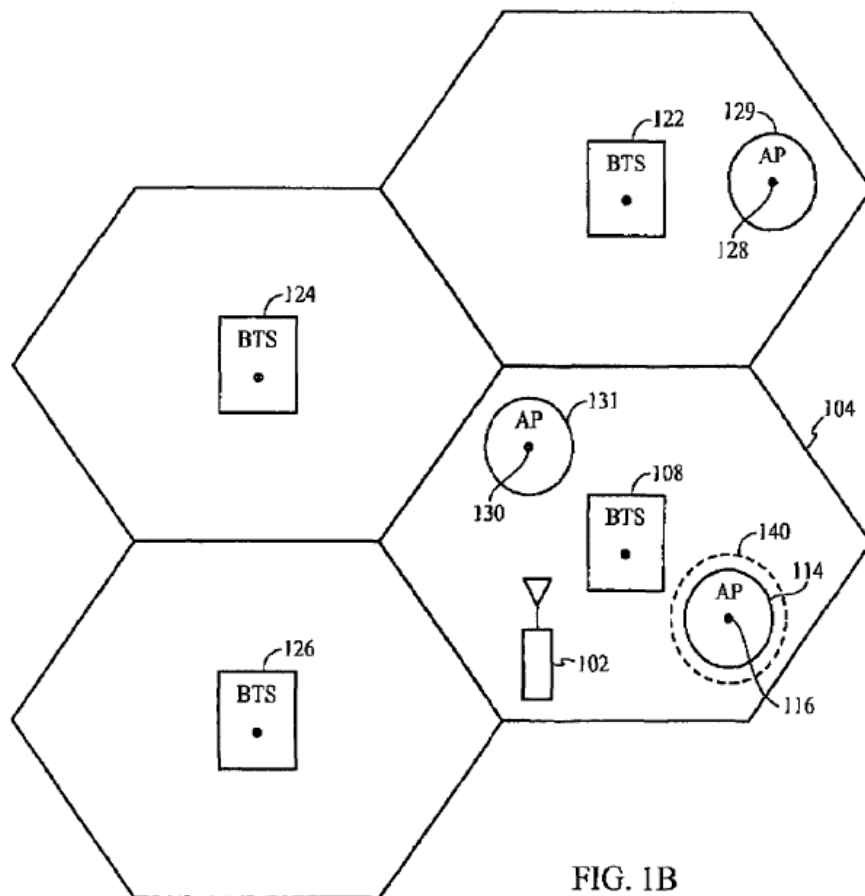
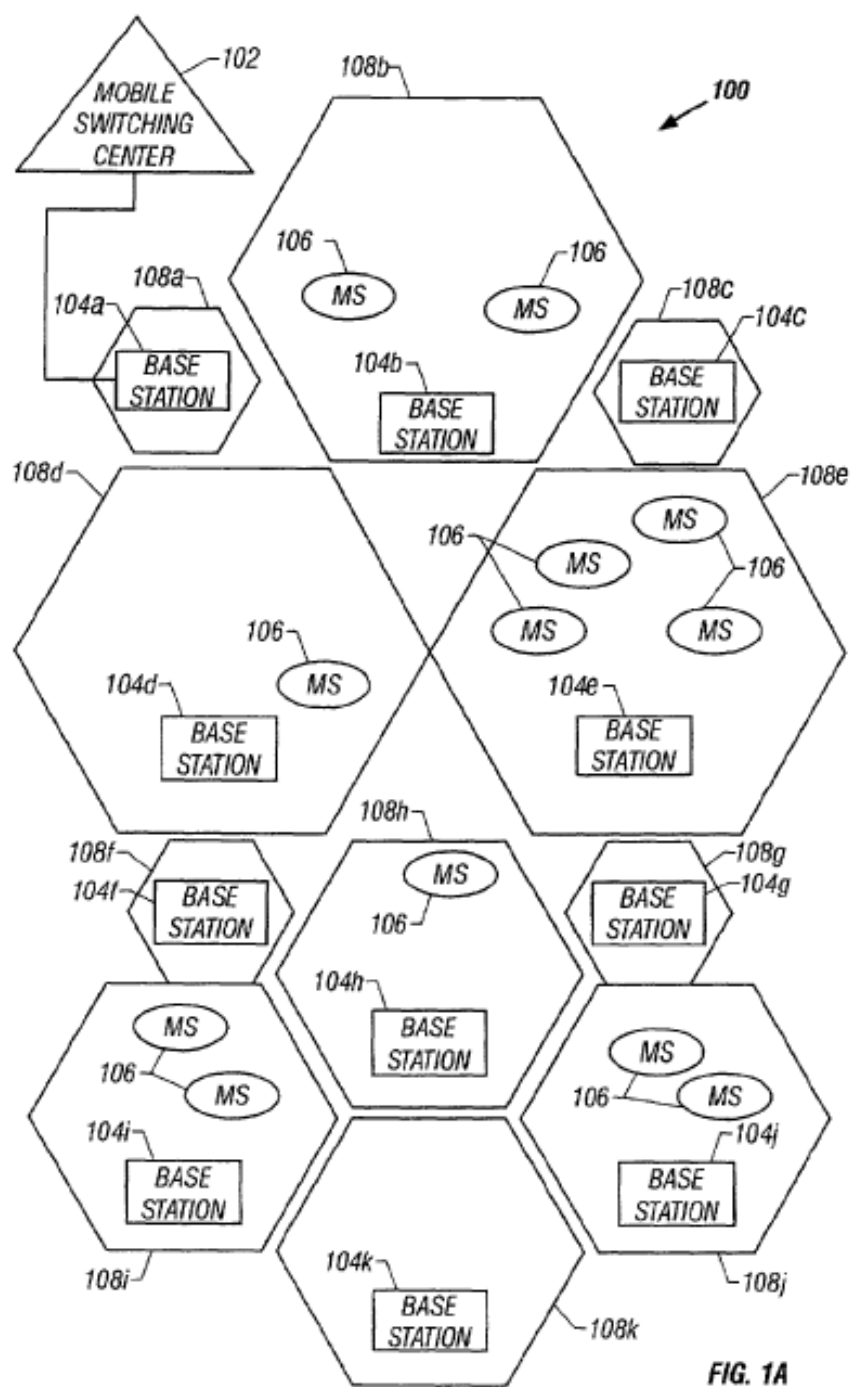


FIG. 1B

178. A person of ordinary skill in the art would have understood that the BTSs and access points are examples of fixed-location service-area antenna stations that substantially continuously operate, given they are in fixed locations and provide beacon/pilot signals and facilitate radio communications with mobile device 102 within a coverage area provided by such stations.

179. *Hunzinger* also discloses use of known base stations. (Ex-1054, FIG. 1A (below), 1:21-54, 5:6-12, 7:9-14.)



180. In my opinion, a person of ordinary skill in the art would have appreciated that implementing such substantially continuously operating fixed

stations, like those described by *Nanda* and *Hunzinger* (and also as known in the art), would have enhanced the use of *Spain-I*'s MU in such wireless network infrastructures. This would have involved wireless communications between the MU and the stations to facilitate a location-determination process similar to that disclosed by *Nanda* and *Hunzinger*. (See my above analysis in §§IX.A.1(b)(ii)(1)-(3).) The disclosures of base stations, wireless communications, and the like in *Spain-I*, coupled with the complementary teachings in *Nanda* and *Hunzinger*, and a person of ordinary skill in the art's knowledge of the art, would have motivated such a skilled person to configure and implement the MU in a wireless network that includes a plurality of such antenna stations that substantially continuously operate to provide communication signals that the MU uses to build the fingerprint database and facilitate location determination processes.

181. A person of ordinary skill in the art would have had the skills and rationale in light of the teachings/suggestions of *Spain-I-Hunzinger-Nanda*, and such a skilled person's state-of-art knowledge, to implement the above-configuration with a reasonable expectation of success for reasons similar to those I explained above in §IX.A.1(b)(1)-(3). Likewise, the above implementations would have involved known technologies/techniques (e.g., use of known antenna stations consistent with that taught by *Spain-I*, *Hunzinger*, and *Nanda*) that would have led

to the MU in the modified *Spain-I* system/processes I discussed above working in conjunction with conventional antenna stations like those contemplated by *Spain-I*, *Hunzinger*, and *Nanda*. (Ex-1011, 3:34-40, 15:19-29.)

2. Claim 2

- a) The method of claim 1 wherein the characteristic is the communications signal's strength, which varies over a range of an antenna station.**

182. In my opinion, *Spain-I-Hunzinger-Nanda* discloses and/or suggests these limitations for reasons I discussed above. (§IX.A.1 (explaining how *Spain-I* (including as modified) uses signal strengths as a signal characteristic as claimed); §§IX.A.1(b)(ii)(2)-(3) (number(s)); Ex-1011, 3:42-54, 7:58-8:8.) A person of ordinary skill in the art would have appreciated that the signals received by the mobile unit (MU) from the antenna stations in the modified *Spain-I* system/processes would have had signal strengths. These signal strengths would fluctuate based on the distance to each station, aligning with the principles of *Spain-I* and *Nanda*, as well as the prevailing knowledge in the field:

The term “wireless communications network” is used herein to refer to a communications network comprising at least one base station transceiver arranged to communicate with at least one mobile station. It will be appreciated by those skilled in the art that a wireless communications network will often take the form

of a cellular communications network, in which a plurality of base station transceivers each define a geographical cell. Mobile stations located in the communications network communicate with one or more base station transceivers, for example, the closest one to the mobile station. **Each base station transceiver has a limited range** and a cell can be considered to be a geographical region over which a base station transceiver can communicate effectively with a mobile station therein.

(Ex-1101, 1:16-29, 3:49-54 (signal characteristics vary); Ex-1006, Abstract (device measures “characteristics or attributes...that vary according to physical location within...[the] network”), 7:23-28 (attributes vary because of environmental variability), 10:19-20 (“attributes that make up the fingerprint may have values that vary (even for the same location)”); Ex-1102, 1:59-2:6 (“The size and shape of each cell is defined by the range of a base station.”); Ex-1103, ¶0006 (“RF signal strength for a signal received by a mobile device varies based upon the mobile device’s location in the cell and velocity.”).)

In wireless communication fields such as portable radio telephone systems and personal handy-phone systems (PHS), a radio wave strength (an electric field strength) level at reception varies in accordance with the distance from a base station. This signifies that the detection of the strength levels of radio waves picked up from a plurality of base stations in a

mobile station side allows the detection of the position of the mobile station, i.e., the position of a person or object who or which carries the mobile station. However, in the case of radio communication systems such as prior portable telephones and PHSs where a plurality of radio zones constitute a service area, the specification of the present location of a mobile station is limited to within a relatively wide area being the range of a radio zone of a base station which accepted the position registration of the mobile station (the range of a general calling area composed of a plurality of radio zones including the radio zone of the base station which accepted the position registration).

(Ex-1104, 2:16-24.)

3. Claim 3

- a) **The method of claim 2 wherein the chosen location signal strengths were measured by the first portable RF communication device.**

183. It is my opinion that *Spain-I*, in view of *Hunzinger* and *Nanda*, discloses and/or suggests these limitations for reasons similar to those I explained in claims 1-2. (§§IX.A.1(pre)-IX.A.2.) As I discussed, *Spain-I* discloses that the MU measures signal strengths. (*See id.*; my discussions above in §VIII.A; Ex-1011, 3:55-65, 5:28-32.) Thus, consistent with my analysis and discussions above (§IX.A.1(b)(ii)(1)), the MU in the modified *Spain-I* system/process would have

measured the signal strengths of the received communication signals from such user chosen location(s), consistent with *Spain-I*'s teachings/suggestions and those of *Hunzinger* and *Nanda*. (§IX.A.1(pre)-IX.A.2; Ex-1011, 5:20-32, 3:55-58, 5:20-28, 13:49-55; Ex-1005, 3:57-61, 4:16-18; Ex-1009, 3:7-24, 4:34-44; Ex-1010, 3:4-21, 4:32-44; Ex-1006, 9:61-11:9; Ex-1054, 3:49-60, 4:3-5:22, 6:37-49, 7:9-22.) Thus for similar reasons, it is my opinion that the *Spain-I-Hunzinger-Nanda* combination discussed above for claim 1 discloses or suggests the user chosen location signal strengths were measured by the MU (*e.g.*, the first portable RF communication device), as claimed in claim 3.

4. Claim 4

- a) **The method of claim 2 wherein the chosen location signal strengths were measured by a second portable RF communication device.**¹²

184. It is my opinion that *Spain-I* in view of *Hunzinger* and *Nanda*, discloses and/or suggests this limitation.

¹² The '698 patent specification describes one instance where a "different mobile telephone" may use the "same data" measured/transferred by a first device (Ex-1001, 10:18-25), but that does not describe the "different" device measuring signal strengths of a user chosen location as recited in claim 4. (*Generally* Ex-1001.)

