

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VOLKSWAGEN GROUP OF AMERICA

Petitioner

v.

CARUCEL INVESTMENTS, L.P.

Patent Owner

Case No. IPR2019-01102
U.S. Patent 7,979,701

**DECLARATION OF MARK R. LANNING IN SUPPORT OF
PATENT OWNER'S RESPONSE TO THE PETITION
PURSUANT TO 37 C.F.R. § 42.120**

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I. INTRODUCTION

1. I have been retained on behalf of Carucel Investments, L.P. (“Carucel”) to provide assistance regarding U.S. Patent No. 7,848,701 (“the ’701 Patent”, Ex. 1001) in connection with Volkswagen Group of America, Inc.’s (“Petitioner”) Petition for Inter Partes Review IPR2019-01102. Specifically, I have been asked to consider the validity of Claims 10, 15-18, 31, 33-35 of the ’701 Patent (the “Challenged Claims”). I have personal knowledge of the facts and opinions set forth in this declaration, and, if called upon to do so, I would testify competently thereto.

2. I am being compensated for my time at my ordinary and customary consulting rate of \$550 per hour for my work. My compensation is based solely on the amount of time that I devote to activity related to this case and 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 financial interest in this proceeding. My opinions are based on my years of education, research and experience, as well as my investigation and study of relevant materials, including those cited herein.

3. I may rely upon these materials, my knowledge and experience, and/or additional materials to rebut arguments raised by the Petitioner and Mr. Denning.

Further, I may also consider additional documents and information in forming any necessary opinions, including documents that may not yet have been provided to me.

4. My analysis of the materials produced in this proceeding is ongoing and I will continue to review any new material as it is provided. This declaration represents only those opinions I have formed to date. I reserve the right to revise, supplement, and/or amend my opinions stated herein based on new information and on my continuing analysis of the materials already provided.

5. For simplicity, I have used the same abbreviations and Exhibit numbers as the Petitioner for the '701 Patent and the purported prior art as set forth in the table below.

Petitioner's IPR Petition Exhibits	
Exhibit No.	Title/Description
Ex. 1001	U.S. Patent No. 7,848,701 B2 to Gavrilovich ("the '701 patent")
Ex. 1002	Prosecution File History of U.S. Patent No. 7,848,701 ("'701 Prosecution History")
Ex. 1003	Declaration of Mr. Denning in Support of Petition for Inter Partes Review of U.S. Patent No. 7,848,701 ("Denning Dec.")
Ex 1004	Mr. Denning's Curriculum Vitae
Ex. 1005	U.S. Patent No. 5,276,686 to Ito ("Ito")
Ex. 1006	U.S. Patent No. 5,504,786 to Gardner ("Gardner")
Ex. 1007	U.S. Patent No. 5,109,390 to Gilhousen et al. ("Gilhousen390")
Ex. 1008	U.S. Patent No. 4,001,692 to Fenwick et al. (Fenwick)
Ex. 1009	U.S. Patent No. 5,559,865 to Gilhousen ("Gilhousen865")

Ex. 1010	George Calhoun, <i>Digital Cellular Radio</i> , Artech House, Inc., 1988 (“Calhoun”)
Ex. 1011	Young et al., “Advanced Mobile Phone Service: Introduction, Background, and Objectives,” <i>The Bell System Technical Journal</i> , vol. 58, no. 1, Jan. 1979; pp. 1-14. (accessible at https://archive.org/details/bstj58-1-1) (“Young”)
Ex. 1012	Mac Donald et al., “Advanced Mobile Phone Service: The Cellular Concept,” <i>The Bell System Technical Journal</i> , vol. 58, no. 1, Jan. 1979; pp. 15-41. (accessible at https://archive.org/details/bstj58-1-15) (“Donald”)
Ex. 1013	John Scourias, “Overview of the Global System for Mobile Communications,” May 19, 1995. (“Scourias”)
Ex. 1014	“Advanced Communications Project, Technology Reference Document,” VisiCom Laboratories Inc., September 1993. (“VisiCom”)
Ex. 1015	<i>Law Enforcement News</i> , vol. V, no. 20, Nov. 26, 1979. (accessible at https://archive.org/details/lawenforcementne20john_1/page/n15) (“News”)
Patent Owner’s Response Exhibits	
Exhibit No.	Title/Description
Ex. 2100	Declaration of Mark R. Lanning in Support of Patent Owner’s Response to the Petition (“Lanning Decl.”)
Ex. 2101	Mr. Lanning’s Curriculum Vitae
Ex. 2102	Carucel Investments’ Memorandum of Contentions of Fact and Law (Dkt. No. 184) filed on February 10, 2017 in <i>Carucel Investments L.P. v. Novatel Wireless, Inc. et al.</i> (16-cv-01118-H-KSC)
Ex. 2103	Craig Freudenrich, Ph.D. “How Cordless Telephones Work” (11 December 2000) retrieved from https://electronics.howstuffworks.com/cordless-telephone.htm
Ex. 2104	Newton’s Telecom Dictionary, 11 Edition 1996.

Ex. 2105	<i>Carucel Investments, L.P. v. Novatel Wireless, Inc. et al.</i> , Claim Construction Order, Case No. 16-cv-118-H-KSC, Sept. 16, 2016
Ex. 2106	Order Denying Carucel Investments’ Motion for Judgment as a Matter of Law or, in the Alternative, for a New Trial (Dkt. No. 356) filed on June 13, 2017 in <i>Carucel Investments L.P. v.</i> <i>Novatel Wireless, Inc. et al.</i> (16-cv-0118-H-KSC)
Ex. 2107	Excerpts of the file history for U.S. Patent No. 7,848,701
Ex. 2108	Transcript of Deposition of Scott Denning
Ex. 2109	Samuel C. Yang “CDMA RF System Engineering” (1998)
Ex. 2110	Jhong S. Lee “CDMA Systems Engineering Handbook” (1988)
Ex. 2111	“Radio Repeater Station” retrieved from http://www2.hawaii.edu/~rtoyama/repeater.html
Ex. 2112	U.S. Patent No. 5,257,283 (“Gilhousen”)

II. SUMMARY OF OPINIONS

6. Ground 1: It is my opinion that a POSITA would not be motivated to combine Ito and Gardner for the reasons set forth herein. It is further my opinion that Ito and Gardner fail to disclose all of the elements of or render obvious Claims 10, 15, 17, and 18 for the reasons set forth herein.

7. Ground 2: It is my opinion that a POSITA would not be motivated to combine Gilhousen865 and Gilhousen390 for the reasons set forth herein. It is further my opinion that Gilhousen865 and Gilhousen390 fail to disclose all of the

elements of or render obvious Claims 10, 15, 17, and 18 for the reasons set forth herein.

III. EDUCATION, BACKGROUND AND QUALIFICATIONS

8. All of my opinions stated in this declaration are based on my own personal knowledge and professional judgment. In forming my opinions, I have relied on my knowledge and experience in designing, developing, researching, and teaching the technology referenced in this declaration.

9. I am over 18 years of age and, if I am called upon to do so, I would be competent to testify as to the matters set forth herein. I understand that a copy of my current curriculum vitae, which details my education as well as my professional and academic experience, is being submitted as Exhibit 2101. The following provides a brief overview of some of my experience that is relevant to the matters set forth in this declaration.

10. I am currently the President of three consulting companies: Telecom Architects, Inc., I.N. Solutions, Inc., and Reticle Consulting, LLC. All three companies provide professional consulting services and custom software development for one or more particular technical areas. Telecom Architects, Inc. was established in 1999 to provide specialized consulting services to fixed and wireless telecom service providers and their suppliers. I.N. Solutions (Intelligent Networking Solutions) was established in 1991 with an emphasis on applications

design and network architecture engineering for telephone-based switching and Advanced Intelligent Networking systems. Reticle Consulting was created in 2009 to provide specialized consulting services for forensic software analysis and software source code comparison for misappropriation cases.

11. I have over 40 years' experience in a wide variety of communication technologies including, but not limited to, different types of circuit-switched and packet-switched networks, cellular networks and their components, advanced cellular network based services, Public Switched Telephone Network ("PSTN") networks, VoIP networks, Advanced services that use Intelligent Networking ("AIN") network elements, and various signaling protocols (e.g., Signaling System 7 ("SS7") and Integrated Digital Services Network ("ISDN")).

12. I have developed software for many types of computer systems ranging in size from large scale distributed computer systems that used hundreds of computers down to a single personal computer. I have also used many different types of operating systems and programming languages, which includes creating software applications that interfaced with operating systems for at least process creation and scheduling; memory management; and interprocess communication.

13. My communications experience began in 1976 while I was enlisted in the U.S. Army Signal Corps. Specifically, I worked in the U.S. Army Security Agency (ASA) where I was a member of a technical team responsible for upgrading

worldwide voice and data communications used by the White House staff and other government agencies.

14. Beginning in 1984, I was a member of a team responsible for converting a PSTN switch into a cellular mobile switching center that Motorola and other companies used extensively in cellular networks located the U.S. and other countries.

15. I have also been a member or manager of development teams that built cellular network elements and specialized cellular applications. These network element types include at least: base station; home location register; short and multimedia message centers; intelligent peripherals; personal number plans; and pre-paid billing systems. These applications include, but are not limited to, creating, processing and delivering Short Message Service (SMS) and Multimedia Message Service (MMS) messages in cellular networks and cellular phones.

16. Since 1991, I have been responsible for the design and implementation of multiple packet-switched networks and their required interfaces to different circuit-switched networks. Examples of these networks are British Telecom, Nextel, and Sprint. These networks include much of the functionality that is used today in packet switched networks and similar to the purported inventions and technology of the Evaluated Patents.

17. Since 1995, I have also provided second generation (2G) and third generation (3G) Code Division Multiple Access (CDMA) network architecture and equipment design and implementation consulting services to companies such as Sprint, Nextel, Nokia, and Ericsson. While consulting to Nextel, which has since become part of Sprint, as one of the network architects for its iDEN network, one of my responsibilities was to define the network and mobile phone functionality required to support the Multimedia Messaging Service (MMS) and advanced data communications capability.

18. I have consulted for cellular phone suppliers, e.g., Nokia and Ericsson, to verify that the phone's functionality operated correctly and to ensure device compatibility and connectivity between many different models of cellular phones and 2G and 3G cellular networks.

19. In addition to my experience listed above, for at least the past ten years, I have been updating my knowledge of the present-day 3G, 4G, and 5G cellular network and wireless standards and their associated equipment and protocols through my study of each new release of these standards, technical books and trade publications, as well as my expert work in legal cases, which has involved evaluating the functionality of many different types of network equipment, mobile devices, baseband chipsets and thousands of cellular oriented patents.

20. I am a member of the Institute of Electrical and Electronics Engineers (IEEE), including the IEEE Standards Association. I am also a member of the Association for Computing Machinery (ACM). I was also a member of the American National Standards Institute (ANSI) T1 and T1X1 standard groups responsible for the definition and standardization of the Advanced Intelligent Network (AIN) and Signaling System 7 (SS7) protocol.

21. I received my Bachelor of Science degree in Computer Science from Southern Methodist University (SMU) in 1983. More detail on my education, work experience and the cases that I have previously given testimony within at least the past four years is contained in my attached CV as Exhibit 2101.

22. In preparation for this declaration, I have considered the materials discussed in this declaration, including, for example, the '701 Patent, the prosecution history of the '701 Patent, the references cited by Mr. Denning and other references cited in this declaration.

IV. UNDERSTANDING OF RELEVANT PATENT LAW

23. In expressing my opinions and considering the subject matter of the claims of the '701 Patent, I am relying upon certain basic legal principles that counsel has explained to me.

24. First, I understand that for an invention claimed in a patent to be found patentable, it must be, among other things, new and not obvious from what was known before the invention was made.

25. I understand the information that is used to evaluate whether an invention is new and not obvious is generally referred to as “prior art” and generally includes patents and printed publications (e.g., books, journal publications, articles on websites, product manuals, etc.).

26. I understand that in this proceeding, the claims must be given their plain and ordinary meaning consistent with the specification. The claims after being construed in this manner are then to be compared to the information in the prior art.

27. I understand that in this proceeding, the information that may be evaluated is limited to patents and printed publications. My analysis below compares the claims to patents and printed publications that are prior art.

28. I understand that there are two ways in which prior art may render a patent claim unpatentable. First, the prior art can be shown to “anticipate” the claim. Second, the prior art can be shown to have made the claim “obvious” to a person of ordinary skill in the art. I understand that Petitioner contends that certain references render obvious the claims of the ’701 Patent, but that Petitioner does not assert that any prior art anticipates any claim. My understanding of the applicable legal standards for obviousness is set forth below.

A. Obviousness

29. I understand that a claimed invention is not patentable if it would have been obvious to a person of ordinary skill in the field of the invention at the time the invention was made.

30. I understand that the obviousness standard is defined in the patent statute (35 U.S.C. § 103(a)) as follows: A patent may not be obtained though the invention is not identically disclosed or described as set forth in 35 U.S.C. § 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

31. I understand that the following standards govern the determination of whether a claim in a patent is obvious. I have applied these standards in my evaluation of whether the claims of the '701 Patent would have been considered obvious.

32. I understand that to find a claim in a patent obvious, one must make certain findings regarding the claimed invention and the prior art. Specifically, I understand that the obviousness question requires consideration of four factors (although not necessarily in the following order):

- The scope and content of the prior art;
- The differences between the prior art and the claims at issue;
- The knowledge of a person of ordinary skill in the pertinent art; and
- Whatever objective factors indicating obviousness or non-obviousness may be present in any particular case.

33. In addition, I understand that the obviousness inquiry should not be done in hindsight, but must be done using the perspective of a person of ordinary skill in the relevant art as of the effective filing date of the patent claim.

34. I understand the objective factors indicating obviousness or non-obviousness may include: commercial success of products covered by the patent claims; a long-felt need for the invention; failed attempts by others to make the invention; copying of the invention by others in the field; unexpected results achieved by the invention; praise of the invention by the infringer or others in the field; the taking of licenses under the patent by others; expressions of surprise by experts and those skilled in the art at the making of the invention; and the patentee proceeded contrary to the accepted wisdom of the prior art.

35. I understand the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. I also understand that an example of a solution in one field of endeavor may make that solution obvious in another related field. I also understand that market demands

or design considerations may prompt variations of a prior art system or process, either in the same field or a different one, and that these variations will ordinarily be considered obvious variations of what has been described in the prior art.

36. I also understand that if a person of ordinary skill can implement a predictable variation, that variation would have been considered obvious. I understand that for similar reasons, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using that technique to improve the other device would have been obvious unless its actual application yields unexpected results or challenges in implementation.

37. I understand that the obviousness analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, but instead can take account of the “ordinary innovation” and experimentation that does no more than yield predictable results, which are inferences and creative steps that a person of ordinary skill in the art would employ.

38. I understand that sometimes it will be necessary to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art. I understand that all these issues may be

considered to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.

39. I understand that any motivation that would have been known to a person of skill in the art, including common sense, or derived from the nature of the problem to be solved, is sufficient to explain why references would have been combined.

40. I understand that a person of ordinary skill attempting to solve a problem will not be led only to those elements of prior art designed to solve the same problem. I understand that steps suggested by common sense are important and should be considered. Common sense teaches that familiar items may have obvious uses beyond the particular application being described in a reference, that if something can be done once it is obvious to do it multiple times, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle. I understand that the Federal Circuit has repeatedly warned that references to “common sense”—whether to supply a motivation to combine or a missing limitation—cannot be used as a wholesale substitute for reasoned analysis and evidentiary support, especially when dealing with a limitation missing from the prior art references specified. As such, the prior art considered can be directed to any need or problem known in the field of endeavor at the time of invention and can provide a reason for combining the elements of the prior art in the manner claimed.

In other words, the prior art does not need to be directed towards solving the same problem that is addressed in the patent. Further, the individual prior art references themselves need not all be directed towards solving the same problem.

41. I understand that an invention that might be considered an obvious variation or modification of the prior art may be considered non-obvious if one or more prior art references discourage or lead away from the line of inquiry disclosed in the reference(s). A reference does not “teach away” from an invention simply because the reference suggests that another embodiment of the invention is better or preferred. My understanding of the doctrine of teaching away requires a clear indication that the combination should not be attempted (e.g., because it would not work or explicit statements saying the combination should not be made). I understand that a person of ordinary skill is also a person of ordinary creativity.

42. I further understand that in many fields, it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature or knowledge, will drive design trends. Where there is such a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within their technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance, the fact that a combination was

obvious to try might show that it was obvious. The fact that a particular combination of prior art elements was “obvious to try” may indicate that the combination was obvious even if no one attempted the combination. If the combination was obvious to try (regardless of whether it was actually tried) or leads to anticipated success, then it is likely the result of ordinary skill and common sense rather than innovation.

V. CLAIM CONSTRUCTION

43. It is my understanding that (i) the Board, in this proceeding, will construe claim terms based on their ordinary and customary meaning in light of the specification and as understood by one skilled in the art; (ii) a patentee may act as his own lexicographer in the specification; and (iii) either the Petitioner or the Patent Owner can request a construction of a claim term.

44. It is also my understanding that the Patent Owner has requested construction of several claim terms in the ‘701 Patent. The Patent Owner has identified these terms, along with the proposed constructions, in the Patent Owner Response. I have reviewed the proposed constructions as set forth by the Patent Owner in the Patent Owner Response, and based upon my understanding of the ‘701 Patent, the ‘701 Patent file history, and my own experience as a person of ordinary skill in the art at or near the filing date of the earliest priority application of the ‘701 Patent, agree with the constructions as set forth by the Patent Owner. I have applied these constructions in my analysis unless I specifically state otherwise.

45. It is my understanding that certain claim terms were construed during a prior civil action involving the ‘701 Patent (Ex. 2105) and were identified by Petitioner. Petitioner also identified an additional term to be construed in this action. Those terms, as well as two additional terms identified by Patent Owner to be construed, are set forth in the table below.

Term	Patent Owner’s Construction	Petitioner’s Construction
“configured to”	“constructed to move with the traffic at a rate of speed which is comparable to the speed of the traffic” as previously construed by the District Court for the Southern District of California	Petitioner asserts that no terms need to be construed for the purpose of this proceeding.
“transmit radio frequency signals to a mobile device corresponding to the received fixed port signals”	Patent Owner does not dispute the Board’s determination that no construction is necessary for this term.	Petitioner asserts that no terms need to be construed for the purpose of this proceeding.
“mobile device”	Plain and ordinary meaning, such as “a device that must register with and be able to directly communicate with the cellular network” as set forth in the specification of the ’701 Patent	Petitioner asserts that no terms need to be construed for the purpose of this proceeding.
“automotive vehicle”	Plain and ordinary meaning of “automotive vehicle”, such as “automobile.”	Petitioner asserts that no terms need to be construed for the purpose of this proceeding.

VI. LEVEL OF ORDINARY SKILL IN THE ART

46. It is my understanding that a Person of Ordinary Skill in the Art (“POSITA”) at or near the filing date of the earliest priority application of the ‘701 Patent would have had (i) a Bachelor of Science degree in electrical engineering or computer engineering or related field of study; (ii) at least two years of experience with wireless communications systems; and (iii) would also be familiar with cellular communication technology. A lack of experience can be compensated with additional education and a lack of education can be compensated with additional work experience.

47. Based on my education, extensive experience cited herein and my working with at least one hundred people in the 1995 timeframe that I would consider to be at least a POSITA, I believe I am qualified to provide opinions about the understanding and qualifications of a person of ordinary skill in the art in this proceeding.

VII. PETITIONER’S AND MR. DENNING’S DESCRIPTIONS OF THE ‘701 PATENT AND THE PURPORTED PRIOR ART ARE INCORRECT AND MISLEADING

A. The ‘701 Patent

48. I understand that the ‘701 Patent issued on December 7, 2010, from U.S. Patent Application No. 11/733,069 (“the ‘069 Application”), filed on April 9, 2007. I also understand that the ‘701 Patent claims priority back to an application

filed June 2, 1995. The '701 Patent lists Charles D. Gavrilovich as the inventor. I further understand that Carucel Investments L.P. is the current assignee of the '701 Patent.

i. The '701 Patent Invention Requires At Least These Components that Have Specific Functionality

49. The '701 Patent is titled “Mobile Communication System with Moving Base Station.” '701 Patent EX1001. The three main components required by the invention of the '701 Patent are: (1) Cellular fixed base stations (fixed ports) that operate the same as conventional cellular base stations; (2) mobile units (aka, moving mobile units/mobile devices) that are capable of registering with and communicating directly with a fixed base station in a conventional manner and/or communicating with a moving base station; and (3) a Moving Base Station that may be located in a vehicle and communicates with the fixed base stations and with one or more mobile units. Specifically, the '701 Patent discloses that: “[t]he invention relates to *cellular telephone systems* in which a *mobile unit* communicates by wireless communication *to a base station* connected to the wire telephone network and more particularly to *cellular telephone systems* adapted for use with *fast-moving mobile units*.” *Id.*, 1:17-21 (emphasis added)¹. As discussed in detail in the

¹ All emphasis has been added in this declaration unless specifically noted otherwise.

Section below, a cellular network has at least two different sized cells and the small cells require frequent handoffs for a fast-moving mobile phone. The following disclosures of the '701 Patent are additional examples that the invention supports, among other things, the following components: (1) a moving base station that is capable of moving at the speed of traffic; (2) moving mobile telephone units (cellular phones); and (3) fixed base stations (conventional cellular base stations) that are spaced apart with:

“A problem with existing mobile telephone systems is the considerable time required in handoffs. This becomes a particular problem in urban areas which are highly congested” *Id.*, 1:54-56.

“A drawback, however, to decreasing the size of the cells is that a mobile unit tends to cross cell boundaries more often, requiring a larger number of handoffs which will tend to overload the mobile telephone switching office (MTSO) to the point where existing calls may be interrupted or dropped.” *Id.*, 1:65-2:2.