185. *Spain-I* discloses that the MU communicates with location server/Other Party 30 through a wireless infrastructure involving base stations of a cellular network. (Ex-1011, 3:8-11, 4:7-22.) The location server/Other Party 30 can be a mobile device. (*Id.*, 3:9-12 (“The location server may or may not be mobile”).) *Spain-I* describes configurations where the fingerprint database may be stored at the location server/Other Party 30. (See my above analysis in §§IX.A.1-2; Ex-1011, FIG. 3, 6:9-14 (“fingerprint database is stored at the location server”), 6:15-30; Ex-1005, FIG. 3, 4:28-58; Ex-1009, 5:22-42; Ex-1010, 5:20-41.) Likewise, *Nanda* teaches/suggests similar features where a mobile device creates/sends fingerprint to a remote database. (Ex-1006, 12:14-31.) *Nanda* also discloses configurations where such a remote database can be used to collect fingerprints (with corresponding signal strengths) from other MUs, thus building a database of fingerprint information relating to signal strengths measured by different MUs. (*Id.*) *Nanda* explains “receiv[ing] fingerprints from multiple mobiles devices” allows for a “much larger database of available access points than would be found in a single mobile device.” (*Id.*)

186. Based on such teachings/suggestions in context of the reasons and teachings/suggestions that I discussed above for claim 1 (§IX.A.1(b)), it is my opinion a person of ordinary skill in the art would have been motivated to configure

the *Spain-I-Hunzinger-Nanda* system/processes such that multiple MUs (including a second MU different from the first MU (claim 1)) measure/collect signal strengths from signals received when at the user chosen location for building a robust fingerprint database, consistent with that contemplated by *Spain-I* and *Nanda*. A person of ordinary skill in the art would have recognized and appreciated that the resulting modifications to the *Spain-I-Hunzinger-Nanda* system/process would have resulted in the system/processes using, in some instances, fingerprint information (station IDs and signal strengths) obtained from a different (second) MU (which may be operated by a different user or by the same user of the first MU) and stored in the database for comparison to current monitored location fingerprint information corresponding to the first MU, as I discussed above for claims 1-2 (§IX.A.1-2).

187. A person of ordinary skill in the art would have been motivated to consider and implement such features to allow the modified system/processes to receive and process fingerprints from multiple MUs to create/maintain a larger database of antenna station fingerprint information, like that suggested by *Nanda* (Ex-1006, 12:26-29), thus beneficially expanding applications of *Spain-I*'s disclosed features. Such a skilled person would have had similar rationale for considering such features from *Nanda* and *Hunzinger* (and *Spain-I*) as those I explained above in claim 1 (§IX.A.1(b)), as well as had similar capabilities, expectation of success,

and state-of-art knowledge, that would have led to the above modifications discussed here. A person of ordinary skill in the art would have recognized that *Spain-I* contemplated processes designed to complement existing location determining technologies and augments their performance. (Ex-1011, 3:34-40.)

188. In one non-limiting example, the resulting modified system/processes would have predictably included the use of a remote fingerprint database (contemplated by *Spain-I*'s FIG. 3 configurations and by *Nanda*), resulting in an accurate fingerprint database with an expanded set of fingerprint information that were available for use in the comparison and related location determining operations as I discussed for limitation 1(b) in claim 1. (§IX.A.1(b); *see also* my discussions, rationale, and analysis below for claim 6 (§IX.A.6) regarding remote database features, which are applicable here to support my opinions.) A person of ordinary skill in the art would have been motivated to configure the modified system/processes such that a remote server (*e.g.*, location server/Other Party 30 or other server) maintains a fingerprint database that included measured signal strength and associated ID information that was measured/collected by a plurality of different MUs (*e.g.*, including a first and second “portable. . . device[s]”) associated with and/or operated by a respective user (or same user) (*e.g.*, using a second MU when building databases for user-selected location(s), using the first MU when monitoring

location), for use in the processes for determining whether the first MU is at or in proximity of the user chosen location as discussed above. (Ex-1011, 4:23-25.)

189. A person of ordinary skill in the art would have been motivated and capable of configuring and implementing such modifications in the *Spain-I-Hunzinger-Nanda* system/process so that a remote database maintained fingerprints with similar parameter(s) (e.g., signal strength and ID information used to facilitate location determination via the comparison processes I discussed above in claim 1), regardless of the source of the fingerprints. Such a skilled person would have been motivated to configure and implement such features so that a second MU measured signal strengths at the user chosen location, even where the second device were operated by the same user of the first MU (e.g., at a different time when building fingerprints for the database). For instance, such a skilled person would have known and appreciated that it was common at the time for users to own/use multiple mobile devices (e.g., laptops, tablets, PDAs, mobile telephone, etc.). Thus, in one example, the teachings of *Spain-I* and *Nanda* would have motivated such a skilled person to configure/design the modified *Spain-I* system/processes such that the user of the first MU used a different second mobile device to measure the signal strengths at locations chosen by that user (who may have been a user of the first MU), and for building the fingerprint database maintained by a remote server (such as location

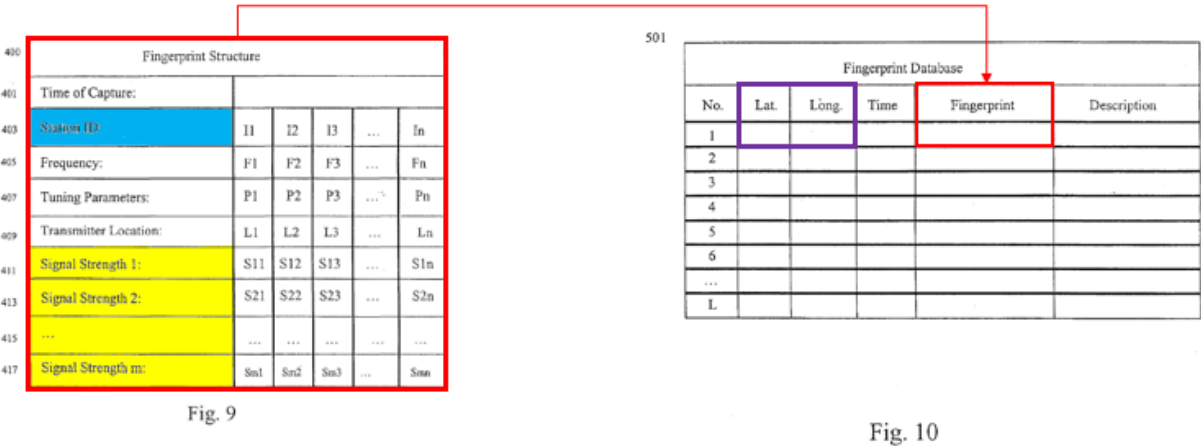
server/Other Party 30 or another server). Alternatively, or in addition to, for similar reasons discussed, such a skilled person would have, likewise, been motivated to configure the modified *Spain-I* system/processes such that a second MU operated by a different user provides fingerprint data (signal strengths) for user selected locations (including those selected by the user of the first MU) for building the remote fingerprint database. Either way, the remote database would have been expanded with signal strength and associated ID information obtained from multiple MUs, consistent with that described by *Nanda*.

190. A person of ordinary skill in the art would have had the knowledge, skills, and rationale in light of the teachings/suggestions of *Spain-I-Hunzinger-Nanda*, and a person of ordinary skill in the art's state-of-art knowledge, to implement the above-configurations with a reasonable expectation of success in achieving them for above and similar reason I explained in claim 1 and those I discussed above here (§IX.A.1(b)). Especially given such modifications would have predictably resulted in the fingerprint database (and the underlying signal strength and ID information) to be collected and stored for subsequent analysis consistent with the processes and features disclosed/suggested by the *Spain-I-Nanda* combination I discussed above.

5. Claim 5

- a) The method of claim 2 wherein the chosen location signal strengths and the at least one ID originated from a database of geographic locations and corresponding signal strengths and IDs.

191. It is my opinion that *Spain-I*, in view of *Hunzinger* and *Nanda*, discloses and/or suggests this limitation. As I explained in claim 1, and as shown below in FIGS. 9-10, *Spain-I*'s MU (including as modified in view of *Nanda* (§IX.A.1(b)(ii)(1))) builds a fingerprint “database” (501) including fingerprint structures (red—FIG. 9) including signal strengths and IDs (yellow/blue) that correspond to geographic locations (purple).



(Ex-1011, FIGS. 9-10 (annotated), 13:16-14:37, 13:62-64 (“Lat and Long fields indicate the latitude and longitude of the location to which *the fingerprint corresponds*”), 13:64-14:1 (“[i]n one instance the fingerprint corresponds not to one

exact spot on the surface of the earth, but instead to a small areas” where “the Lat and Long fields. . . indicate a position inside the area, preferably the center point”), 14:3-4 (“Fingerprint column contains the actual fingerprint data”); Ex-1005, FIGS. 4-5, 5:40-6:61; Ex-1009, FIGS. 9-10, 9:15-10:37; Ex-1010, FIGS. 9-10, 9:10-10:31.)

192. In light of such teachings in context of the rationale I explained for limitation 1(b)(ii) (§IX.A.1(b)(ii), and for the similar reasons I explained for modifying the *Spain-I* system/process as I explained in claim 1, a person of ordinary skill in the art would have been motivated to configure the MU in the above-described modified *Spain-I* system/process to include similar features taught by *Spain-I* (Ex-1011, FIGS. 9-10) such that the fingerprint database from which the user selected signal strengths and station IDs were stored and later obtained for comparison with the monitored location information included geographic locations corresponding to the strength and ID information.

193. Such a configuration/modification would have predictably resulted in the chosen location signal strength number(s) and at least one ID in the *Spain-I-Hunzinger-Nanda* system/process that I discuss above for claim 1 to have originated from a database of geographic locations and corresponding signal strengths and IDs, like that claimed in claim 5. Such a configuration would have complemented *Spain-*

I's goal of designing processes to complement/augment existing location determining technologies, which in this case would use a fingerprint database consistent with that described by *Spain-I*. (Ex-1011, 3:34-40, 15:19-29.) A person of ordinary skill in the art would have had similar rationale, expectation of success, skills, and capabilities to consider and implement such features (like those taught by *Spain-I*) as those I discussed above for the modifications expressed for claim 1. (See my above analysis in §IX.A.1(b).)

6. Claim 6

a) The method of claim 5 wherein the database is stored remotely from the first portable RF communications device.

194. It is my opinion that *Spain-I* in view of *Hunzinger* and *Nanda* discloses and/or suggests this limitation. (§§IX.A.1, IX.A.5.) As I discussed above, *Spain-I* describes configurations where the fingerprint database may be stored remotely from the MU. (See my above analysis in §§IX.A.1, IX.A.4-A.5; Ex-1011, FIG. 3, 6:9-14 (“fingerprint database is stored at the location server”), 6:15-30; Ex-1005, FIG. 3, 4:28-58; Ex-1009, 5:22-42; Ex-1010, 5:20-41.) *Nanda* also discloses similar features where the mobile device creates a fingerprint and transmits it for storage in a remote database for subsequent analysis. (Ex-1006, 12:14-31; see my discussions above for claim 4 in §IX.A.4.)

195. In light of such teachings in context of the rationale and teachings and suggestions that I discussed above in claim 1 (and those for claims 4-5), it is my opinion that a person of ordinary skill in the art would have been motivated to configure the modified *Spain-I-Hunzinger-Nanda* system/processes such that the MU operates in conjunction with a remote fingerprint database, where the MU generates fingerprints (with signal strength measurements and ID information for respective locations) and provides them to a remote server (e.g., location server/Other Party 30 or other server) for storage in a database for subsequent access, use and analysis, consistent with that contemplated by *Spain-I* and *Nanda*.

196. A person of ordinary skill in the art would have been motivated to consider and implement such features to allow the modified system to be able to receive and process fingerprints from multiple MUs, and maintain a larger database of antenna station fingerprint information, like that suggested by *Nanda* (Ex-1006, 12:26-29), thus beneficially expanding the applications of *Spain-I*'s disclosed features. (See also my analysis for claim 4 above.)

197. A person of ordinary skill in the art would have had similar rationale, capabilities, expectation of success, and state-of-art knowledge for considering such features from *Nanda* (and *Spain-I*) as I explained above in claim 1 (§IX.A.1(b)(ii)) and claim 4 (§IX.A.4), that would have led to such a person to design and configure

the modified *Spain-I-Hunzinger-Nanda* system/processes to work with a remote database/server responsible and configured to build, maintain, and make accessible the fingerprint database, like that recited in claim 6.

198. For instance, a person of ordinary skill in the art would have been motivated, in light of such teachings/suggestions, to configure the above *Spain-I-Hunzinger-Nanda* combined system/processes to use a remote database for storing fingerprint information, while still providing location determination processes to be performed by the MU consistent with that I discussed above. (§§IX.A.1(a)-(b), IX.A.5.) While a person of ordinary skill in the art would have contemplated using a remote server/database (*e.g.*, such as the location server or another server) to perform such determining processes, like that taught by *Spain-I* for its Figure 3 configuration (Ex-1011, 6:9-31 (which describes features where the location server perform location determining operations) and similarly in *Nanda* (Ex-1006, 12:14-31), such a skilled person would have likewise been motivated and found benefit in allowing the MU to perform the determination processes like those I discussed above in claims 1 and 5 using signal strength/ID information that were stored at the remote database.

199. Such a skilled person would have recognized advantages, such as conserving memory/processing resources in the MU that would have otherwise been

used to build and maintain the fingerprint database locally, while still providing the ability for the MU to perform the comparison processes using the fingerprint comparison features discussed above (*see* my analysis for claims 1 and 5) to determine whether the MU is in proximity of a user chosen location. Such a skilled person was aware of techniques/technologies in the art that used remote database systems that shared fingerprint information to mobile devices. (*See* my discussions above in §V; *see also e.g.*, Ex-1028, 5:1-62 (5:57-61 (“server that delivers reference RF fingerprint information to MUs” for location determination), 6:34-37, 16:42-63; Ex-1032, 1:15-31, 2:48-52, 3:59-4:7.) Such knowledge, coupled with the teachings from *Nanda* and *Spain-I* (as I pointed out above), would have led a person of ordinary skill in the art to consider, design, and implement use of a remote database for storing fingerprint information corresponding to the user chosen location(s) (like that discussed for limitation 1(b) (§§IX.A.1(b)-(b)(ii)(1))), and configured to deploy such information to the MU when its location was to be determined in accordance with the processes discussed for limitation 1(b) (including those in light of *Nanda*).