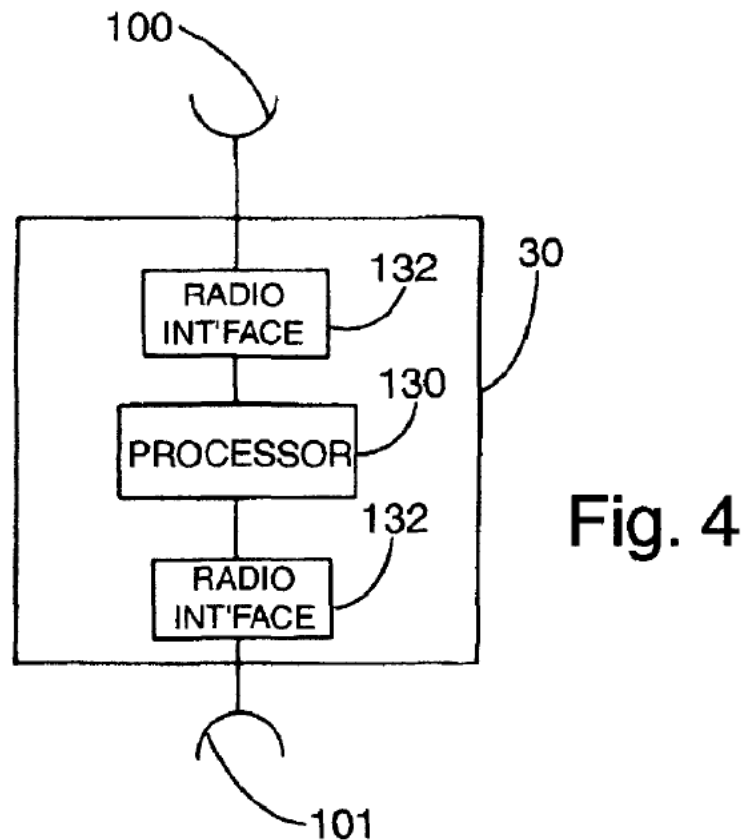
“These and other problems of the prior art are overcome in accordance with this invention by means of a *moving base station* which is interposed between a moving *mobile telephone unit* and a *fixed base station*. In accordance with this invention, *a movable base station moves with the traffic at a rate of speed which is comparable to the speed of the traffic* and communicates with a moving mobile telephone unit via standard mobile radio transmission. The movable base station further communicates by radio signals with a *plurality of fixed*

antennas spaced along the path of travel of the mobile base station.

The several fixed antennas are connected to a telephone wire line network via a telephone gateway office in a standard fashion.” *Id.*, 2:65-3:10.

ii. The Moving Base Station Is “Interposed” Between One Or More Cellular Telephones and Multiple Base Stations

50. The disclosures from the ’701 Patent in at least the Section directly above describe that the Moving Base Station has the functionality to concurrently act as two different cellular system components. First, when communicating with the fixed base stations, the Moving Base Station functions as a cellular phone—e.g., providing call connections and performing handoffs between fixed base stations. Second, when communicating with one or more cellular phones, the Moving Base Station functions as a base station. These two relationships are shown by Fig. 4 of the ’701 Patent below.



EX1001 Figure 4.

51. The '701 Patent discloses that “FIG. 4 is a block diagram representation of the moving base station 30. The station 30 includes a processor 130 connected via radio interfaces 132, 134 to the antennas 100, 101, respectively.” *Id.*, 6:23-26.

iii. The Mobile Telephone Units Must Be Capable of Directly Communicating with Either a Fixed Cellular Base Station or a Moving Base Station

52. The '701 Patent further discloses that the “moving mobile telephone” units can be switched back-and-forth between having a direct connection with the fixed base station or have a connection with a moving base station:

“In the hierarchal cell structure, the low tier, small cells, e.g., on the order of 100 feet in diameter, accommodate low speeds. The low speed is mostly pedestrian traffic and other traffic moving at speeds below 30 miles per hour” *Id.*, 2:40-43 and that “[a] ***fast-moving mobile unit***, for example, may be served by the ***macro cell*** to avoid an extreme number of handovers. ***Slow-moving users*** are allocated to ***micro cells*** to save capacity for the macro cells.” *Id.*, 2:26-29.

“In the arrangement of FIG. 1, fixed base stations 70 would accommodate communications with mobile units traveling at a speed of less than 30 miles per hour including pedestrian traffic and stationary units. It will be readily apparent that instead of having fixed and moving base stations as depicted in FIG. 1, slowly moving and rapidly moving units may be used as well.” *Id.* 4:46-52.

“In the configuration of FIG. 1, the antennas 102 are arranged to communicate with the mobile units 20 and the antennas 103-105 are arranged to communicate with other mobile telephone communications from slow moving traffic or stationary subscribers.” *Id.* 5:29-33.

53. The '701 Patent additionally discloses that a “Moving Telephone Unit” (cellular phone) can either directly communicate with the cellular network via a “fixed port” (conventional base station) or it can communicate with the cellular network indirectly by communicating with a “moving base station” that communicates with the “fixed ports.” These capabilities exist regardless if the cellular phone is located inside or outside (pedestrian) the vehicle with:

In one particular embodiment, *a number of fixed base stations are provided in addition to moving base stations* allowing *slower moving traffic*, such as pedestrian traffic [outside of vehicle] or rush hour mobile traffic [inside of vehicle] to communicate *via the fixed base stations*. *Id.* 3:15-19.

The system in accordance with the invention differs from the prior art primarily in that the base stations **30, 40** are moving with the traffic and communicate with the gateway office **60** via fixed radio ports **50**. Furthermore, *the various call-handling functions, including handoff*, are performed by the *moving base station*. Advantageously, because of movement of the base station in the same direction as the traveling mobile unit, the number of handoffs is greatly reduced. *Id.* 5:8-16.

54. The '701 Patent further discloses that, when the cellular phone is communicating with the cellular network via the moving base station, the moving base station performs the handoffs between the “fixed ports” (cellular base stations). However, when the cellular phone is communicating directly with the fixed base stations, the cellular phone is responsible for performing the handoffs between the different cellular base stations by itself with:

The operation of the fixed base stations **70** is essentially the same as that of a standard fixed base station. In congested traffic areas, *a mobile unit which is stopped or slowly moving, e.g., less than 30 miles per hour, will preferably be serviced by one of the fixed base stations 70. As the speed of travel of the mobile unit 20 increases, a handoff will*

occur between the fixed base station and a moving base station. The procedures for determining whether a mobile unit is to be served by a fixed base station or a moving base station are the same procedures as described earlier herein in determining which moving base station is selected to serve a mobile unit, i.e., based on signal strength and error rate. Thus, when a call involving a mobile unit is initiated or when it is determined that a handoff should occur, the mobile unit may be handed from a moving station to a fixed station, or vice versa. Id. 10:50-65.

55. Fig. 1 of the '701 Patent shows the mobile devices/mobile units (20, 25) communicating with either a Fixed Base Station (50, 70) or a Moving Base Station (30, 40):

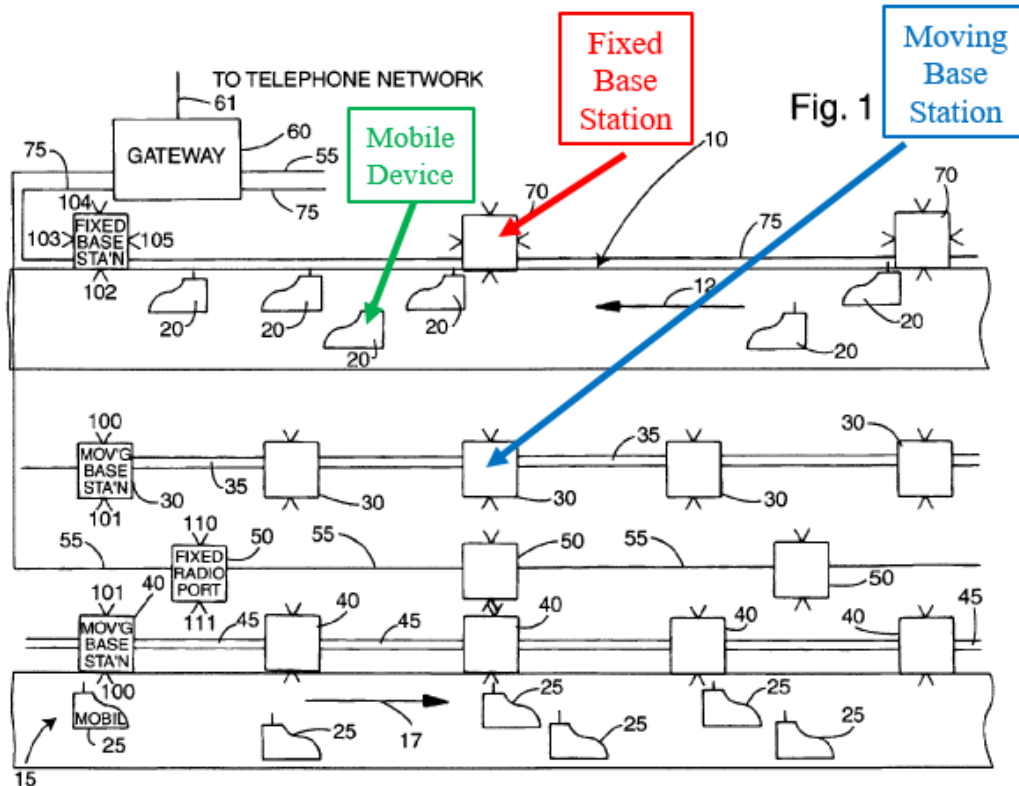


Figure 1 EX1001 (emphasis added)

56. The '701 Patent further discloses that:

The *moving base station [30, 40]* preferably handles telecommunications with *mobile units [20, 25]* which travel at a rate of not more than 30 miles per hour faster or slower than the moving base station. *Id.* 4:40-43.

In the arrangement of FIG. 1, *fixed base stations 70* would accommodate communications with *mobile units [20, 25]* traveling at a speed of less than 30 miles per hour including pedestrian traffic and stationary units. It will be readily apparent that instead of having fixed and moving base stations as depicted in FIG. 1, slowly moving and rapidly moving units may be used as well. *Id.* 4:46-52.

iv. The Moving Mobile Telephone Units are Capable of Registering with a Cellular Network

57. The '701 Patent additionally discloses that that the “moving telephone units” must be capable of registering with a cellular network so that they are able to receive calls coming from the cellular network. As described below, if the cellular phone does not register with the cellular network, the network will not be able to deliver calls to the cellular phone because the network does not know its location. A POSITA would have understood that the registration process with a cellular network requires a number of different significant steps that require cellular capabilities of a cellular phone as described below:

When a mobile unit set is first powered up or first enters a service area, the *mobile unit must register* in the manner described earlier, *by transmitting its unique address* in the new service area. The address will be received by the closest moving base station **30** and transmitted via a fixed radio port and the gateway switch **60** to the telephone network. *This registration procedure is required* so that an *incoming call for the mobile unit can be appropriately directed*. *Id.* 9:49-56.