200. In considering and implementing such a modification, a person of ordinary skill in the art would have considered the tradeoffs relating to the various design options available, including those gleaned from the teachings in the prior art (and such a person’s state of art knowledge (§V)). For example, such a skilled

person would have considered the possible applications of the modified *Spain-I-Hunzinger-Nanda* system, along with associated design constraints, cost considerations, benefits of using such a remote database, and other known factors, to conclude that such modifications would have been feasible for at least certain applications for the modified system. Thus, a person of ordinary skill in the art would have had good reason to consider and implement a configuration where the MU in the modified *Spain-I* system/process obtains stored fingerprint information (with data corresponding to the chosen locations as I discussed above in claims 1 and 4) from a remotely located database (*e.g.*, such as the location server or other server), especially in view of *Spain-I*'s goal of designing processes to complement/augment existing location determining technologies. (Ex-1011, 3:34-40, 15:19-29.)

201. A person of ordinary skill in the art would have had the knowledge, skills, and rationale in light of the teachings/suggestions of *Spain-I-Hunzinger-Nanda*, and such a skilled person's state-of-art knowledge, to implement the above-configuration with a reasonable expectation of success in achieving it. This would have been understood since such a person would have appreciated the modification would have involved applying known technologies/techniques (*e.g.*, programming, design/configuration of components and wireless communications,

database systems, etc.) for receiving information from a remote database for local processing by a MU. (*See also* rationale for limitations 1(b)(ii) and claims 4-5.)

7. Claim 7

a) The method of claim 5 wherein the database is built by a service provider.

202. It is my opinion that *Spain-I* in view of *Hunzinger* and *Nanda* discloses and/or suggests this limitation. (*See* my analysis above for claims 1 and 5 (§§IX.A.1 and IX.A.5).

203. As I discussed for claims 4 and 6 (*see* my discussions in §§IX.A.4, IX.A.6), *Spain-I* describes configurations where the fingerprint database may be stored remotely at a location server/Other Party 30. (Ex-1011, FIG. 3, 6:9-14 (“fingerprint database is stored at the location server”), 6:15-30; Ex-1005, FIG. 3, 4:28-58; Ex-1009, 5:22-42; Ex-1010, 5:20-41.) *Nanda* teaches/suggests similar features. (Ex-1006, 12:14-31.) My analysis for claim 5 also explains how and why a person of ordinary skill in the art would have been motivated in light of the teachings of *Nanda* and *Spain-I* to configure the modified *Spain-I* system/processes I discussed in claims 1 and 5 (§§IX.A.1, IX.A.5) such that the MU operates in conjunction with a remote fingerprint database, where the MU generates fingerprints (with signal strength measurements and ID information for respective locations) and provides them to a remote server, such as the location server/Other Party 30 for

storage in a database for subsequent analysis, consistent with that contemplated by *Spain-I* and *Nanda*. (See my above analysis in §IX.A.6.)

204. A person of ordinary skill in the art would have had similar rationale for considering such features from *Nanda* (and *Spain-I*) as I explained above in claim 6 (*id.*; see also §IX.A.1(b)), as well as similar capabilities, expectation of success, and state-of-art knowledge, that would have led to configuring the modified *Spain-I* system/processes with a database built remotely and maintained by a remote server, such as location server 30 or another server.

205. For reasons similar to those I explained in claims 5 and 6 (§§IX.A.5-IX.A.6), it is my opinion that a person of ordinary skill in the art would have been motivated to configure the *Spain-I- Hunzinger-Nanda* modified system to use a database of geographic locations and corresponding signal strengths and IDs maintained remotely at a service provider server, such as one similar to location server 30, so that the fingerprints maintained in the fingerprint database can include a more robust set of signal strength data (*e.g.*, from other MUs), as suggested by *Nanda* (Ex-1006, 12:26-29), thus beneficially expanding the applications of *Spain-I*'s disclosed features. A person of ordinary skill in the art would have had similar rationale for considering such features from *Nanda* (and *Spain-I*) as I explained above in claims 1, 5-6 (§IX.A.1(b)(ii), IX.A.5-IX.A.6), as well as similar

capabilities, expectation of success, and state-of-art knowledge, that would have led to configuring the modified *Spain-I* system/processes as I discussed.

206. *Spain-I* discloses that the location server 30 may be interested in the location of the MU for “personalized services” (Ex-1011, 3:12-16), which is consistent with a “service provider” and *Nanda* teaches configurations where base station controllers or mobile switching centers maintain the fingerprint database (Ex-1006, 12:14-31), which a person of ordinary skill in the art would have understood to be related to a service provider (*e.g.*, wireless communication services for MUs) (*id.*, 3:58-7:17). A person of ordinary skill in the art would have thus been motivated to configure the above-discussed resulting modified system/process to implement use of a remote fingerprint database built by a “service provider” as claimed (*e.g.*, location server 30 or other server providing service(s) for the MU/user), especially in view of *Spain-I*’s goal of designing processes to complement/augment existing location determining technologies. (Ex-1011, 3:34-40, 15:19-29.) Such a skilled person would have appreciated the benefits of such a modification, such as allowing the fingerprint database to be built and maintained by a server that also provides services to the MU based on the MU’s determined location, consistent with that described by *Spain-I* and known in the art. (*See e.g.*, my discussions of the state of art technologies in §V.)

8. Claim 9

a) The method of claim 1 wherein the at least one ID is a cell ID.

207. It is my opinion that *Spain-I-Hunzinger-Nanda* discloses/suggests this limitation. (§IX.A.1.) For instance, *Spain-I* discloses that the mobile unit (*e.g.*, a cell phone) monitors the “identity of the (wireless communication network) cell”:

In one embodiment, the mobile unit is instructed by the location server to scan selected portions of the spectrum and capture selected parameters from the received signals. The location server determines which portions of the spectrum to scan and what parameters to capture based on other information it has received or generated regarding the mobile unit. For example, in one instance the location server knows the approximate location of the mobile unit by receiving identity of the (wireless communication network) cell that the mobile unit is in at that time. By looking up a database the location server can determine the geographic location of the cell. The location server then determines which signals in the vicinity of the cell are most suitable for generating a fingerprint. For example, certain television signals may have better coverage of the cell than other signals. The cellular network then transmits this information (*e.g.*, television channel numbers) to the mobile unit via the wireless link requesting it to scan only those selected signals.

(Ex-1011, 5:33-50, 15:23-24; *see also id.*, 4:42-46, 5:28-32; §IX.A.1.b.) Further, *Spain-I* states the station ID field 403 in the fingerprints “indicates the unique identifying code of a broadcasting station from which the signal emanated”:

The fingerprint comprises characteristics of received signals at multiple frequencies. Each column in FIG. 9 is information pertaining to a particular frequency or carrier. A Station ID field 403 indicates the unique identifying code of a broadcasting station from which the signal emanated. This field is optional. In one embodiment this field is filled by the mobile unit using information received in the signal. In another embodiment this field is filled by the location server to indicate to the mobile unit as to which signals to capture for the fingerprint.

(Ex-1011, 13:27-36, FIG. 9.) Also *Spain-I* discloses configurations where “the communication link between the mobile unit and location server is through the base stations and base station controllers of the cellular network” (*id.*, 4:7-22) and discloses the known use of cell ID in location determining processes (*id.*, 1:21-42 (“cell ID information”). (*See also id.*, 15:19-25 (*Spain-I*’s features can be implemented with minor software changes in a MU (“typically a cellular phone”), FIG. 12 (“cellular network”), 15:6-14; Exs-1013-1014.)

208. Given these teachings/suggestions, especially in context of the *Spain-I-Hunzinger-Nanda* combination detailed in §IX.A.1, it is my opinion that a person

of ordinary skill in the art would have been motivated to adapt the modified *Spain-I* system/processes to incorporate cell IDs as the station ID information within the fingerprints for determining the location of the MU consistent with that I discussed above for claim 1. This modification would have been undertaken with a reasonable expectation of success in attaining such functionalities. Indeed, a person of ordinary skill in the art would have had the knowledge, skills, and rationale in light of the teachings/suggestions of *Spain-I-Hunzinger-Nanda*, and a person of ordinary skill in the art's state-of-art knowledge, to configure the modified system/process to use cell IDs in a cellular network environment, which would operate consistent with that explained above for claim 1. Such modifications would have predictably resulted in applying known technologies/techniques (e.g., use of signal source identifier information and known use of cell IDs as described by *Spain-I* and cellular network infrastructures) for use in the fingerprint structures used to determine whether the MU is in the proximity of a user chosen location, in accordance with my discussion above for claim 1.

9. Claim 10

a) The method of claim 1 wherein the first portable RF communications device is a mobile phone.

209. It is my opinion that the modified *Spain-I* system/processes (*Spain-I-Hunzinger-Nanda*) discloses and/or suggests this limitation. As detailed in §IX.A.1,

Spain-I provides a clear description of the MU as being a mobile phone. (§IX.A.1; Ex-1011, 15:23-24 (“mobile unit (typically a cellular phone)”); *id.*, 4:16-22 (SMS communications).) For instance, and as found in Exhibit 1011, *Spain-I* states in 15:23-24, “mobile unit (typically a cellular phone)”:

In conclusion, it can be seen that this invention has one or more of the following significant improvements over prior art for mobile unit location techniques: (1) it can be implemented without requiring any modifications to the existing wireless network infrastructure, (2) only minor software changes in the mobile unit (typically a cellular phone) are required, and (3) it can be utilized in areas where GPS coverage is either not available or not reliable. This follows because the fingerprints are generated by using portions of the RF spectrum that typically have superior coverage and in-building penetration than GPS signals.

(*Id.*, 15:23-24.) And in 4:16-22, *Spain-I* also references SMS (Short Message Service) communications:

In another embodiment of the system, data is communicated in both directions between the mobile unit and location server by using the Short Messaging System (SMS) of the network. Using SMS messages for implementation of this invention has the

advantage of avoiding potential interference with voice channel network operations.

(*Id.*, 4:16-22.) These references within *Spain-I* not only explicitly disclose/suggest the MU as a cellular phone but also indicate its communication capabilities, which align with the limitation being discussed.

10. Claim 12

a) The method of claim 1 wherein the signal characteristic is the signal's phase.

210. It is my opinion that *Spain-I-Hunzinger-Nanda* discloses/suggests this limitation. (§IX.A.1.)

211. In the above discussed *Spain-I-Hunzinger-Nanda* system and process, as previously explained, fingerprint information, encompassing parameters that reflect signal characteristics, including signal strength, is compared for both monitored and selected/chosen locations to determine the proximity of the mobile unit (MU) to a chosen location. (§IX.A.1(b); Ex-1011, 5:20-32, 13:49-55; Ex-1006, FIG. 3B, 10:51-11:32, 5:43-46.) However, it's important to note that the *Spain-I-Hunzinger-Nanda* system and process discussed above was not restricted solely to configurations that determine location based on signal strength comparisons. Indeed, *Spain-I* discloses that the fingerprints used in its processes can be generated from a variety of different RF characteristics (alone or in combination). (Ex-1011,

4:55-56 (“[T]he spectral fingerprint may be generated using *many different parameters*, either *individually or in combination*”), 3:57-64 (signal strength, **phase**, signal identity, signal source identity) 3:55-58, 5:20-22.) *Nanda* similarly contemplates and suggests the use of other types of signal characteristics, such as phase:

As is known in the art, the mobile device 102 monitors beacon and pilot signals from the base stations of the cellular network. These signals can include pilot and paging signals. The mobile device monitors these signals to measure primary and neighbor signal strengths to perform hand-offs between base stations. Also, in networks where the base stations are synchronized, **the mobile device may also measure a phase of each pilot signal** to assist with hand-off determination. Thus, **at any location within the network 104, the mobile device 102 observes up to** n base stations with measurable signal strengths which can be characterized as two vectors $x_1, \dots, x_n$, and $y_1, \dots, y_n$. Where each x value is a signal strength of a pilot signal from a base station and each y value is **a phase of the pilot signal from a base station.**

....

The information may be utilized as a conceptual fingerprint, or a signature, of a location of the mobile device 102. Thus, if

locations within the area 140 have a certain known fingerprint, then the mobile device can determine its current fingerprint and compare it to the known fingerprint to determine whether the mobile device is located within the area 140. While the above discussion merely mentions using two attributes of the WAN (i.e., pilot signal strength and phases).

....

The attributes may be calculated in a variety of different ways without departing from the scope of the present disclosure. **For example, an instantaneous measurement may be taken of such attributes as pilot signal strength and phase and used as the fingerprint.** However, even when the mobile device is stationary, the values of these attributes vary because of environmental variability. Accordingly, multiple measurements may be taken and averaged together or otherwise combined in some statistically significant manner in order to generate the fingerprint.

(Ex-1006, 6:12-25, 6:52-59, 7:19-28; *see also id.*, 8:43-10:8 (describing phase/signal strength fingerprint data and different “possible information [] may be used to characterize a fingerprint...”), 10:53-11:19.)

WAN ID	WLAN SSID	WLAN BSS ID	Signal Strength	Phase
A	I1	A ₁	s ₁ (A ₁) . . . s _n (A ₁)	p ₁ (A ₁) . . . p _n (A ₁)
		A ₂	s ₁ (A ₂) . . . s _n (A ₂)	p ₁ (A ₂) . . . p _n (A ₂)
	I2	A ₃	s ₁ (A ₃) . . . s _n (A ₃)	p ₁ (A ₃) . . . p _n (A ₃)
B	I1	B ₁	S ₁ (B ₁) . . . s _n (B ₁)	
	I2	B ₂	S ₁ (B ₂) . . . s _n (B ₂)	

(*Id.*, 8:43-55.)