Data received from the telephone network at the gateway 60 and *intended for a registered mobile unit* is stored in the memory of the processor 150 in a register particularly associated with the moving base station currently serving the mobile unit. *Id.* 10:21-25.

v. The Moving Base Station is Capable of Performing Call-Handling Functions and Handoffs with the Fixed Base Stations

58. The '701 Patent discloses that the “moving base station” is capable of performing various call-handling functions, such as mobile initiated calls, mobile received calls, and handoffs between the fixed base stations (fixed ports).

59. For example, the '701 Patent discloses that:

Furthermore, in the examples described herein, the various call-handling functions, *including handoff*, are *performed by the moving base station*. Advantageously, because of movement of the base station in the same direction as the traveling mobile unit, the number of handoffs is greatly reduced. *Id.* at 5:12-16.

This procedure is equivalent to a handoff between cell sites of different cells in the existing cellular network in a manner which is well known in the art. *Id.* at 9:3-6.

The operation of the fixed base stations 70 is essentially the same as that of a standard fixed base station. In congested traffic areas, ***a mobile unit which is stopped or slowly moving, e.g., less than 30 miles per hour, will preferably be serviced by one of the fixed base stations 70. As the speed of travel of the mobile unit 20 increases, a handoff will occur between the fixed base station and a moving base station.*** The procedures for determining whether a mobile unit is to be served by a fixed base station or a moving base station are the same procedures as described earlier herein ***in determining which moving base station is selected to serve a mobile unit, i.e., based on signal strength and error rate.*** Thus, when a call involving a mobile unit is initiated or when it is determined that a handoff should occur, ***the mobile unit may be handed from a moving station to a fixed station, or vice versa.*** *Id.* 10:50-65.

vi. A Moving Base Station is Capable of Supporting Multiple Mobile Units (Cellular Phones)

60. The '701 Patent discloses that the “moving base station” is capable of supporting multiple moving mobile units (cellular phones). Therefore, multiple cellular phones traveling in a vehicle with the moving base station would be supported by the moving base station.

61. For example, the '701 Patent discloses:

The *moving base station* preferably *handles telecommunications* with *mobile units* which travel at a rate of not more than 30 miles per hour faster or slower than the moving base station. *Id.* 4:40-43.

B. The Invention of the '701 Patent is Not a Cordless Phone System

62. The Invention of the '701 Patent is Not a Cordless Phone System as Mr. Denning explicitly and/or implicitly opines. Mr. Denning appears to ignore the explicit language in the '701 Patent Specification related to mobile units/mobile devices as he applies the claimed invention of the '701 Patent to the prior art references.

63. A cordless phone system is significantly different that the invention disclosed by the '701 Patent. A “cordless telephone” is described as a standard, wired telephone that has only replaced the handset cord with a radio link. The following publications, which support my understanding of a cordless phone, provide more detail into the characteristics of a cordless phone.

i. Electrical Engineering Tutorials

Introduction to How Cordless Telephones Work

Cordless telephones are one of those minor miracles of modern life—with a cordless phone, you can talk on the phone *while moving freely about your house or in your yard*. Long before cell phones became so cheap that anyone could afford one, *cordless phones gave everyone the freedom to walk and talk within the privacy of their own homes*.

Cordless phones have many of the same features as standard

telephones, and there are many models available. In this article, we will examine how these cordless telephones work and see why there are so many different types on the market today.

The Basics

A cordless telephone is basically a combination telephone and radio transmitter/receiver (see How Telephones Work and How Radio Works for details on these two technologies). A cordless phone has two major parts: *base and handset*.

The *base is attached to the phone jack through a standard phone wire connection*, and as far as the phone system is concerned *it looks just like a normal phone*. The base receives the incoming call (as an electrical signal) through the *phone line*, converts it to an FM radio signal and then broadcasts that signal.

The handset receives the radio signal from the base, converts it to an electrical signal and sends that signal to the speaker, where it is converted into the sound you hear. When you talk, the handset broadcasts your voice through a second FM radio signal back to the base. The base receives your voice signal, converts it to an electrical signal and sends that signal *through the phone line to the other party*.

EX 2107 at p. 1.

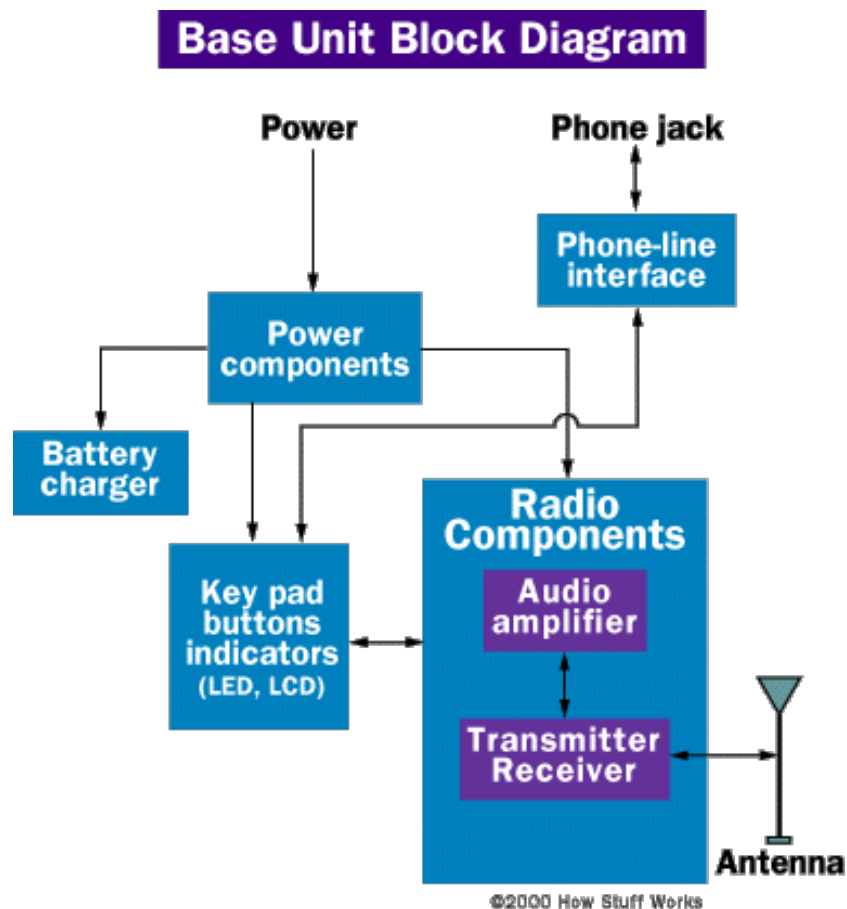
*ii. Newton's Telecom Dictionary (Ex. 2104)*²

64. A telephone with *no cord between handset and base*. Each piece contains a radio transmitter, receiver, and antenna. The handset contains a rechargeable battery; the base must be plugged into an AC outlet. Depending on product design, radio frequency, environmental conditions, and national law, range between handset and base can be 10 feet to several miles. Cordless phones were once analog. Now a breed of digital ones is out. They work much better in electrically noisy environments—like the typical office. EX2104, p. 153.

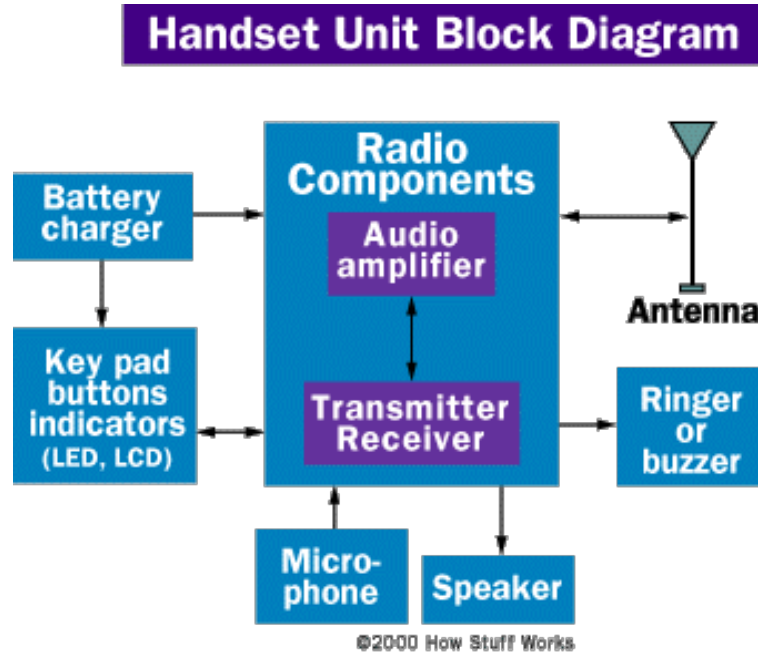
65. I agree that the descriptions above are consistent and accurate with the state of technology of cordless phones in the 1995 timeframe based on my own personal experience with using many different types of cordless telephones. Additionally, these descriptions further support my description of a cordless phone as “a standard, wired telephone that has only replaced the handset cord with a radio link.” The common characteristics included in the descriptions above are: (1) the base is connected to a fixed telephone line; (2) the curled cord between the telephone and handset is replaced by a radio link; and (3) the cordless handset is not capable of registering with or communicating with a cellular network.

² Newton's Telecom Dictionary, 11th Edition 1996.

66. Of significant relevance for this declaration, is the functionality that is not included in the handset for a cordless telephone. With the exception of the radio link that replaces the curled cord, the functionality of the handset is the same as the handset on a conventional telephone as shown by the diagrams below. In other words, a cordless handset does not include cellular telephone capability of being able to communicate- and register- with a cellular network. These differences will be addressed in more detail for some of the prior art references used by Mr. Denning that use a cordless phone for the cellular phone required by the '701 Patent.



EX 2103 at p. 3.



EX 2103 at p. 5.

C. The Invention of the '701 Patent is Not a Repeater System

67. The “moving base station” in the invention of the '701 Patent is not a repeater system as Mr. Denning explicitly and/or implicitly opines. Specifically, Mr. Denning equates the invention of the '701 Patent to that of mobile repeater stations placed in vehicles. *See* Ex. 1003, ¶ 65. (“A mobile repeater is substantially similar to a movable base station because both devices operate as intermediary systems that facilitate communications between a mobile device and a fixed base station.”). I further note that Mr. Denning does not provide any explanation regarding why a POSITA would equate the '701 Patent to a mobile repeater nor does Mr. Denning provide any evidentiary support, including any of the underlying facts or data on which Mr. Denning’s assertion is based. *Id.*

68. It is my understanding that during prosecution of the '701 Patent the inventor distinguished the invention of the '701 Patent from and overcame a repeater system of the prior art reference Charas. Ex. 2107 at pp. 16-17, 43-51. A repeater system is significantly different than the moving base station disclosed by the '701 Patent. *See* Denning Deposition 48:6-9 (“Q. So a movable base station has additional capabilities and responsibilities beyond what a repeater would have? A. Yes”). Based on my own personal experience of designing and building cellular networks, the function of a “repeater system” is to extend the distance of a signal by receiving and retransmitting it. If the signal is in digital form, the signal can be regenerated before it is transmitted. My understanding of a “repeater system” is further supported by Newton’s Telecom Dictionary, included below, which states:

i. Newton’s Telecom Dictionary)

69. A repeater is needed because the ***quality and strength of a signal decays over distance***. You will find repeaters in cables and in microwave systems. Repeaters may also regenerate a digital signal—“squaring it” and cleaning it up—but not changing it. Regenerating the signal removes noise and thus reduces the likelihood of errors. EX 2104 p. 508.