212. Hence, *Spain-I* (and *Nanda*) envisions, contemplates, and suggests the utilization of various signal characteristics, including those linked to phase, within the fingerprints employed in the location determination procedure.

213. Considering these teachings and suggestions, a person of ordinary skill in the art would have understood there were different ways and reasons for using various parameters for building fingerprints used in the location-determining applications contemplated by the *Spain-I-Hunzinger-Nanda* system/process. As a result, such a skilled person would have been motivated to adapt the modified system such that the fingerprints were generated by incorporating phase information, consistent with the disclosures of *Spain-I* and *Nanda* discussed above.

214. The setup would have predictably led to the mobile unit (MU) gathering/measuring phase characteristic values, such as number data, for each signal received from the antenna stations. This information, in addition to or in place of signal strengths, would have been utilized as the fingerprint parameter(s) for

subsequent comparisons when determining whether the MU first monitored location is in proximity of the user chosen location, akin to the aspects that I previously discussed above for limitation 1(b) and consistent with features described by *Spain-I* and *Nanda*. (§IX.A.1(b).) Consequently, the *Spain-I-Hunzinger-Nanda* system/process would have executed such location determining by electronically comparing at least one number based on phase information for the signal(s) received from the first antenna stations at the first monitored location with at least one number based on corresponding phase of the signals received from each of the antenna stations at the user chosen location.

215. The resulting modified *Spain-I-Hunzinger-Nanda* system/process discloses/suggests the features claimed as “number(s)” recited in limitation 1(b) concerning claim 12. In my opinion this assertion is substantiated by the same reasons I explained above in §IX.A.1(b)(ii)(2) (*e.g.*, whether the “number(s)” reflect the obtained phase values (like with signal strength measurement values I discussed in §IX.A.1(b)(ii)(2)) and the reasons in §IX.A.1(b)(ii)(3) in view of *Nanda* (*e.g.*, pertaining to whether the “number(s)” are a result of a formula to the gathered or measured phase information, which may include calculated averages, other mathematical operations, etc., like with the calculated signal strength number(s) as I discussed in §IX.A.1(b)(ii)(3)).

216. A person of ordinary skill in the art would have had the incentive to explore and been motivated to consider and use phase signal characteristics as previously indicated above. Such motivation/incentive is supported by the fact that such phase information was a known signal parameter used with fingerprint location determining systems as demonstrated by *Spain-I* and *Nanda*. (See my above analysis.) *Spain-I*'s discussion and suggestions regarding the use of different signal parameters (not limited to RSSI, and including phase etc.) and *Nanda*'s similar guidance, teachings, and/or suggestions of fingerprint comparison/matching processes using phase data, would have naturally led such a skilled person to make the modifications to the system/process as described above.

217. In light of such teachings and suggestions, it is my opinion that a person of ordinary skill in the art would have recognized and appreciated that configuring the *Spain-I-Hunzinger-Nanda* system/process to utilize phase signal characteristics, as discussed above, would have been a suggested and predictable implementation of then-established technologies/techniques and/or a simple substitution of one known signal characteristic for another that would have been used in similar ways (fingerprint parameter comparisons) as contemplated by *Spain-I* in context of *Hunzinger-Nanda*. Given the familiar features/technologies taught by *Spain-I-Hunzinger-Nanda*, coupled with a person of ordinary skill in the art's state of art

knowledge in the field, such a skilled individual would have had the skills, knowledge, and rationale to consider and implement these modifications, all while maintaining a reasonable expectation of success.

11. Claim 13

- a) **The method of claim 1 wherein part (a) is performed iteratively, with a predetermined time delay between successive iterations.**

218. It is my opinion that *Spain-I-Hunzinger-Nanda* discloses/suggests this limitation. (§IX.A.1.) As I previously detailed, the configuration of the *Spain-I-Hunzinger-Nanda* system/processes would have entailed the MU monitoring/measuring/collecting signal characteristic numbers (e.g., signal strengths) in addition to station ID information. (§IX.A.1.) *Spain-I*, furthermore, discloses constructing the database by capturing fingerprints at different times for the “signal characteristics” to cover different patterns in transmitted signals:

According to this aspect of the invention, the fingerprint database and the decision algorithms are designed to accommodate such dynamic changes. Since the change pattern in signal characteristics is predetermined, the database is constructed by **capturing the fingerprints at different times so as to cover all the different patterns in the transmitted signals. The time at which a fingerprint was captured is also stored along with its location identity.**

(Ex-1011, 8:1-8.) This is reinforced by references in *Spain-I*, such as in 6:62-65, where it suggests that the fingerprint database may be generated using models involving parameters dependent on the time of day, and in 7:51-54, where it discusses measurements taken at different times to create distinct databases. (*Id.*, 6:62-65 (fingerprint database may be generated using models using parameters that “depend on the...time of the day”), 7:51-54 (measurements taken at different times to produce different databases.)

219. *Spain-I*’s teachings and suggestions regarding time-based fingerprint collection would have led a person of ordinary skill in the art to consider and/or explore existing teachings in the art regarding other temporal-based fingerprint collection methods for fingerprint collection/building for location monitoring operations. In doing so (including for reasons explained above for claim 1), such a skilled person would have found *Hunzinger* and *Nanda* to provide relevant guidance regarding time-based monitoring in location determining processes and technologies like that disclosed by *Spain-I*, and thus would have been motivated to configure the above-discussed modified system/process such that monitoring of the MU’s current location (*see* my discussion above in §IX.A.1(a)) was performed iteratively, with a predetermined time delay between successive iterations like that recited in claim 13.

220. For example, *Hunzinger* and *Nanda* discloses features, consistent with that commonly understood in the art, relating to periodic fingerprint monitoring. *Hunzinger*, for instance, explains the “mobile may monitor the current location periodically....” (Ex-1054, 4:39-40.) Moreover, *Nanda* explicitly discloses that “when the mobile device 102 periodically awakes...it may also determine its location”:

However, by limiting searching for beacon signals to periods when the mobile device is within the area 140, a significant savings in power consumption may be realized. Thus, when the mobile device 102 periodically awakes to listen to the paging channel or a quick paging channel in the WAN it may also determine its location. If it determines that its location is within the area 140, then it can search for a wireless LAN beacon signal. Otherwise, it can avoid unnecessarily searching for the beacon signal.

....

The above table includes a deviation value for the signal strength and a separate deviation value for the phase portion of the fingerprint. Use of these values is explained with respect to the flowchart of FIG. 3B. In step 320, the mobile device awakens or is otherwise controlled to capture a fingerprint of its current location. Continuing the example where the fingerprint has a

vector for signal strengths and one for phases, a pair of vectors are collected $x_1 \dots x_n$ and $y_1 \dots y_n$.

(Ex-1006, 5:41-49, 10:49-57.) *Nanda* also teaches the concept that its location determining process involves taking a fingerprint, which encompasses features where it would have been “recorded automatically on a periodic basis”:

Referring back to the previously mentioned fingerprints, the mobile device 102 also includes an algorithm executable by the processor 208 for creating multiple fingerprints and comparing different fingerprints to one another. For example, using the keypad 212, a user of the mobile device 102 may select a key that causes the mobile device 102 to create a current fingerprint and store that fingerprint in memory 211. If at the time the fingerprint is created, the mobile device is connected to a wireless LAN, then the stored fingerprint may be associated with that wireless LAN access point. In addition, the fingerprint can also be recorded automatically on a periodic basis or at programmatic events such as successful access, successful access with desired quality of service, etc.

....

The above table includes a deviation value for the signal strength and a separate deviation value for the phase portion of the fingerprint. Use of these values is explained with respect to the

flowchart of FIG. 3B. In step 320, the mobile device awakens or is otherwise controlled to capture a fingerprint of its current location. Continuing the example where the fingerprint has a vector for signal strengths and one for phases, a pair of vectors are collected $x_1 \dots x_n$ and $y_1 \dots y_n$.

In step 322, the current WAN ID is checked and the table entries for access points associated with that WAN ID are determined. Further search refinements are possible by searching the database for identifiers of the observable pilots. For the CDMA network the search criterion can be PN phase offsets of the observable pilots. Next the fingerprint for each of these access points is then compared, in step 324, to the current fingerprint to determine if there is a match. Algorithmically, the comparison and determination is performed by:

For $i = 1$ to n :
 determine if $|x_i - s_i(\cdot)| < d_i(\cdot)$
 determine if $|y_i - p_i(\cdot)| < q_i(\cdot)$

Thus, the deviation values d and q can be used to select how closely the current finger print (x and y vectors) must match a stored finger print (s and p vectors). The larger the deviation values, the more the values can differ and there still be a match.

(*Id.*, 8:30-42, 10:49-11:11, FIG. 3B; §IX.A.1(b).) These teachings/suggestions align with a person of ordinary skill in the art's understanding that periodic generation and/or recording of fingerprint information would have entailed a predetermined time delay between successive iterations, for instance, occurring every X seconds, Y minutes, etc. for a given application, in accordance with established industry practices and consistent with that known in the art:

Generally, the more signal strength measurements taken, the more accurate the projections. Signal strength measurements can be made on a periodic basis which may be a function of the cell size or an expected maximum speed or average speed of a mobile in the current cell. For example, in a mobile network with cells having approximately a five-mile radius, it would be appropriate to measure signal strength on the order of every 15 seconds. Similarly, based on the expected velocity of a mobile unit at a particular time of day, for example rush hour, a less frequent measurement may be sufficient. Also, the periodic interval may be determined in real time and based on factors including, but not restricted to, maximum estimated or average velocity of the mobile unit and network traffic.

(Ex-1029, 4:24-41.)

For larger zones, the system can allow the user a larger window of time in which to collect measurements at sample points in the

desired zone. The duration may also be varied by the network operator based on different service offerings associated with different sized zones, having different pricing levels or structures. The desired zone sizes may vary depending on the application or service. One way to express the zone size is as a single distance from one size of the zone to the other. For instance in a home zone application, a zone size of between 5 m and 20 m or between 10 m and 30 m or between 20 m and 50 m or any combination of these ranges may be suitable. In this case a time duration between 5 s and 20 s or between 10 s and 30 s or between 20 s and 2 minutes or any combination of these ranges may be sufficient to gather the measurements. In another service targeted to large houses, possibly having multiple storeys a larger zone size may be suitable, from 10 m to 35 m or from 25 m to 75 m or from 40 m to 200 m. In this example, suitable measurement time intervals may range from 10 s to 50 s or from 30 s to 3 mins or from 1 min to 5 minutes or any combination of these ranges may be suitable. Other zone based services may be targeted at commercial enterprises having offices or other commercial properties. Zone sizes in such cases may range between a few metres and hundreds of metres with corresponding ranges of time required to obtain measurements characterizing the zones.

(Ex-1019, ¶0214.)

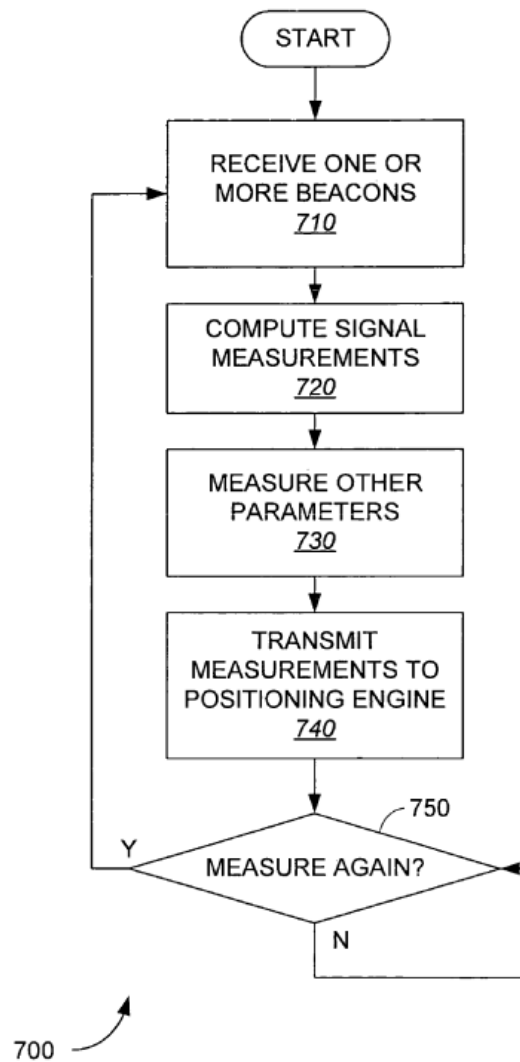


FIG. 7

In decision block 750 the process may pause until it is time to measure parameters again, in which case the process repeats beginning in block 710. The measurement process may be periodic. Alternatively, measurements may be based on whether or not changes have occurred in the environment.

(Ex-1047, FIG. 7, 13:63-14:1.)

221. Given such teachings, suggestions, and/or knowledge, a person of ordinary skill in the art would have been motivated to adapt the *Spain-I-Hunzinger-Nanda* system and/or process to iteratively perform the monitoring step (as I discussed above in §IX.A.1), with a periodic, predetermined time delay between successive iterations. Such a skilled individual would have appreciated the benefits and/or advantages of introducing such features in context of the modified *Spain-I* system/processes discussed above.

222. For instance, in one application, a person of ordinary skill in the art would have understood programming/configuring the MU to periodically monitor its location (similar to that described above in §IX.A.1) would have enhanced and complemented the location-based action features employed in modified system (in view of *Hunzinger*). This would ensure that the MU's location was monitored at proper intervals to promptly identify a user chosen location so that appropriate actions/operations can be executed, as I discussed in §IX.A.1(b)(ii)(1). In other scenarios or applications, such a skilled person would have recognized the advantages of extending the time frame between iterative monitoring operations to conserve power and processing resources of the MU, depending on the requirements of the modified system. (Ex-1006, 5:41-49.) Indeed, in such configurations, such a skilled individual would have understood that such a conventional, periodic delay

could be determined in real time “based on factors including...maximum estimated or average velocity of the mobile unit in network traffic,” along with other considerations tailored to a specific application or design. (Ex-1029, 3:24-41.)

223. A person of ordinary skill in the art would have had the necessary skills, knowledge, rationale, and capabilities to configure and implement such modifications, all while maintaining a reasonable expectation of success. This is particularly evident because such modifications would have predictably involved employing known techniques/technologies consistent with those known in the art and contemplated by *Spain-I* and *Nanda*. (Ex-1006, 8:30-42, 10:49-11:11; Ex-1029, 3:24-41; Ex-1019, ¶0214; Ex-1047, FIG. 7, 13:63-14:1.)

12. Claim 21

- a) **The method of claim 1 wherein the at least one number based on the signal characteristic of the communications signals from each of the first plurality of antenna stations is more than one number, each of which number is based on the signal characteristic of the communications signal from only one of the first plurality of the antenna stations.**

224. It is my opinion that *Spain-I-Hunzinger-Nanda* discloses/suggests this limitation. (§IX.A.1.) As I discussed for claim 1, the *Spain-I-Hunzinger-Nanda* combination discloses/suggests comparing numbers based on the signal characteristic (*e.g.*, signal strengths) of respective signals received from respective

stations for monitored and user chosen locations. (§IX.A.1(b); Ex-1011, 4:42-63, 5:61-6:4; Ex-1006, FIG. 3B, 8:29-36.) Indeed, *Spain-I* describes measuring multiple signals strengths for the signal received from a single respective station in range of the MU (e.g., Station I1 (SS1-Sm1) (yellow below), Station I2 (S12-Sm2) (blue), etc.). (§IX.A.1; Ex-1011, FIG. 9 (below).) Such operations occur when the MU is at the current monitored location and at the stored location when building the database. As I explained, the signal strengths in the database are compared to the monitored signal strengths:

When a location estimate of the mobile unit is desired (either by the mobile unit itself or by the location server), it activates component 101 (FIG. 2), which captures predetermined information from a predetermined portion of the RF spectrum. Instructions regarding what information to capture and the portion of the RF spectrum from which to capture may be either pre-programmed in the mobile unit, or generated in real time. In the latter case, it may be generated in the mobile unit, or downloaded into the mobile unit from the location server over the wireless network. The mobile unit may capture multiple pieces of information or from multiple portions of the spectrum.

The spectral fingerprint may be generated using many different parameters, either individually or in combination. In one embodiment, signal strength is used. In another embodiment,

phase information is used. In another embodiment, the identity of the received signals (e.g., frequency) is used. In yet another embodiment, the identity of the signal source (e.g., channel number or station code) is used. In yet another embodiment, the geographic locations of the transmitters from which the signals originate are used.

....

Once the fingerprint is generated, its association with a certain location has to be determined. According to this invention this is done by utilizing a fingerprint database that contains a number of fingerprints along with their corresponding location identities.

(Ex-1011, 4:42-63, 5:61-6:4.)

400	Fingerprint Structure					
401	Time of Capture:					
403	Station ID:	I1	I2	I3	...	In
405	Frequency:	F1	F2	F3	...	Fn
407	Tuning Parameters:	P1	P2	P3	...	Pn
409	Transmitter Location:	L1	L2	L3	...	Ln
411	Signal Strength 1:	S11	S12	S13	...	S1n
413	Signal Strength 2:	S21	S22	S23	...	S2n
415	...	...	...	...	...	...
417	Signal Strength m:	Sm1	Sm2	Sm3	...	Smn

Fig. 9

225. For reasons explained (§IX.A.1(b)), the modified *Spain-I* system/process would have been configured to perform comparison and determination operations as recited in claim 1, where multiple “number(s)” based on responsive signal strengths were used for the monitored location (§IX.A.1(a)) and the stored location to build the database and resulting comparison processes like that claimed (§IX.A.1(b)).

226. *Nanda* also discloses collecting signal characteristic data (numbers based on signal strength) for the signal received from respective stations, and comparing the multiple strength values for each respective station. (Ex-1006, FIG. 3B (below).)

Thus, at any location within the network 104, the mobile device 102 observes up to n base stations with measurable signal strengths which can be characterized as two vectors $x_1, \dots, x_n$, and $y_1, \dots, y_n$. Where each x value is a signal strength of a pilot signal from a base station and each y value is a phase of the pilot signal from a base station.

....

Referring back to the previously mentioned fingerprints, the mobile device 102 also includes an algorithm executable by the processor 208 for creating multiple fingerprints and comparing different fingerprints to one another. For example, using the

keypad 212, a user of the mobile device 102 may select a key that causes the mobile device 102 to create a current fingerprint and store that fingerprint in memory 211. If at the time the fingerprint is created, the mobile device is connected to a wireless LAN, then the stored fingerprint may be associated with that wireless LAN access point. In addition, the fingerprint can also be recorded automatically on a periodic basis or at programmatic events such as successful access, successful access with desired quality of service, etc.

As a result of the above process, the memory 211 may contain a wireless LAN search table arranged, for example, similar to the following table:

WAN ID	WLAN SSID	WLAN BSS ID	Signal Strength	Phase
A	I1	A ₁	s ₁ (A ₁) . . . s _n (A ₁)	p ₁ (A ₁) . . . p _n (A ₁)
		A ₂	s ₁ (A ₂) . . . s _n (A ₂)	p ₁ (A ₂) . . . p _n (A ₂)
	I2	A ₃	s ₁ (A ₃) . . . s _n (A ₃)	p ₁ (A ₃) . . . p _n (A ₃)
B	I1	B ₁	S ₁ (B ₁) . . . s _n (B ₁)	
	I2	B ₂	S ₁ (B ₂) . . . s _n (B ₂)	

The first column of the table refers to the WAN ID of the WAN. The WAN ID identifies the system and network for the WAN known as the SID/NID in the wide area wireless system. The particular base stations in the WAN may be identified by the pilot offsets, pilot signal strengths or other attribute which are part of the finger print as discussed below. The fingerprint identifies the location of the mobile device. The second column refers to the

text identifier of the WLAN network. The third identifier refers to wireless LAN access points (also known as BSS). In the exemplary table there are three access points (A1, A2, A3) within the first coverage area of base station A. Similarly, there are two access points within the coverage area of the base station B. There may, of course, be many more wireless LANs within the areas covered by any WAN ID but the user of the mobile device may not be interested in those access points because they are associated with wireless LANs that the user may not be permitted to access. Accordingly, the table may merely include a fingerprint for those access points to which the user typically connects.

The two remaining columns include the values that comprise the fingerprint itself. In this example table the fingerprints for the access points A1, A2, and A3 include both strength and phase information. However, the fingerprints for the access points B1 and B2 comprise only signal strength information. Also note that although each fingerprint in this table is denoted by a vector of length n , there may be less than n non-null components of the vector.

....

The above table includes a deviation value for the signal strength and a separate deviation value for the phase portion of the

fingerprint. Use of these values is explained with respect to the flowchart of FIG. 3B. In step 320, the mobile device awakens or is otherwise controlled to capture a fingerprint of its current location. Continuing the example where the fingerprint has a vector for signal strengths and one for phases, a pair of vectors are collected $x_1 \dots x_n$ and $y_1 \dots y_n$.

In step 322, the current WAN ID is checked and the table entries for access points associated with that WAN ID are determined. Further search refinements are possible by searching the database for identifiers of the observable pilots. For the CDMA network the search criterion can be PN phase offsets of the observable pilots. Next the fingerprint for each of these access points is then compared, in step 324, to the current fingerprint to determine if there is a match. Algorithmically, the comparison and determination is performed by:

For $i = 1$ to n :
 determine if $|x_i - s_i(\cdot)| < d_i(\cdot)$
 determine if $|y_i - p_i(\cdot)| < q_i(\cdot)$

Thus, the deviation values d and q can be used to select how closely the current finger print (x and y vectors) must match a stored finger print (s and p vectors). The larger the deviation values, the more the values can differ and there still be a match.

If there is a match at step 324, in step 326 an optional comparison may be made to determine whether the sum of all differences for a given access point (e.g. $|x_i - s_i(\cdot)|$ and $|y_i - p_i(\cdot)|$) also fall below a respective threshold (e.g., X and Y). This additional test can help catch certain scenarios where the individual differences may show a match but when the fingerprint is considered in total, it can be determined that there is no match.

(*Id.*, 6:12-25, 8:29-9:15, 10:49-11:19; §IX.A.1(b).)

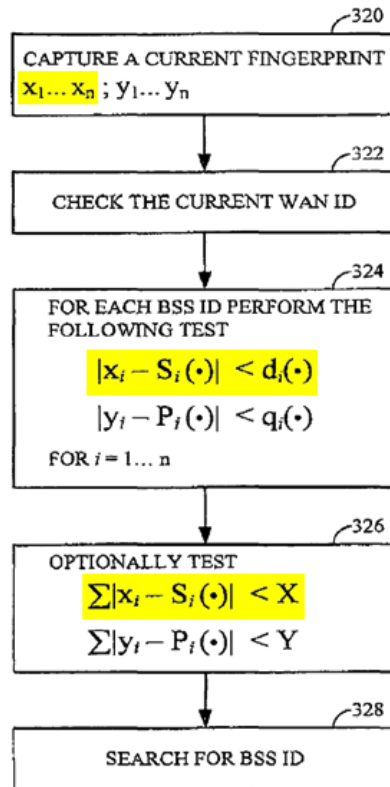


FIG. 3B

227. In light of such teachings, and for reasons similar to those explained above for claim 1, a person of ordinary skill in the art would have been motivated to

configure the *Spain-I-Hunzinger-Nanda* such that the location determining operations I discussed above for limitation 1(b) included comparing multiple signal strengths numbers, such that the “at least one number based on the signal characteristic of the communications signals from each of the first plurality of antenna stations is more than one number,” where each of which number is based on the signal characteristic of the communications signal from only one of the first plurality of the antenna stations, as recited in claim 21. (§IX.A.1; Ex-1011, 4:42-63, 5:61-6:4; Ex-1006, FIG. 3B, 6:12-25, 8:29-9:15, 10:49-11:19.) Indeed, as explained, the signal strength for each base station in *Spain-I* and *Nanda* is monitored (and similarly compared via fingerprint comparison operations) and similar features would have been implemented in to the *Spain-I-Hunzinger-Nanda* system/process when determining if the MU is in proximity of the user chosen location as I discussed for limitation 1(b). (§IX.A.1(b); §§IX.A.1(pre)-IX.A.1(a); Ex-1011, 4:42-63, 5:61-6:4; Ex-1006, FIG. 3B, 6:12-25, 8:29-9:15, 10:49-11:19.)

228. A person of ordinary skill in the art would have had similar reasons/knowledge/skills and expectation of success to configure/implement such features as recited in claim 21 as explained for claim 1. (§IX.A.1(b).) Thus, the modified *Spain-I-Hunzinger-Nanda* system/process discloses/suggests the “number(s)” features recited in limitation 1(b) in context of claim 21 for the same

reasons explained above in §IX.A.1(b)(ii)(2) (*e.g.*, whether the “number(s)” reflect the signal strength measurement values as I discussed in §IX.A.1(b)(ii)(2)) and the reasons in §IX.A.1(b)(ii)(3) in view of *Nanda* (*e.g.*, whether the “number(s)” are a result of a formula applied to such collected/measured strength information (*e.g.*, calculated averages, other mathematical operations, etc.) like that I discussed in §IX.A.1(b)(ii)(3)).

229. Consequently, and in one non-limiting example using *Spain-I*'s FIG. 9 (above) as an example, the modified *Spain-I* system/process would have been configured such that the “at least one number...is more than one number...” (*e.g.*, whether a signal strength value (§IX.A.1(b)(2)) or a value derived from signal strengths (§IX.A.1(b)(3)) as claimed. For example, for reasons explained, a person of ordinary skill in the art would have been motivated to configure the modified system in one application such that multiple signal strengths (S11-Sm1) for a signal received from station ID1 (yellow) were averaged/smoothed, etc. (*Nanda*) to generate a number (*e.g.*, a signal strength metric) for only that antenna station (ID1), and also the signal strengths (S12-Sm2) for a signal received from a different station ID2 (blue) were averaged/smoothed, etc. to generate a second number (*e.g.*, a second signal strength metric) (“more than one number”) for only that different antenna station (ID2), consistent with the teachings in *Spain-I* and *Nanda*, such that a

number/signal-strength metric includes more than one number like that claimed. (See my above analysis here and §IX.A.1(b).) Such features would have been employed to the monitored MU location (“of each of the first plurality of communications signals from the first plurality of antenna stations” (§IX.A.1(a))). Such features would have been consistent with those of claim 21 as claimed and with those discussed during prosecution (Ex-1004, 166).