70. Of significant relevance for this declaration, is the functionality that is not included in a repeater. A repeater is not a router, which means a received signal is simply retransmitted on a predetermined antenna as shown by the diagram below.

In other words, a repeater does not include cellular capability of a “moving base station” because it does not at least: (1) route calls and messages between a fixed base station and a moving mobile station to facilitate the registration, making calls and receiving calls at a moving mobile station; (2) support multiple moving mobile stations; and (3) perform handoffs between the base stations (fixed ports). These differences will be addressed in more detail for some of the prior art references used by Mr. Denning that use a repeater system for the moving base station as required by the '701 Patent.



EX 2111 at p. 1.

**VIII. THE '701 INVENTION IS SIGNIFICANTLY DIFFERENT THAN
THE INVENTIONS OF THE PURPORTED PRIOR ART**

A. The Ito Patent

71. The title of the Ito Patent is “Mobile radio communication system having mobile base and portable devices as a mobile station.” EX1005. As set forth in more detail below, the Ito Patent is not directed toward a Moving Base Station as disclosed by the '701 Patent.

i. Ito Does Not Disclose or Render Obvious the Moving Base Station as Required by the Challenged Claims

72. The Ito Patent discloses that a cellular type automobile telephone system has been known in the art as a mobile radio communication system, which included at least a plurality of base stations and a plurality of mobile stations. *Id.* 1:15-45. As Ito discloses, each of the mobile stations of an automobile telephone system is equipped with an “automobile telephone main unit.” *Id.* The Ito Patent further discloses that each of the “automobile telephone main units” are connected by a radio channel to the base station of a radio communication zone where the “automobile telephone main unit” is located. *Id.* As disclosed by *Ito*, these “automobile telephone main units” employ frequency division multiple access technique (FDMA) for its connection with the base station. *Id.*

73. The invention of Ito is not the prior art mobile radio communication system or its components (i.e., automobile telephone main units and base stations).

Instead, the invention of Ito is only eliminating (1) the cord between the “automobile telephone unit,” located in the trunk of a car and the cradle that holds the handset typically located around the dash of the vehicle; and (2) the curled cord used between the cradle and the handset with Ito’s “mobile base device” in conjunction with Ito’s “portable device,” as disclosed by the following passage below:

A cellular type automobile telephone system has been known as a mobile radio communication system. Such a system normally comprises a control station, a plurality of base stations and a plurality of mobile station, of which the control station is connected to a wired telephone network by way of a wire communication path. *Id.* 1:15-21.

Now, each of the mobile stations of an automobile telephone system is equipped with an *automobile telephone main unit* and peripheral equipment *including a handset assembly*. An automobile telephone main unit comprises radio transmission circuits, control circuits and other circuits. A handset assembly normally comprises a cradle and a handset, which by turn comprises a telephone transmitter, a receiver and a console unit. A console unit by turn comprises dial key, hook switch, an LCD display and other components. *The automobile telephone main unit and the handset assembly are connected by a signal cord. The cradle and the handset are connected by a curled cord.*

With such an arrangement, the *curled cord can constitutes an annoying obstacle* when the driver drives and speaks into the telephone

transmitter simultaneously. Moreover, *the handset cannot be moved away beyond a limit posed by the curled wire*, meaning that a passenger sitting on the front or rear passenger seat is compelled to stand up or take a crouching posture if he or she wants to speak over the phone.

While the handset assembly of a conventional mobile station is placed within the passenger cabin of a car, the automobile telephone main unit is normally arranged in the trunk of the car. *The signal cord connecting the telephone main unit and the handset assembly should be carefully arranged so as not to aesthetically damage the appearance of the car*, entailing a troublesome work to be done within a narrow space of the car.

It is therefore an *object of the present invention* to provide a mobile radio communication system that wirelessly connects not only between a base station and a mobile station but also between a mobile station, or a mobile base device, *and a portable device by a radio channel in order to eliminate the necessity of wiring the mobile base device and portable device and enhance the maneuverability of an automobile telephone handset*. EX1005 1:41-2:12

74. As shown in Ito’s disclosure above, this “automobile telephone main unit” is a pre-existing wireless unit that is not part of the invention and it suffers from the issues that are identified in the stated object of the invention that need to be fixed—“the automobile telephone main unit and the handset assembly are connected

by a signal cord. The cradle and the handset are connected by a curled cord.” *Id.* 1:51-54.

75. I further note that Ito fails to disclose the design and circuitry details for the pre-existing base stations. It is my opinion that relying on the Ito reference for the functionality performed by the pre-existing base station is improper. A POSITA cannot properly opine on obviousness alone, or in combination with another reference, without sufficiently more detail regarding the functionality of Ito’s pre-existing base stations.

ii. Ito Does Not Disclose or Render Obvious the Mobile Device as Required by the Challenged Claims

76. Unlike the “mobile device” required by the relevant claims of the ’701 Patent, Ito’s “portable device” (PSS) does not have cellular telephone capability. Instead, Ito’s portable device is a type of “cordless telephone” because Ito’s “portable device” (PSS) can only connect to a telephone network through Ito’s “mobile base device” (MSS), as disclosed by at least these passages:

In a first conceivable application of a system according to the invention, ***a mobile base device [MSS] may be constituted by an automobile telephone main unit installed in a car and a portable device [PSS] may correspond to a portable radio telephone handset to be used with the main unit in a mobile radio communication system*** according to the invention. The portable radio telephone handset is connected with the

automobile telephone main unit by a radio channel to set up a communication channel leading to a telephone network. *Id.* 3:17-26.

Alternatively in a second possible application that uses a system according to the invention for a ***cordless telephone system***, a mobile base device may be constituted by a stationary unit of a codeless [cordless] telephone system while ***a portable device may correspond to a codeless [cordless] telephone handset***. *Id.* 3:36-41.

With such an arrangement, a ***codeless [cordless] telephone handset whose service area is normally limited to the inside of a home or an office*** can be used in a car. *Id.* 3:54-56.

While each of the above described embodiments is an automobile telephone system, ***a system according to the invention may be applied to a cordless telephone system*** that normally comprises stationary units connected to subscribers' lines of a wire telephone network and ***cordless telephone sets*** connected to the respective stationary units by way of radio channels, where the stationary units corresponds to the mobile base devices and ***the cordless telephone sets correspond to the portable devices*** of the above embodiments. *Id.* 16:62-17:3.

77. Therefore, Ito's "portable device" (PSS) is not capable of registering with the cellular network because Ito's "portable device" is not capable of directly communicating with a cellular network. Instead, Ito's "portable device" (PSS) is only able to connect to a cellular network through Ito's "mobile device" (MSS). In contrast, as previously discussed in Section VIII.A, the '701 Patent discloses that the

“moving mobile telephone” units can be switched back-and-forth between having a direct connection with the fixed base station or have a connection with a moving base station:

“In the hierarchal cell structure, the low tier, small cells, e.g., on the order of 100 feet in diameter, accommodate low speeds. The low speed is mostly pedestrian traffic and other traffic moving at speeds below 30 miles per hour” Ex. 1001, 2:40-43 and that “[a] *fast-moving mobile unit*, for example, may be served by the *macro cell* to avoid an extreme number of handovers. *Slow-moving users* are allocated to *micro cells* to save capacity for the macro cells.” *Id.*, 2:26-29.

“In the arrangement of FIG. 1, fixed base stations 70 would accommodate communications with mobile units traveling at a speed of less than 30 miles per hour including pedestrian traffic and stationary units. It will be readily apparent that instead of having fixed and moving base stations as depicted in FIG. 1, slowly moving and rapidly moving units may be used as well.” *Id.* 4:46-52.

“In the configuration of FIG. 1, the antennas 102 are arranged to communicate with the mobile units 20 and the antennas 103-105 are arranged to communicate with other mobile telephone communications from slow moving traffic or stationary subscribers.” *Id.* 5:29-33.

78. As is apparent from Ito, Ito’s “portable device” (PSS) does not have at least this capability. This fact is further supported by Ito’s disclosure that three control circuits are required for the mobile base device (MSS) of the invention to

operate. Ex. 1005. Abstract. As disclosed by Ito, three control circuits are required in order for the Ito invention to have a full voice path between the base station and Ito's portable device (handset). *Id.* Abstract. Without all three of these control circuits, the invention of Ito would not work. For example Ito discloses:

The *mobile base device comprises first, second and third connection control circuits*. The *first connection control circuit* is used to select an idle first radio channel out of the first radio channels in cooperation with the *base station and connect the mobile base device* with the base station by the selected idle first radio channel. The *second connection control circuit* is used to select a radio channel having an idle time slot showing a specific relationship with the first radio channel selected by the first connection control circuit and *connect the mobile base device and the portable device* by the selected idle second radio channel. The *third connection* control circuit is used to *connect the first and second radio channels and establish a telephone communication path between the base station and the portable device*. *Id.* Abstract.

iii. Ito's System is Based on FDMA/TDMA Technology

79. The Multiple Access (MA) method disclosed by Ito is a combination of Frequency Division Multiple Access (FDMA) and Time Division Multiple Access (TDMA) written as FDMA/TDMA. Ito also discloses that alternatively FDMA/TDMA can be used for the connections between base stations and mobile

base devices and TDMA or FDMA can be used for the connections between the moving base stations and the portable stations as described in the passages below

This embodiment *utilizes a FDMA/TDMA technique for connection between a base station and a mobile base device as well as for connection between a mobile base device MSS and a portable device PSS*. With a FDMA/TDMA technique, a number of radio frequencies are shared by a plurality of stations. These radio frequencies have a time division signal unit format where a time frame is divided into a number of time slots, e.g., six time slots TS1 through TS6. When a station tries to call another station in this system, the system searches for an idle radio frequency and then for an idle time slot of the radio frequency and assigns the selected time slot to the calling and called stations to establish a radio telephone communication channel between these stations. EX1005 5:47-61

Moreover, because of the *use of a FDMA/TDMA technique* for radio channels between a *base station BSS and a mobile base device MSS and between a mobile base device MSS and a portable device PSS* in this embodiment... *Id.* 12:25-28.

The scope of the present invention is not limited by the above described embodiments. For instance, while a *FDMA/TDMA technique is employed for radio channels connecting base stations and mobile base devices* as well as mobile base devices and portable devices, a *FDMA or TDMA technique may be used in its place*. Moreover, a *FDMA/TDMA technique may be used for connection between base*

*stations and mobile base devices, while a FDMA or TDMA technique
us used for connecting mobile base devices and portable devices. Id.*
16:24-34.

80. I note that FDMA/TDMA systems are not compatible with Code Division Multiple Access (CDMA) Systems because their wireless interfaces use different technology. For example, at a high level, a CDMA system typically operates on one frequency for the downlink (base stations to mobiles) and another frequency for the uplink (mobiles to base stations). However, an FDMA/TDMA system uses many frequencies to divide the communication as disclosed by Ito.

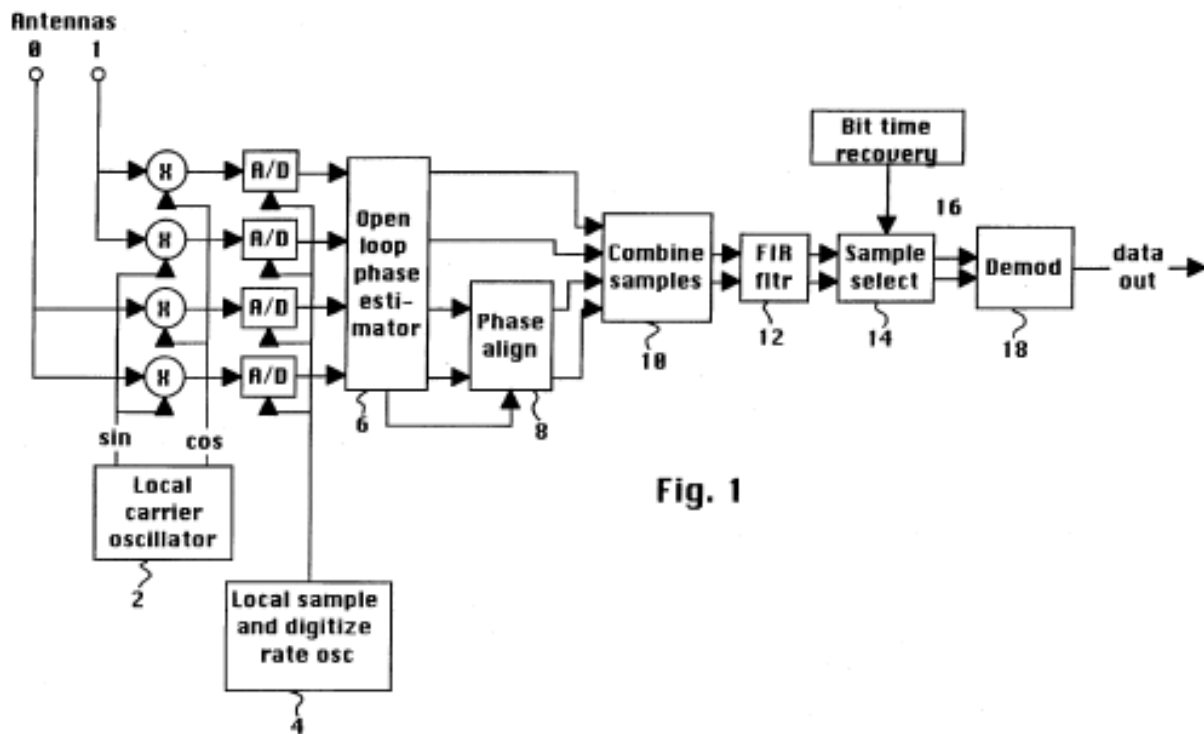
81. The above disclosure from Ito is describing that the first control circuit of Ito is for the connection between the base station and the mobile base station; the second control circuit of Ito is for the connection between the mobile base station and the portable device; and the third control circuit of Ito is for connecting these two connections together inside the mobile base station. Thus, all three of these control circuits are required for a connection between the portable device and the base station. Based on my experience of working on cellular systems in the 1991 timeframe of Ito, it is my opinion that if one or more of these control circuits were missing, the Ito invention would not work.

B. The Gardner Patent

82. The title of the Gardner Patent is “Open loop phase estimation methods and apparatus for coherent combining of signals using spatially diverse antennas in mobile channels. EX1006.

83. Claims 10, 15-18, 31, 33-35 of the '701 Patent require the “moving base station configured to move relative to Earth” to have “a plurality of spatially separated antennas” and perform specific functions with these antennas.

84. The Gardner Patent is not directed toward a moving base station as disclosed by the '701 Patent nor does the Gardner Patent imply or suggest that a “mobile base station” exists. Instead, the Gardner Patent only discloses direct communication between a mobile unit and base station. As shown by Fig. 1 below, two spatially diverse antennas 0,1 are incorporated into the receiver portion of a cellular radio used for mobile data communication:



Ex. 1006, Figure 1, 2:17-20.

85. Although Gardner discloses that the invention “[w]hile the system shown in the FIGURE [Figure 1] *may be used at the mobile units, it is particularly suitable for data base stations used in a mobile communications system*” (*Id.* 2:20-22), a POSITA would have understood that Gardner’s invention would be more “particularly suitable for base stations” than for mobile units, as the Gardner Patent discloses, because mobile units in general suffer from significantly more Rayleigh fading and Doppler Shift than stationary base stations. For example, implementing Gardner’s invention on a mobile device would subject the invention to a much harsher environment; it would be experiencing significantly more Rayleigh fading and Doppler Shift, than if the Gardner invention was implemented on a stationary

base station. This is because base stations have their antennas mounted on a tower, which is well above both fixed and moving ground obstacles; therefore, base stations experience less Rayleigh fading and Doppler Shift than mobile units. This fact is further supported by Petitioner’s own reference, Calhoun (EX1010), which explains that a mobile phone suffers from significantly more Rayleigh fading when compared to a stationary base station. As explained by the Calhoun reference:

Rayleigh fading, however, poses and additional problem for cellular architectures. ...Chances are that, at a given instant in time, *if a mobile is in a fade with respect to the correct base station transmitter*, it is not in a fade from a distant “incorrect” base station transmitting on the same frequency in another cell.” ... “When Rayleigh fading is included in the analysis, *most of the interference is caused when the receiver captures on the interfering stations*, even if it is for a very short time. [20].” EX 1010 p. 218.

Another complicating factor is that some of the *reflectors are also in motion*, changing the Rayleigh characteristics over time *irrespective of the movement of the mobile subscriber*. ... *Large trucks and buses can be significant reflectors for nearby mobile receivers*. *Id.* p. 219.

Another aspect of the mobile channel is caused by the *movement of the vehicle relative to the transmitter*. *This variation in the frequency of the received signal known as the Doppler Shift (emphasis in book)* ... Much as the sound of a horn on a moving car appears to the stationary observer to be slightly higher in pitch when the car is approaching

rapidly and slightly lower when the car is receding, so *radio transmissions are frequency shifted due to the relative motion of the vehicle. This frequency shift varies considerably as the mobile unit changes direction, speed, and is handed off from one cell to the next*, and it introduces considerably random frequency modulation in the mobile signal. ...At 22 miles per hour and 900 MHz [a common cellular frequency], the median Doppler offset is about 30 hertz, which under certain conditions can be sufficient to “introduce distortion objectionable to the ear [21]. *Id.* p. 220.

86. Gardner also does not disclose what type of cellular network its invention is designed to operate with, and the specification does not disclose any design considerations for implementing his device in any of the various types of cellular networks—CDMA, FDMA or TDMA. For example, Ito discloses that its invention is for FDMA/TDMA or a combination of FDMA/TDMA with either FDMA or TDMA. (*See e.g.*, Section VIII.A above). Therefore, Ito discloses how his invention with operate in a system that uses Frequency Division Multiple Access (FDMA), a Time Division Multiple Access (TDMA) or a combination of FDMA/TDMA. The MA in both the FDMA and TDMA acronyms stands for “Multiple Access,” which, at a high level, means many users can use the cellular system at the same time. The method used to support the many different users is defined by the first two letters of each Multiple Access type. Therefore, for FDMA, multiple frequencies are used in the system to support the users; for TDMA, multiple

time slots are used in the system to support the users; and FDMA/TDMA uses a combination of time slots in each frequency to support the users.

87. While Gardner does disclose “the present invention relates to the field of mobile digital communications, and more particularly, cellular communications” (EX1006 1:10-12), Gardner does not include the acronyms of: FDMA; TDMA; CDMA; Spread Spectrum (another way of describing CDMA) or any combination of these. A POSITA would have known that Radio Frequency type inventions like Gardner have different requirements and produce side-effects (interference) to other signals that needs to be carefully considered before they are implemented in any of these different types of cellular networks.

88. For example, Gardner discloses that the invention is based on manipulating a Radio Frequency carrier “by phase shift keyed or frequency modulated digital information modulated on an RF carrier incorporating the present invention.” *Id.* 2:10-13. Based on at least this statement, a POSITA would have understood that combining at least the “frequency modulated” part of the invention would need to be carefully designed when using it in a FDMA, TDMA, FDMA/TDMA or CDMA cellular system because all of these systems also use frequencies for their signals for different purposes than that disclosed for Gardner’s spatially diverse antennas.

89. Gardner does not provide any guidance on how its device can be used for the different types of cellular networks and it would not have been obvious to a POSITA how the “modulated RF carrier” of Gardner could be combined with the many different frequencies used in an FDMA/TDMA system similar to what is disclosed by Ito.

90. Therefore, a POSITA would have known that implementing the Gardner invention on a moving device would subject the invention to a much harsher environment that is experiencing significantly more Rayleigh fading and Doppler Shift, than if the Gardner invention was implemented on a stationary base station nor would a POSITA would have known how to combine the modified “RF carrier” with any of the different types of Multiple Access cellular systems.

C. The Gilhousen390 Patent

91. The title of the Gilhousen390 Patent is “Diversity receiver in a CDMA cellular telephone system.” Ex. 1007. The invention of Gilhousen390 “relates to a novel and improved receiver design for enhancing the reliability and communications in the cellular telephone environment. *Id.* 1:8-11. More specifically, Gilhousen390 is for a Code Division Multiple Access (CDMA) network for ground-based (terrestrial) vehicles.