B. *Spain-I* in View of *Hunzinger*, *Nanda*, and *Damarla* Discloses and/or Suggests the Features of Claims 4 and 6-7

230. It is my opinion that *Spain-I* in view of *Hunzinger*, *Nanda*, and *Damarla* discloses and/or suggests of the limitations of claims 4 and 6-7 of the '698 patent.

1. Claim 4

231. I explain above how and why the *Spain-I* in view of *Hunzinger* and *Nanda* discloses and/or suggests claim 4 in §IX.A.4. In my opinion, the additional teachings of *Damarla* would have further motivated a person of ordinary skill in the art to configure the *Spain-I-Hunzinger-Nanda* system/processes such that the chosen location signal strength number(s) were measured by a second MU, different from the first MU, as recited in claim 4.

232. For example, I discussed above for claim 1 how *Spain-I* (as modified) discloses and/or suggests that a user can use its MU to choose a location where

fingerprint information is collected/generated and subsequently stored for later comparison with related information for a monitored location. (See my analysis above in §IX.A.1(b)(ii).) And while *Nanda*'s teachings (which describe obtaining signal strength information from multiple MUs for storage in a remote fingerprint database), would have motivated a person of ordinary skill in the art to configure the *Spain-I-Hunzinger-Nanda* system/processes such that the user chosen location signal strength number(s) were measured by a second MU (as I discuss above in §IX.A.4), it is my opinion that such a skilled person would have been further motivated to implement such features (like that of claim 4) so that the chosen location signal strength number(s) in the database are updated with more accurate measurements from a second MU as claimed based on the additional guidance and teachings provided by *Damarla*.

233. Similar to *Spain-I*, *Hunzinger*, and *Nanda*, *Damarla* discloses various techniques that were applicable to the location determination systems for mobile units. (Ex-1028, Abstract (“The invention provides a novel method for preparing a wireless environment for location determination of a wireless mobile unit, and for location determination of a wireless mobile unit.”).) *Damarla* also discloses RF fingerprinting techniques, which were consistent with *Spain-I*'s and *Nanda*'s RF fingerprinting systems. (Ex-1028, FIG. 4; Ex-1011, FIGS. 9-10; Ex-1006, FIG. 3B.)

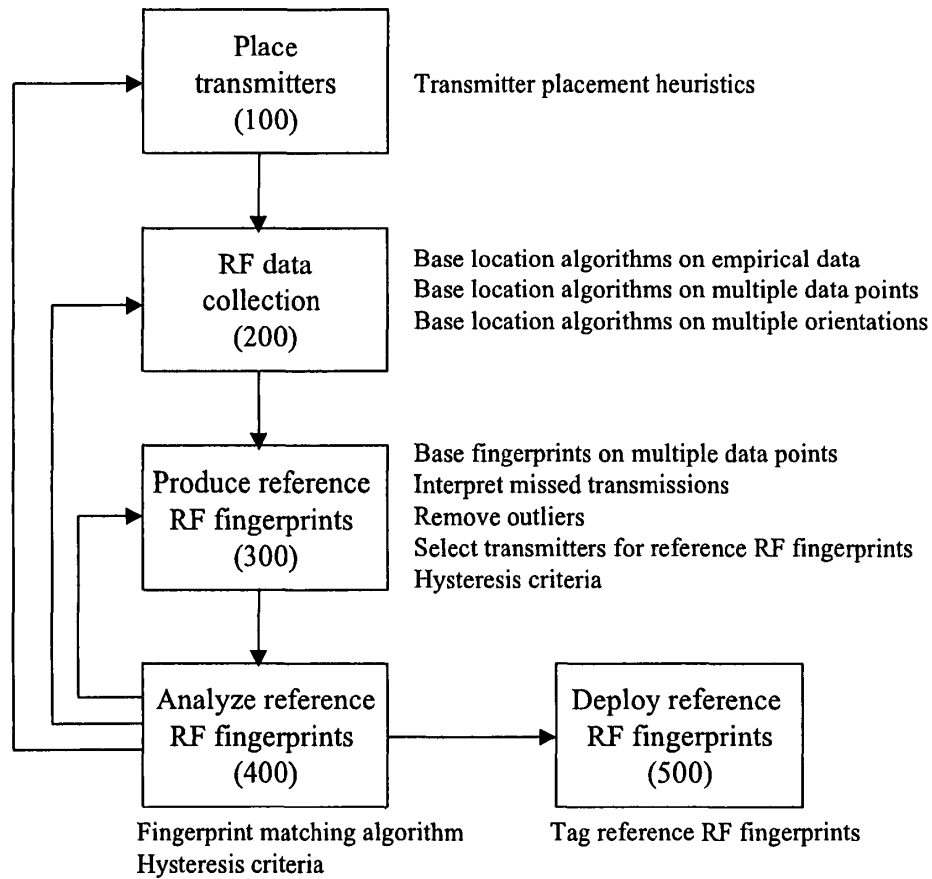


Figure 4

(Ex-1028, FIG. 4.)

234. Thus, a person of ordinary skill in the art would have understood that *Damarla* discloses device location determination technologies/techniques and, like *Spain-I*, *Hunzinger*, and *Nanda*, is in the same technical field as the '698 patent. (§IX.A.1(pre)-(b); see my above analysis regarding *Hunzinger*, *Nanda* and *Spain-I*; §VIII.C; Ex-1001, Abstract, 1:23-10:25.) Also, like *Spain-I*, *Hunzinger*, and *Nanda*, *Damarla* discloses features reasonably pertinent to particular problem(s) the '698

patent attempted to address, and those by a person of ordinary skill in the art at the time. (*E.g.*, §IX.A.1(b)(ii); Ex-1001, 1:23-10:25, 3:26-35, 5:14-37, 5:54-56; Ex-1011, 1:16-54, 3:18-40, 15:19-29; Ex-1054, 3:49-60, 4:3-5:22, 6:37-49, 7:9-22; Ex-1006, 1:21-3:2, 6:12-7:27, 8:14-11:32, 12:14-31; Ex-1028, 1:10-4:20 (*see also infra*).) Such teachings thus would have been consulted by a person of ordinary skill in the art designing/implementing a location-determining process/system, like the *Spain-I- Hunzinger-Nanda* combination I discuss above.

235. In addition to what I explained above, *Damarla* discloses updating signal strengths of reference fingerprints to address known problems with changing RF environments. (Ex-1028, 5:63-6:1 (discussing that “if a permanent environment change affecting RF propagation were made (*e.g.*, taking down a wall or moving a large metal shelf),” for example, an “RF data collection step should be repeated”).) When an RF data collection step is repeated to addresses changes in an environment and improve the accuracy of a location system, *Damarla* explains “[a] MU [mobile unit] is taken to various planned locations in the environment.” (Ex-1028, 5:10-16.) “At each location” for this process, “RF samples are taken and recorded,” which include “information about the RF environment (*e.g.*, signal strength of transmissions from various sources) and is associated with a timestamp and location.” (Ex-1028, 5:10-16.) Figure 4 (above) illustrates the collection of updated

RF data and production of updated reference RF fingerprints in steps 200 and 300.
(*Id.*, FIG. 4.)

236. As a part of a fingerprint update process, *Damarla* discloses that the updated location signal strengths are stored in a first mobile device, wherein the updated signal strengths were measured by a different, second device. For instance, *Damarla* discloses that the updated “reference RF fingerprints are deployed 500 to the computing infrastructure used to support location determination in the environment” where the “infrastructure could be a server that delivers reference RF fingerprint information to MUs, or it could be the MUs themselves.” (Ex-1028, 5:57-62.) (*See also id.*, 16:57-58 (“Fingerprint matching could be performed by a MU or infrastructure”), 5:10-6:1.) The updated RF fingerprints include signal strength information from various transmission sources. (*Id.*, 5:57-62, 14:22-23.) One of the mobile units that receives the updated RF fingerprints and corresponding signal strengths is an example of a first portable RF communication device (where location monitoring is determined) and another different mobile unit that measures signal strengths that are included in the reference fingerprints that can be deployed to the first mobile unit and used for location determining purposes is an example of a “second portable RF communication device” that measures location signal

strengths, which are used for location determining purposes consistent with those described by *Spain-I-Nanda*. (Ex-1028, 5:10-62, 6:34-37, 14:22-23.)

237. A person of ordinary skill in the art would have understood that the *Spain-I* system as modified by *Hunzinger* and *Nanda* discloses/suggests that signal strengths for a chosen location are recorded in a database, and that *Damarla* discloses a beneficial way to update signal strengths stored in a database with measurements that made by a second device, a person of ordinary skill in the art would have been motivated to configure the *Spain-I-Nanda* system I discussed in claim 1 (and claim 4 (§IX.A.4)) such that chosen location signal strength number(s) were measured by a second MU different from the first MU, while still allowing the updated fingerprint information to be deployed to a remote fingerprint database used in the location-determining processes as I explained in claim 1. (§IX.A.1(b); Ex-1011, FIGS. 9-10; Ex-1028, 5:10-6:1.) In such a modification, the chosen location signal strengths (*see* §IX.A.1(b)(ii)(2)) would be updated in the fingerprint database based on signal strength measurements taken by a second device, and such information would have been accessible for use during location determining processes consistent with those I discuss above for limitation 1(b) (§IX.A.1(b); *see also* rationale for modifying the system to use a remote database with fingerprint data collected by different MUs in §IX.A.4.)

238. In addition to the reasons for implementing a remote database for reasons I explained in §IX.A.4, a person of ordinary skill in the art would have had additional reasons to implement such features in light of *Damarla* for updating the chosen location signal strength number(s), such as to improve the accuracy of the location-determining system/processes and better adjust for changing RF propagation environments that would affect RF-based location services, as suggested by *Damarla*. (Ex-1011, 3:34-40, 15:19-29; Ex-1028, 1:62-2:13, 5:63-6:1.) Additionally, in other applications of such a modification that would have been equally contemplated by a person of ordinary skill in the art at the time, configuring the modified system/process to allow one MU to measure updated signal strength information for deployment to the fingerprint database, which are subsequently used by another MU for location determining, would have reduced the computational/memory load of the MU having its location determined; since it would have been configured (for certain applications) to perform location-determining processes (like that in limitation 1(b)) based on user chosen location signal strength number(s) measured by a different MU, without requiring the MUs to maintain the database locally. (Ex-1028, 5:10-6:1; §IX.A.4.)

239. Similar to that discussed above for claim 4 in §IX.A.4, it is my opinion that a person of ordinary skill in the art would have had the skills, rationale, and

knowledge to design/configure such modifications further motivated by *Damarla*, and have done so with a reasonable expectation of success in achieving them. Consistent with that discussed above in §IX.A.4, the above modifications would have involved applications of known techniques/technologies (e.g., fingerprint generation/updating techniques and use of remote database collecting information from multiple MUs, etc. like those described in *Spain-I*, *Hunzinger*, *Nanda*, and *Damarla*). Thus, a person of ordinary skill in the art would have had good reasons and the capabilities to configure the *Spain-I-Hunzinger-Nanda-Damarla* system/process such that user chosen location signal strength number(s) were measured and provided by a MU different from the MU having its location monitored (like that I discussed in claim 1 and similar to that I discuss for claim 4 above). (§IX.A.1(b); §IX.A.4.) The additional teachings and suggestions of *Damarla* would have further motivated such a skilled person to implement such a modification, and thus complemented and enhanced the rationale I explain above for claim 4 in §IX.A.4.

2. Claims 6 and 7

240. I explain above how and why the limitations of claim 5 are disclosed and/or suggested by *Spain-I* in view of *Hunzinger* and *Nanda*. (§IX.A.5.) In my opinion, the additional teachings of *Damarla* would have further motivated a person

of ordinary skill in the art to configure the *Spain-I-Hunzinger-Nanda* system/processes such that the database is stored remotely, and not on the first MU, as recited in claim 5.

241. Consistent with that I explained in the above for claims 4 and 6 (§IX.A.4, IX.A.6, IX.B.1), *Spain-I*, *Nanda*, and *Damarla* discloses/suggests that a mobile unit can receive updated fingerprint information to update *Spain-I*'s fingerprint database 501. In addition to the teachings noted above, and applicable to claim 6, *Damarla* further discloses that “a server that hosts the” fingerprint “database could send the appropriate reference RF fingerprints to a MU” such that only “portions of the database” are “dynamically transmitted for use at run-time” to a mobile unit. (Ex-1028, 16:42-57.) In such a configuration, “a server delivers reference RF fingerprint information to MUs” (*Id.*, 5:57-62), such that the fingerprint database is stored remotely from mobile devices.

242. A person of ordinary skill in the art would have had similar rationale for considering such features from *Damarla* (and *Spain-I* and *Hunzinger-Nanda*) as I explained above for claim 4 (*see* §IX.B.1) and those discussed above for claim 6 (*see* §IX.A.6), as well as similar capabilities, expectation of success, and state-of-art knowledge that would have led to configuring the modified *Spain-I* system/processes as I discussed, especially in view of *Spain-I*'s goal of designing

processes to complement/augment existing location determining technologies. (Ex-1011, 3:34-40, 15:19-29.) In addition to the teachings/suggestions of *Spain-I* and *Nanda* (as I explained above in §IX.A.6), a person of ordinary skill in the art would have been further motivated by the teachings of *Damarla* to store the fingerprint database (as recited in claims 1, 5 (§§IX.A.1, IX.A.5)) on a remote server that can share/deploy portions of such stored information (signal strengths, ID information, etc.) with the first MU when the location of the MU is sought/requested, consistent with the teachings of *Spain-I* (Ex-1011, 4:43-46) to reduce computational and storage requirements of the MU, as suggested by *Damarla*. (Ex-1028, 16:50-63.) Such a modification would have predictably resulted in applying known technologies/techniques (*e.g.*, like those described in *Spain-I*, *Hunzinger*, *Nanda*, and *Damarla*) for receiving information from a remote database for local processing by a MU. (*See also* rationale for limitations 1(b)(ii) (§IX.A.1(b)(ii)) and claims 4-6 (§§IX.A.4-6, IX.B.1).)