92. Claims 10, 15-18, 31, 33-35 of the ’701 Patent require the “moving base station configured to move relative to Earth” to have “a plurality of spatially

separated antennas” and perform specific functions with these antennas. The Gilhousen390 Patent is not directed toward a moving base station as disclosed by the '701 Patent nor does the Gilhousen390 Patent disclose or imply a moving base station of any type exists for the invention as required by the Challenged Claims. Instead, the Gilhousen390 Patent only discloses a mobile unit/device/telephone communicating directly with one or more base stations, as shown by Fig. 1:

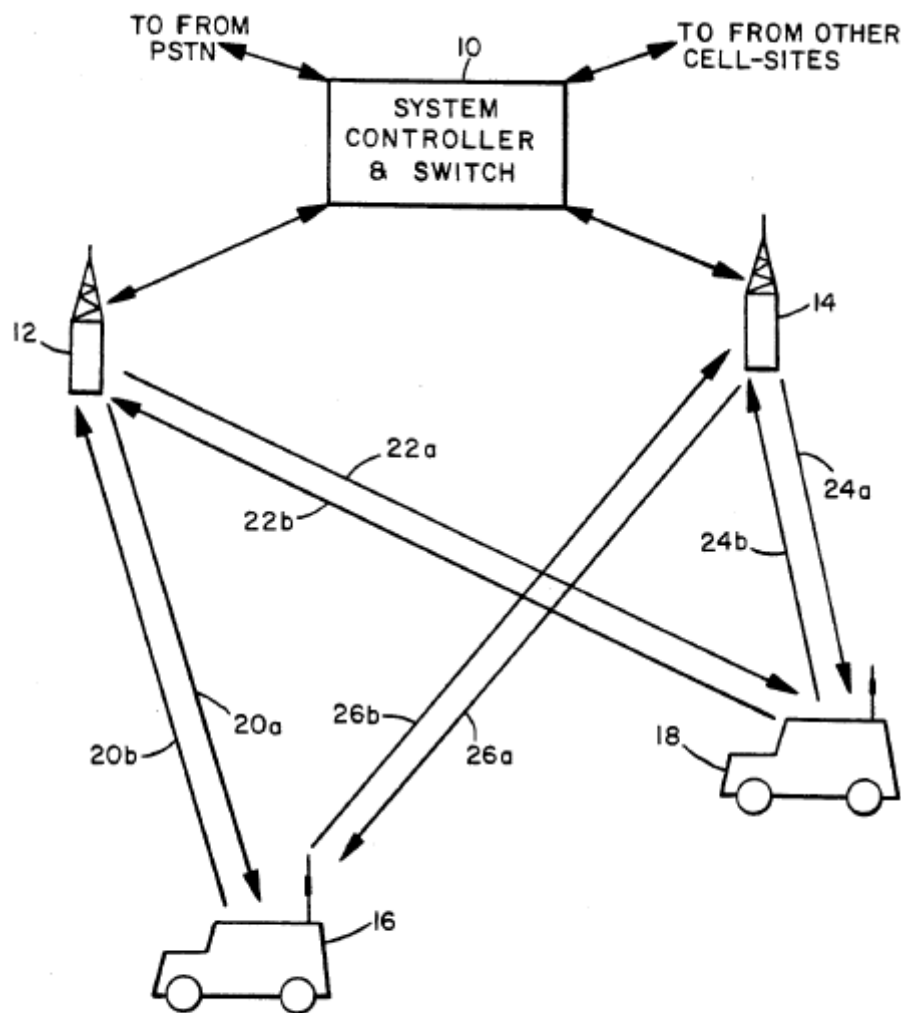


FIG. 1

Ex. 1007, Figure 1.

93. As disclosed by Gilhousen390, the only mobile (moving) device that receives a signal from a base station is defined as a “mobile unit,” or “mobile telephone.” *See e.g., Id.* 9:42-45. Fig. 1 of Gilhousen390 clearly discloses that the mobile unit telephone has one, and only one, antenna for receiving the signals from one or more base stations. Thus, Gilhousen390 also does not disclose “a plurality of spatially separated antennas” as required by the relevant claims.

94. Additionally, Gilhousen390 does not disclose the mobile unit of its invention having multiple antennas as required by the relevant claims of the '701 Patent. As disclosed by Gilhousen390, Fig. 2 shows the block diagram of the mobile unit. *Id.* 11:63-64. As shown by the annotated Fig. 2 below and its relevant supporting description, the mobile unit only has one Antenna 30 that is used for all the receiving and transmitting functions and this one antenna provides the signal to the Analog Receiver 34, Searcher Receiver 44, Digital Data Receivers 40 and 42.

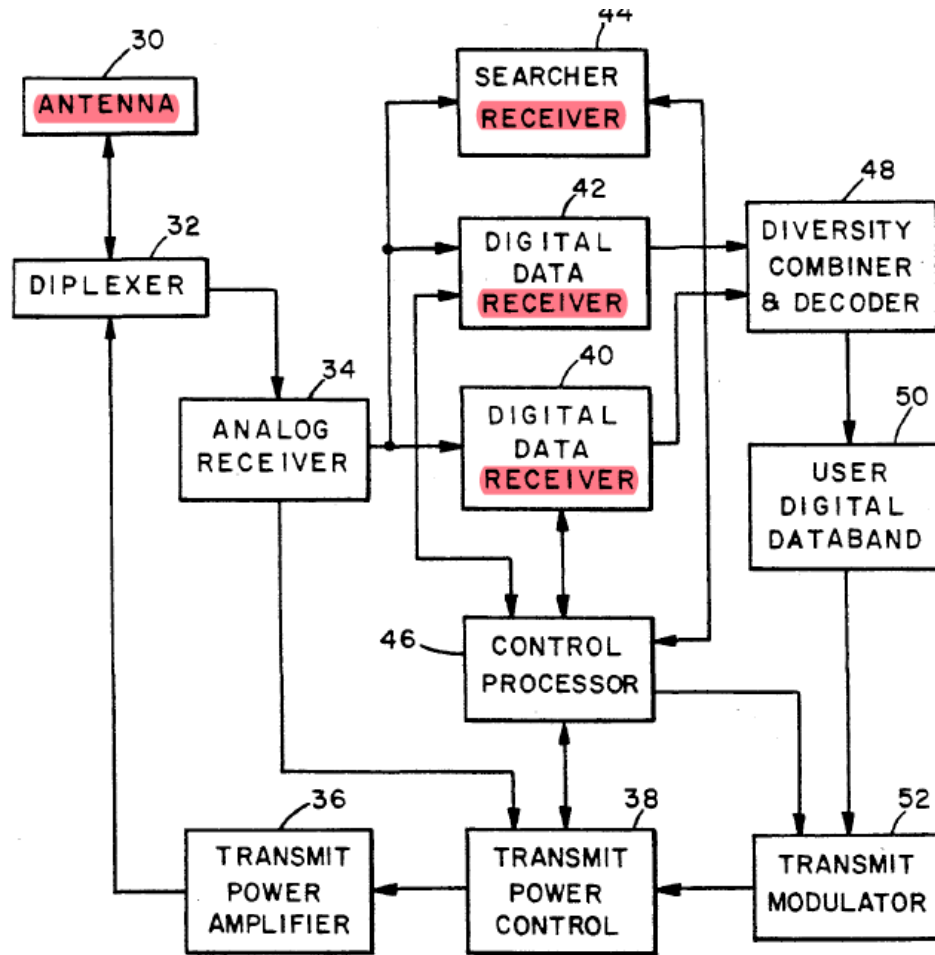


FIG. 2

FIG. 2 is a block diagram of a *mobile unit telephone* configured for CDMA communications in a CDMA cellular telephone system. *Id.* 9:31-33.

FIG. 2 illustrates in block diagram form the mobile unit. The mobile unit includes *an antenna 30* which is coupled through diplexer 32 to analog receiver 34 and 65 transmit power amplifier 36. Antenna 30 and

diplexer 32 are of standard design and *permit simultaneous transmission and reception through a single antenna. Id.* 11:64-68.

In FIG. 2, the digitized signal *output from receiver 34 is provided to digital data receivers 40 and 42 and to searcher receiver 44.* It should be understood that *an inexpensive, low performance mobile unit might have only a single data receiver while higher performance units may have two or more to allow diversity reception. Id.* 12:34-40.

95. Therefore, a POSITA would understand there is one and only one antenna based on the disclosed circuitry of Fig. 2 and its relevant supporting description. For example, if more than one antenna was possible, there would be more circuitry for the analog receiver in order to decode the multiple signals received over each of the multiple antennas, align each signal and combine them together. I note that none of this multiple antenna circuitry is shown in Fig. 2 nor is it disclosed or implied in Gilhousen390. In order to add multiple antennas to Gilhousen390's mobile unit, a POSITA would have known that this would not only require significant changes to the Gilhousen390 invention, but it would also require additional circuitry—none of which are disclosed by Gilhousen390.

96. As disclosed by Gilhousen390, Fig. 3 shows the block diagram of the cell-site equipment. *Id.* 14:35-36. Unlike Fig. 2 for the mobile unit, the annotated Fig. 3 shown below for the base station shows that the base station has multiple

antennas. Therefore, Gilhousen390 discloses multiple antennas on a device where multiple antennas are used.

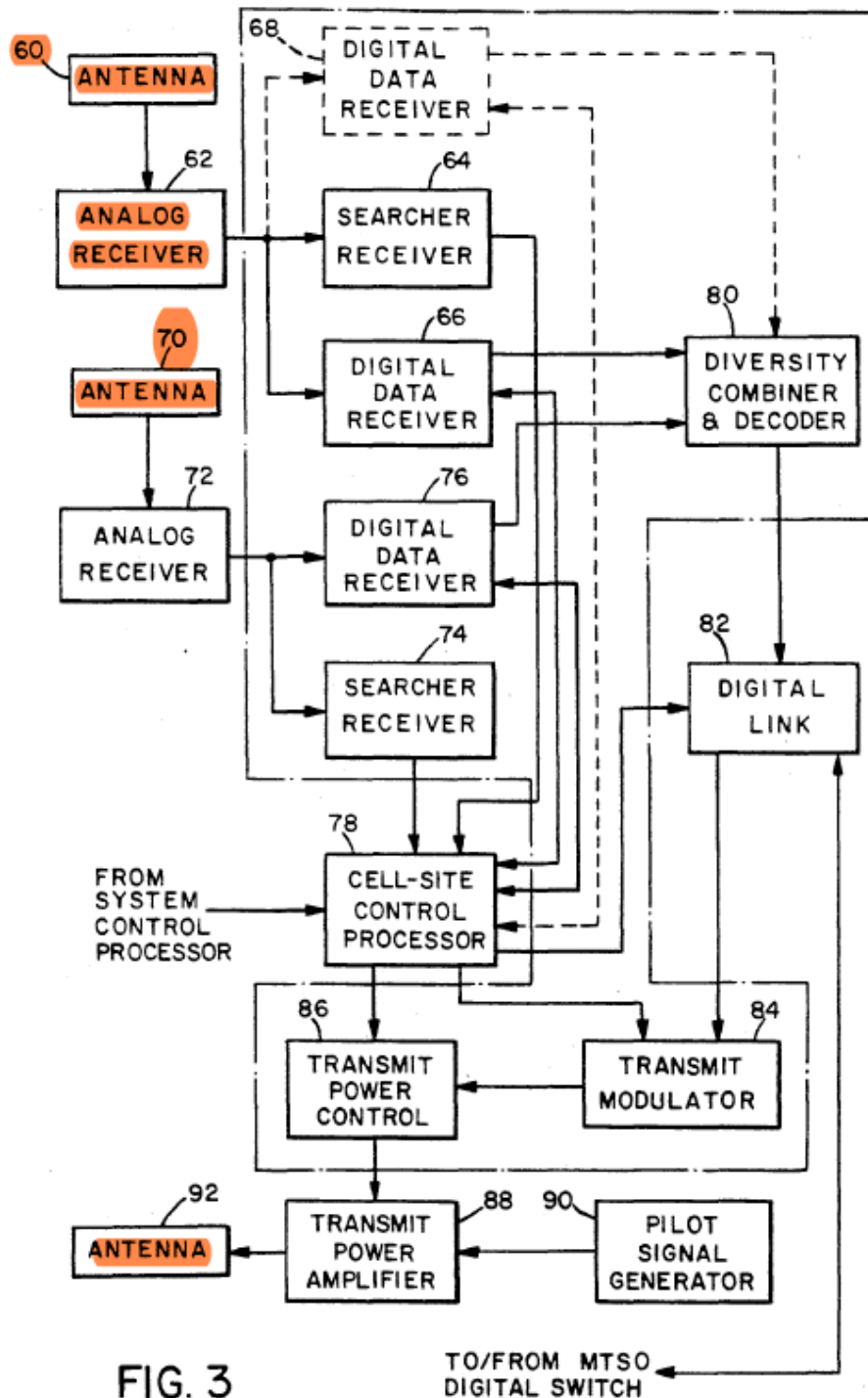


FIG. 3
 Gilhousen390 Fig. 3 (annotated).