243. The above discussed *Spain-I*, *Hunzinger*, *Nanda*, and *Damarla* system/processes discloses and/or suggests the limitations of claim 6 for reasons similar to those that I discussed above for claim 7 in §IX.A.7 and those above for claim 6. The additional teachings of *Damarla* would have complemented the

reasons for modifying/configuring *Spain-I-Hunzinger-Nanda* system/processes for the reasons I explain above for claim 6.

C. *Spain-I* in View of *Hunzinger*, *Nanda*, and *Budampati* Discloses and/or Suggests the Features of Claim 11

244. It is my opinion that *Spain-I*, in view of *Hunzinger*, *Nanda* and *Budampati* discloses and/or suggests all of the limitations of claim 11 of the '698 patent.

1. Claim 11

a) The method of claim 1 wherein the signal characteristic is the signal's arrival time.

245. It is my opinion that *Spain-I* in view of *Hunzinger*, *Nanda*, and *Budampati* discloses and/or suggests this limitation. (§IX.A.1, §VIII.D.) As previously discussed in relation to claim 1, the *Spain-I-Hunzinger-Nanda* system/process involves the comparison of fingerprint information, which includes parameters reflecting signal characteristics such as signal strength, for both monitored and chosen locations. This comparison is carried out to determine whether the mobile unit (MU) is within the proximity of the selected location. (§IX.A.1(b); Ex-1011, 5:20-32, 13:49-55; Ex-1006, FIG. 3B, 10:51-11:32, 5:43-46.) But it is essential to note that the *Spain-I-Hunzinger-Nanda* system/process I discussed above is not confined solely to configurations that determine location based on signal

strength comparisons. Indeed, *Spain-I* explicitly discloses that the fingerprints employed in its processes can be generated from a variety of different RF characteristics, whether individually or in combination. (Ex-1011, 4:55-56 (“[T]he spectral fingerprint may be generated using *many different parameters*, either *individually or in combination*”), 3:57-64 (signal strength, phase, signal identity, signal source identity) 3:55-58, 5:20-22.) *Spain-I* also discloses using fingerprint capture times. (*Id.*, 8:4-8 (“The time at which a fingerprint was captured is also stored along with its location identity.”), 13:19-20, 14:1-3, FIGS. 9-10 (below).)

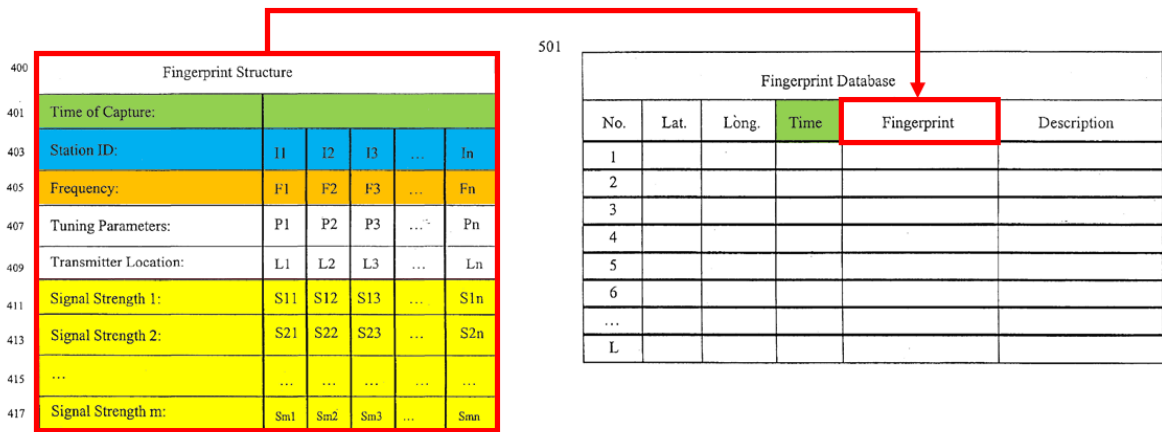


Fig. 9

246. The specific time that a fingerprint is captured can be compared to prior fingerprint capture times because “not all fingerprints in the database are valid for all times in the day,” and the database engine limits the search of to the relevant fingerprints based on “[k]nowing the time at which [a] request is received.” (Ex-

1010, 9:5-10.)¹³ *Spain-I* also recognized the conventional methods of “monitor[ing] the time of arrival of signals” to determine mobile unit locations as “well known to one skilled in the art.” (Ex-1011, 3:17-26.) *Nanda* similarly contemplated and suggested using other types of signal characteristics, including signal strength and phase. (Ex-1006, 7:19-28, 8:45-10:8 (describing phase/signal strength fingerprint data and different “possible information [] may be used to characterize a fingerprint...”).) Consequently, *Spain-I* (and *Nanda*) contemplates and suggests using different types of signal characteristics, including those relating to time, as parameters for generating the fingerprints that are used for the location determination processes.

247. Consistent with the guidance of *Spain-I* and *Nanda*, a person of ordinary skill in the art would have appreciated that there were multiple approaches and reasons for using different parameters when constructing fingerprints for location-determining applications. Such a skilled person thus would have been motivated to consider existing teachings in the art concerning other types of signal parameters to use with the fingerprint matching/comparison operations I discussed above for claim 1. (§IX.A.1(b).) Upon doing so, such a skilled person would have

¹³ See n.4 (Ex-1010, incorporated by reference (Ex-1011, 1:8-15).)

found *Budampati*'s teachings relevant and persuasive, and thus been motivated to configure the modified *Spain-I*'s system/processes to use time of arrival signal characteristic information in the *Spain-I-Hunzinger-Nanda* system/process, in accordance with the approach described above for claim 1.

248. A person of ordinary skill in the art would have had a clear understanding and awareness regarding the common use of signal arrival time, often referred to as Time of Arrival (TOA), as a standard signal characteristic employed to facilitate the determination of locations for mobile devices:

The mobile phone 1 may also comprise software and/or hardware enabling it to use other techniques for automatic determination of its horizontal position such as the Global Positioning System (GPS) using signals received from orbital satellites, or other cellular network based techniques such as Time of Arrival (TOA), cell of origin (COO), or time difference of arrival (TDOA, the details of which are all well known to the skilled person).

(Ex-1105, ¶0089 (mobile phone configured to determine its position using techniques such as TOA); *see also* Ex-1063, ¶0007 (“various known location techniques may include collecting ranging measurements such as, for example, a time of arrival (TOA)”); Ex-1056, ¶0019 (“[t]ime of arrival and signal strength

[were] often combined to estimate range”); Ex-1108, Abstract, 1:53-65 (describing TOA-based comparison location processes).)

249. In alignment with such established knowledge, and with the suggestions of *Spain-I* and *Nanda, Budampati* discloses a location determining system and process which the control of wireless network access is controlled based on “the location of the wireless device.” (Ex-1109, ¶¶0003, 0016-0020.) Time of arrival information is incorporated to aid in making these location determinations:

The most common localization techniques used in WLANs and cellular networks are the time of arrival (TOA), time difference of arrival (TDOA), received signal strengths (RSS), and angle of arrival (AOA) methods. These techniques were initially developed in the context of ranging and localization applications, such as passive or active radar and sonar. They rely on estimating the range between transmitters and receivers, typically from time measurements. The location of the receiver or the mobile station of interest can be computed based on a set of range measurements. The underlying assumption is that the received signals propagate through LOS paths. Violating this assumption introduces NLOS errors in range measurements, leading to erroneous location estimates.

In the TOA technique, the range to a given transmitter is estimated from the arrival time of the first arrival. The approach

assumes that the earliest arrival corresponds to the LOS path. In the TDOA approach shown in FIG. 6, the system determines the difference between the times at which the signal is received at several distributed receivers. Each time difference defines a hyperbola on which the transmitter must lie. The intersection of the hyperbolae gives the source location estimate. Both the TOA and TDOA methods require perfect synchronization among many nodes, e.g., the transmitter and receivers in TOA method and all receivers in TDOA approach. The accuracy of the approaches depends on the accuracy of the time of arrival measurements. This is a function of the bandwidth of the transmitted signal and its time duration, or equivalently the number of returns that are processed to produce the range estimate.

(*Id.*, ¶¶0054-0055.)

250. Among its various features, *Budampati* details a fingerprint matching/comparisons process that leverages time of arrival (TOA) signal characteristics. Similar to *Spain-I*'s fingerprint comparison/matching processes, *Budampati* recognized the potential for conducting measurements to ascertain Received Signal Strength (RSS) and TOA measurements obtained from various base stations for different locations, which "led to the development of a class of location fingerprinting techniques" where for a "[g]iven fingerprint, e.g., a set of **measured**

RSS, **TOA**, and/or AOA, the algorithm searches a database of location fingerprints for the closest match” where “[t]he algorithm then returns the location of that closest match as the location of the transmitter”:

The service area of a WLAN may be limited to the inside and close vicinity of a building. It is therefore feasible to optimize the placement of the base stations. It is also possible to conduct measurement campaigns to determine the RSS, TOA, and AOA observed from different base stations for different locations within or immediately outside the building. This observation has led to the development of a class of location fingerprinting techniques that could be considered extensions of the enhanced RSS method. The basic operation of pattern recognition positioning algorithms is simple. Given a fingerprint, e.g., a set of measured RSS, TOA, and/or AOA, the algorithm searches a database of location fingerprints for the closest match. The algorithm then returns the location of that closest match as the location of the transmitter. The database of location fingerprints is populated by dividing the service area into non-overlapping cells, analyzing the received signal patterns corresponding to each cell and recording the corresponding fingerprint in the database. Several variations on this simple approach have been successfully demonstrated in limited service areas. Indeed, the major limitation of this class of techniques is that it does not scale easily, requiring larger databases and becoming more prone to

errors that are due to different locations displaying close signatures because of the small scale fluctuations observed in radio propagation.

(*Id.*, ¶0061.) The location fingerprint database is populated by storing recorded fingerprints created through “analyzing the received signal patterns corresponding to each [service-area] cell.” (*Id.*)

251. It is my opinion that *Budampati* is in the same technical field as the '698 patent (as well as *Spain-I-Hunzinger-Nanda*) and discloses features reasonably pertinent to particular problem(s) the '698 patent (and a person of ordinary skill in the art) looked to solve. Consequently, *Budampati* thus would have been consulted by a person of ordinary skill in the art contemplating *Spain-I-Hunzinger-Nanda*. (§IX.A.1(b)(ii); *see* above regarding *Budampati*; § Ex-1001, Abstract, 1:23-10:25, 3:26-35, 5:14-56.)

252. Considering the insights offered by *Budampati* in context of *Spain-I* (and *Nanda*), coupled with the common knowledge of Time of Arrival (TOA) data for location determining applications held by a person of ordinary skill in the art, a person of ordinary skill in the art would have been motivated to configure the modified *Spain-I* system/process to measure/store/use signal arrival time as the signal characteristics for the fingerprints generated and used in the *Spain-I*-

Hunzinger-Nanda system/process I discussed for claim 1. (§IX.A.1(b).) This configuration would have predictably resulted in the mobile unit (MU) measuring and/or obtaining time of arrival for each signal received from the antenna stations, and using that information, in addition to or instead of signal strengths, as the fingerprint parameter(s) subsequently compared when determining whether the MU first monitored location is in proximity of the user chosen location like that discussed above for limitation 1(b). (§IX.A.1(b).) As a result, the *Spain-I-Hunzinger-Nanda-Budampati* system/process would have carried out the location determining by electronically comparing at least one number based on arrival times of the signals received from the first antenna stations at the first monitored location with at least one number based on corresponding arrival times of the signals received from each of the antenna stations at the user chosen location.

253. The *Spain-I-Hunzinger-Nanda-Budampati* system/process discloses/suggests the “number(s)” features recited in limitation 1(b) in context of claim 11 for the same reasons explained above in §IX.A.1(b)(ii)(2) (*e.g.*, whether the “number(s)” reflect the obtained TOA values (like with signal strength measurement values I discussed in §IX.A.1(b)(ii)(2)) and the reasons in §IX.A.1(b)(ii)(3) in view of *Nanda* (*e.g.*, whether the “number(s)” are a result of a formula applied to such collected/measured TOA information (*e.g.*, calculated

averages, other mathematical operations, etc.) like with the calculated signal strength number(s) as discussed in §IX.A.1(b)(ii)(3)).

254. A person of ordinary skill in the art would have had good reason and been motivated to contemplate and incorporate Time of Arrival (TOA) signal characteristics, as mentioned earlier, since TOA information was a recognized signal parameter known for its ability to enhance accuracy in “position measurement.” (Ex-1108, 1:53-65.) Furthermore, in specific applications of such a modification, such a skilled person would have recognized the potential advantages and benefits in using TOA-based fingerprint comparison matching as a means of validating and confirming the accuracy of other determinations based on fingerprint parameters, such as those reliant on signal strengths. (Ex-1110, 11:26-35 (describing the use of a second location determination method to confirm the result of a first determination method).) Such knowledge, coupled with *Spain-I*’s contemplated use of different signal parameters (not limited to RSSI, etc.) and *Budampati*’s similar teachings/suggestions of fingerprint comparison/matching algorithms, where fingerprints may be based on one or more different parameters (including TOA and/or RSSI), would have led a person of ordinary skill in the art to modify the system/process as noted above.

255. In light of the teachings and suggestions of *Spain-I*, *Nanda*, and *Budampati*, a person of ordinary skill in the art would have recognized that configuring the *Spain-I-Hunzinger-Nanda* system/process to utilize signal arrival time as I explained above would have been a suggested and predictable implementation of established technologies/techniques and/or simple substitution of one known signal characteristic for another that would have been used in similar ways (fingerprint parameter comparisons) as contemplated by *Spain-I* in context of *Hunzinger-Nanda-Budampati*. Indeed, considering the familiar features/technologies taught by *Spain-I-Hunzinger-Nanda-Budampati*, along with contemporary state of art knowledge (*see* my above analysis; *see also, e.g.*, Ex-1105, ¶0090; Ex-1063, ¶0007; Ex-1056, ¶0019), such a skilled person would had the skills, knowledge, and rationale to consider and implement such modifications with a reasonable expectation of success.

D. *Spain-I* in View of *Hunzinger*, *Nanda*, and *Blomqvist* Discloses and/or Suggests the Features of Claims 15-16

256. As explained below, it is my opinion that *Spain-I* in view of *Hunzinger*, *Nanda*, and *Blomqvist* discloses and/or suggests all of the features of claims 15-16 of the '698 patent.

1. Claim 15

a) The method of claim 1 further comprising passing an

indicia to a computer program application running on the first portable RF communications device indicating that the device is one of: (i) at the chosen location, or (ii) no longer at the chosen location.

2. Claim 16

- a) The method of claim 1 further comprising launching a computer program application on the first portable RF communications device when the device is at the chosen location.**

257. It is my opinion that *Spain-I* in view of *Hunzinger*, *Nanda*, and *Blomqvist* discloses and/or suggests these limitations. (§IX.A.1; §VIII.E.) As I discussed above for claim 1, the *Spain-I-Hunzinger-Nanda* combination discloses and/or suggests determining if the MU monitored location is within proximity of a location chosen by the user of the first MU, like that claimed in limitation 1(b). (See my discussions above in §IX.A.1(b) (e.g., based on the comparison operations performed by the *Spain-I-Hunzinger-Nanda* system/processes, the MU determines whether the MU monitored location is in proximity of a user chosen location corresponding to the signal strength/ID fingerprint information in the database).)

258. Given *Spain-I* also discloses location-based service features (Ex-1011, 3:8-16 (location server interested in MU location for providing “personalized services,” etc.)), a POSITA would have had reasons to consider teachings in the art providing details regarding MU-based features that would leverage the location

determining features discussed above, including use of a location-based software applications known to be available in mobile devices at the time. In view of *Hunzinger* and *Blomqvist* (see my analysis above), it is my opinion that a person of ordinary skill in the art would have been motivated to configure the *Spain-I-Hunzinger-Nanda* system/process such the MU performs processes that passes an indicia to a computer program application running on the first MU indicating that the MU is at the user chosen location (like that in claim 15) and launches the computer program application on the first MU when the MU is at the chosen location (like that in claim 16).

259. As I explained above, *Hunzinger* discloses a mobile device performing selected actions based on a determination whether the MU current location is at, entering, or left a user chosen location assigned to such action(s) (Ex-1054, FIGS. 1A-4, 1:38-2:44, 3:4-67, 4:1-6:22, 6:37-49, 7:9-22), and based on such teachings (among others), the modified *Spain-I-Hunzinger-Nanda* system/processes would have implemented similar features in relation to user chosen locations. (See my discussions above in §IX.A.1(b).)

260. *Blomqvist* describes systems and processes for efficiently determining the location of a mobile device. For example, *Blomqvist*'s Abstract describes:

A method for activating a location-based function, at least one item of position data is determined for the function as a condition for activating the function. A device in a wireless communication network examines at least one property of the network to decide whether positioning of the device (1) is conducted. Likewise, a system may provide a location-based function, for which at least one item of position data is determined as a condition for activating the function. A program in which the method is applied is also provided.

(Ex-1033, Abstract.) (*See also* my discussions above in §VIII.E.)

261. *Blomqvist* explains that,

The present invention relates to a method for ***activating a location-based function, in which at least one item of position data is determined for the function as a condition for activating the function***, the device being used in a wireless communication network in which signals are transmitted. The invention also relates to a system comprising determination means for determining a location-based function, ***in which at least one item of position data is determined for the function as a condition for activating the function***, processing means for ***activating the location-based function in a device***, and a wireless communication network comprising at least one transmitter for transmission of signals. Moreover, the invention relates to a ***device comprising determination means for determining a***

*location-based function, in which at least one item of position data is determined for the function as a condition for activating the function, processing means for activating the location-based function in a device, and wireless communication means for setting up a data network connection to a wireless communication network. The invention also relates to **a program containing a group of machine-executable program commands for presenting messages in a device, and at least one location-based condition for presenting the message is determined in the message, said program being intended to be executed in a device** used in a communication network in which signals are transmitted.*

(*Id.*, 1:14-39.)

262. *Blomqvist* also explains:

Several applications have been developed that contain a location-based condition determined for a message for the presentation of the message. Such messages are for example regional *advertisements that can be transmitted to a device carried by the user, and when the user arrives to a certain location, for example in the vicinity of a store, a restaurant, a service station, or the like, this is indicated in the device of the user.* The person in question may have determined *conditions for presenting different messages in his or her device, wherein when he or she approaches a location in relation to which he or she has*

determined a message to be presented, said message is presented in the device. The person may determine for example a reminder to *visit a certain hardware store, wherein when the user approaches said hardware store, this is indicated in the device of the user.*

(*Id.*, 1:43-58.)

263. *Blomqvist* thus describes features that determine the position (location) of a mobile device 1 where the device can automatically activate a location-based function when it is determined the device is at or within vicinity of a specified location. (*Id.*, FIG. 2 (annotated below), 1:14-39, 2:20-62, 5:10-60.)

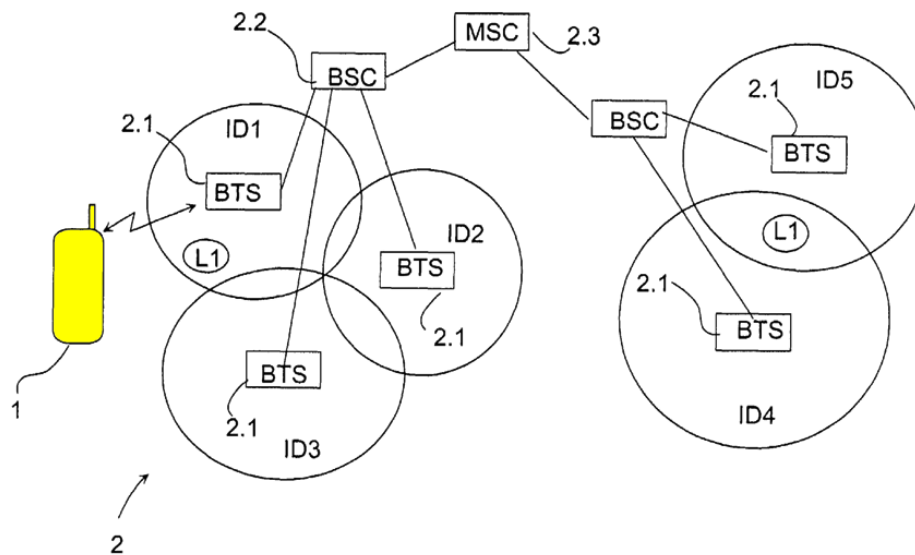


Fig. 2

264. For example, *Blomqvist* explains:

After the location of the device 1 has been determined, it is examined *whether the device 1 is in the vicinity of a location complying with a stored function performance condition*. This is implemented in the device 1 advantageously in such a manner that the location coordinates and possible distance information, such as the radius, are examined in the function information stored in the memory 1.1. *If the determined location is in the area determined by a performance condition of the function, the necessary measures are taken to perform the function*. This can be advantageously implemented in such a manner that a so-called *reminder service library implementing the reminder service as well as an application that utilizes the reminder service library to perform a function*, for example to present a reminder in text format for the user are established in the device 1.

(*Id.*, 5:10-25.)

Thus, *the application calls for such a function in the reminder service library* by means of which the application can determine the location in which *the reminder service library will provide the application with information on the arrival in the determined location*. *When the application has received information on the arrival in the determined location, the application implements the determined function*, for example presents a message in text format. Thus, said text is formed on

the display 1.6. Similarly, if the message in question is another visual message, this message is formed on the display 1.6. Furthermore, if the message in question is a sound message, this sound message is transmitted to a speaker/earpiece 1.7.

(*Id.*, 5:25-37.) (*See also id.*, 5:38-45.)

265. Further, *Blomqvist* discloses that:

Other functions to be mentioned in this context that can be activated on the basis of the location are starting of a program, changing the settings of a device, for example changing the user profile in a mobile station, re-configuration, or a security function. The user for example wishes to silence his or her mobile station when arriving to a certain location, turn off the mobile station for example when arriving to an airport, etc. It should be evident that ***the afore-described details only represent some possible examples, but the invention can also be applied in implementing numerous other functions on the basis of the location.*** Furthermore, the invention can be applied to implement various services. Non-restrictive examples that can be mentioned in this context are informative services and security services.

(*Id.*, 5:46-60.)

266. Thus, a person of ordinary skill in the art would have understood *Blomqvist* to disclose, among other features (*id.*, 2:23-3:12 (change in network

property as condition for performing subsequent operations), 4:35-60, 6:39-64, 7:19-26, 7:43-8:5), then-conventional mobile device functionalities that involved triggering a location-based function, such as a reminder, picture/text/sound message, application, etc., when the device is at or within vicinity of a specified location (*id.*, FIGS. 1a-2, 1:14-39, 2:20-62, 3:44-64, 5:10-6:36, 8:52-62). For example, as explained above, when an “*application has received information on the arrival in the determined location, the application implements the determined function*, for example presents a message in text format.” (*Id.*, FIG. 1, 5:10-37.) *Blomqvist* further discloses or suggests that such an application is configured to run on the mobile device to, for example, issue a reminder to a user via a phone display. (*Id.*, 5:10-37, 8:33-36, 8:52-62, FIG. 3.) Furthermore, “it is obvious that [*Blomqvist*’s] invention can also be applied for activating and performing other functions” such that “it is for example possible to *activate an application (program) installed in the device 1* at that stage *when the device 1 is positioned close to a predetermined location*” for indicating “that the *user has arrived* to a certain location, activating a map application, etc.” (*Id.*, 8:52-62; *see also id.*, 3:44-50, 5:46-50 (“starting of a program”).)

267. Upon considering *Blomqvist* within the context of the above-teachings in context of the *Spain-I-Hunzinger-Nanda* system/processes discussed above for

claim 1 (which determines when the MU is at a user chosen location (§IX.A.1(b))), it is my opinion that a person of ordinary skill in the art would have been motivated and had good reason to configure the MU in the modified *Spain-I* system/process (§IX.A.1) to include a location-based software program application that receives an indicia indicating when the MU is determined to be at the user chosen location and launching the location-based application to perform desired functions, consistent with the features taught by *Blomqvist*. Such a modification would have predictably resulted in the MU having installed therein, one or more applications like those suggested/taught by *Blomqvist*, which would have been launched/executed upon receiving indicia indicating that the MU is at the user chosen location, which would have been associated with the corresponding function to be performed, consistent with features disclosed by *Hunzinger* and *Blomqvist* and with the features recited in claims 15-16. Providing such applications on a mobile device like that taught by *Spain-I* would have been a suggested implementation of known features, especially considering that mobile devices before the alleged time of invention were known to offer applications to assist the user with various tasks, events, and the like based on location (as taught/suggested by *Blomqvist* and *Hunzinger*). (See also my discussions above in §V.)

268. In my opinion, a person of ordinary skill in the art would have been motivated and had good reason to include such features in the *Spain-I-Hunzinger-Nanda-Blomqvist* system/processes in order to enhance user convenience and assistance regarding certain tasks, such as providing reminders, to-do lists, or provide location-based application when they/MU is determined to be at a given/chosen location, similar to the teachings/guidance offered by *Blomqvist* and *Hunzinger*. (Ex-1033, 1:43-58, 5:10-37; Ex-1054, Abstract.) A person of ordinary skill in the art also would have appreciated the advantages and benefits of such a modification, as it would have enhanced and complemented the features offered by the MU in the *Spain-I-Hunzinger-Nanda* system/processes. This would have included providing user-friendly service-based operations that aligned with the service-based features contemplated by *Spain-I*. (Ex-1011, 3:8-16.)

269. Thus, the collective teachings and suggestions of *Spain-I-Hunzinger-Nanda-Blomqvist* like that explained above, would have motivated a person of ordinary skill in the art to configure the location determining processes performed by the modified system (§IX.A.1) to further include providing an indicia that informed a location-based software program application running on the MU that the MU is at the location chosen by the user and launching that applications to perform location-based functions, like that recited in claims 15-16.

270. A person of ordinary skill in the art would have possessed the necessary skills, knowledge, and rationale to successfully configure and implement the aforementioned modifications, with a reasonable expectation of success in achieving them. This is especially the case given that such a configuration/implementation would have involved the use of known techniques/technologies, including programming/modifying software executed by the MU, consistent with the features described by *Spain-I-Hunzinger-Nanda-Blomqvist*. (Ex-1011, 15:19-29; Ex-1054, 3:49-5:22; Ex-1033, 8:33-62.)

X. CONCLUSION

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

Dated: November 7, 2023



Kevin C. Almeroth