D. The Gilhousen865 Patent

97. The title of the Gilhousen865 Patent is “Airborne Radiotelephone Communications System.” EX 1009. The invention of Gilhousen865 is directed towards improving the cellular radiotelephone communications between an airplane and a ground base station by overcoming specific issues that existed with the aircraft radiotelephone system. As disclosed by Gilhousen865, these issues included:

[T]he aircraft based radiotelephone does not register in the ground based system. The ground based system, therefore, does not know the location of the aircraft radiotelephone. This restricts the aircraft radiotelephone to initiating calls; it cannot receive calls since the ground system does not know where to forward calls. *Id.* at 28-34.

[T]he aircraft radiotelephone system does not perform hand-offs between cells as is done in ground based cellular radiotelephone systems when the radiotelephone reaches the edge of the cell. This results in the call from the aircraft radiotelephone being dropped when the aircraft reaches the limit of the cell's coverage. *Id.* at 36-41.

98. Gilhousen865 discloses that its invention is comprised of two subsystems: the ground based subsystem and the airborne based subsystem. As disclosed by Gilhousen865, the “airborne based subsystem” includes an “airborne wireless radio” and an “airborne wireless repeater” with:

The radio communications system of the present invention encompasses a ground based subsystem and an *airborne based subsystem*. The ground based subsystem is comprised of a base station for transmitting land originated signals and receiving repeated signals *from the airborne subsystem*. The base station is coupled to a public switched telephone network (PSTN). The *airborne based subsystem* is comprised of an *airborne wireless radio* for transmitting and receiving signals and an *airborne wireless repeater* for repeating the signals to the base station. *Id.* 1:51-60.

99. Unlike the “mobile device” required by the relevant claims of the ’701 Patent, Gilhousen865’s radiotelephone does not have cellular telephone capability. Instead, Gilhousen865’s radiotelephone is similar to a “cordless telephone” described above in Section VII.B because Gilhousen865’s radiotelephone can only connect to the ground base station through Gilhousen865’s radiotelephone signal repeater 210 and its antenna 215, as disclosed by at least these passages:

The repeater (210) receives the signals from the individual radiotelephones (205) within the aircraft and *relays them to an antenna (215) mounted on the outside of the aircraft*. The *outside antenna (215) relays the signals to the base station on the ground*. This subsystem may have a single radiotelephone, as in a small aircraft, or multiple radiotelephones, as in an airline size aircraft.

The airborne subsystem also operates in the reverse direction. Telephone calls from the PSTN to *the base station on the ground are*

transmitted to the outside antenna (215) that relays them to the repeater (210) mounted in the aircraft. The repeater's antenna communicates the signal to the proper radiotelephone (205) in the aircraft. *Id.* 2:53-65.

100. Therefore, Gilhousen865's radiotelephone is not capable of registering with the cellular network because Gilhousen865's radiotelephone is not capable of directly communicating with a cellular network. Instead, Gilhousen865's radiotelephone is only able to connect to a cellular network through Gilhousen865's radiotelephone signal repeater 210. In contrast, as previously discussed in Section VII.A, the '701 Patent discloses that the "moving mobile telephone" units can be switched back-and-forth between having a direct connection with the fixed base station or have a connection with a moving base station:

"In the hierarchal cell structure, the low tier, small cells, e.g., on the order of 100 feet in diameter, accommodate low speeds. The low speed is mostly pedestrian traffic and other traffic moving at speeds below 30 miles per hour" Ex. 1001, 2:40-43 and that "[a] *fast-moving mobile unit*, for example, may be served by the *macro cell* to avoid an extreme number of handovers. *Slow-moving users* are allocated to *micro cells* to save capacity for the macro cells." *Id.*, 2:26-29.

"In the arrangement of FIG. 1, fixed base stations 70 would accommodate communications with mobile units traveling at a speed of less than 30 miles per hour including pedestrian traffic and stationary

units. It will be readily apparent that instead of having fixed and moving base stations as depicted in FIG. 1, slowly moving and rapidly moving units may be used as well.” *Id.* 4:46-52.

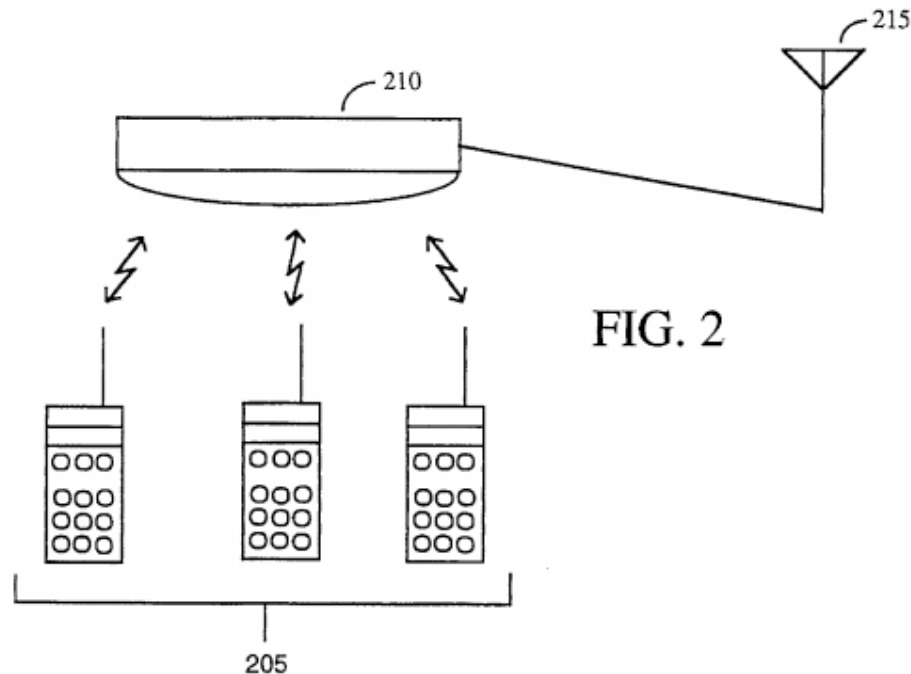
“In the configuration of FIG. 1, the antennas 102 are arranged to communicate with the mobile units 20 and the antennas 103-105 are arranged to communicate with other mobile telephone communications from slow moving traffic or stationary subscribers.” *Id.* 5:29-33.

101. The only moving device disclosed by Gilhousen⁸⁶⁵ is the airborne based subsystem 125. The airborne wireless repeater 210 in the airborne subsystem only has one antenna 215 for communicating signals to and from the ground based subsystem and communicating as shown by at least Fig. 2 below and its supporting text from the specification:

The repeater (210) receives the signals from the individual radiotelephones (205) within the aircraft and ***relays them to an antenna (215) mounted on the outside of the aircraft.*** The ***outside antenna (215) relays the signals to the base station on the ground.*** This subsystem may have a single radiotelephone, as in a small aircraft, or multiple radiotelephones, as in an airline size aircraft.

The airborne subsystem also operates in the reverse direction. Telephone calls from the PSTN to ***the base station on the ground are transmitted to the outside antenna (215)*** that relays them to the repeater (210) mounted in the aircraft. The repeater's antenna

communicates the signal to the proper radiotelephone (205) in the aircraft. *Ex. 1009*, 2:53-65.

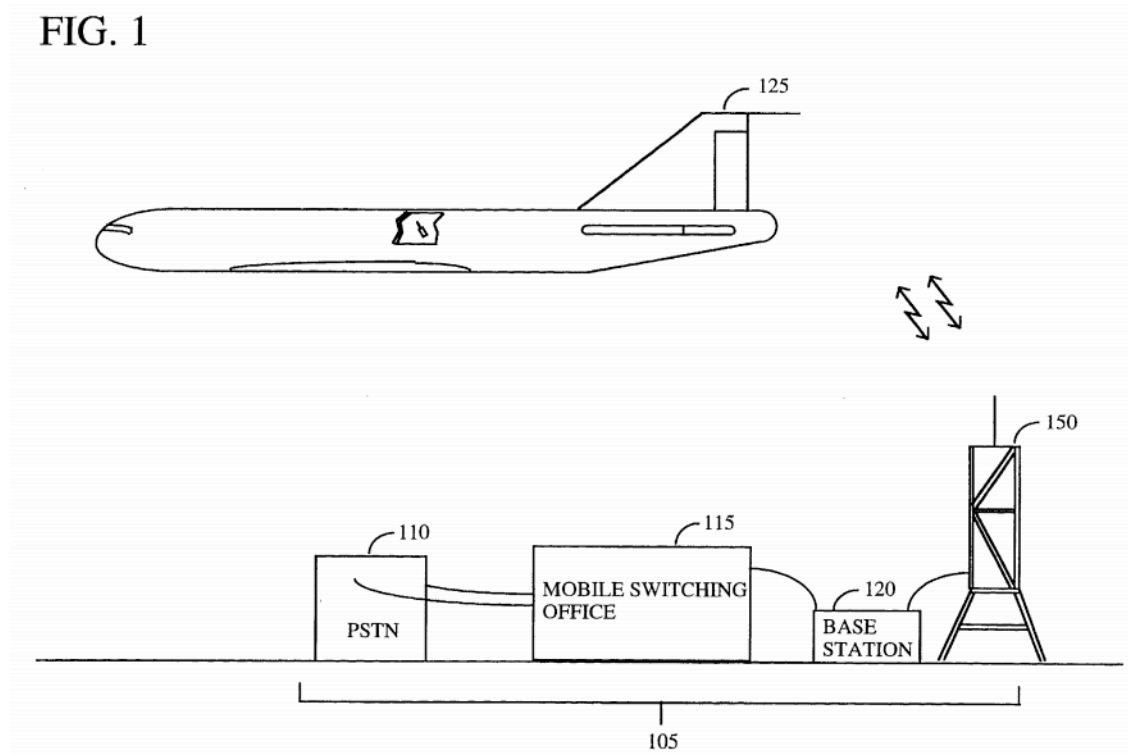


EX 1009, Fig. 2.

102. I also note that the Petitioner and Mr. Denning also admit that the airborne repeater has one and only one antenna “[a]s shown in Fig. 2 above, the repeater includes *an external antenna 215 that sends and receives signals with the base station*. See *Ex. 1009*, 2:53-65.” *Ex.1003* ¶158.

103. I also note that Mr. Denning was asked in his deposition about the multiple issues a POSITA would need to know in order to modify Gilhousen865 to install and use “a plurality of spatially separated antennas” on a plane as required by the relevant claims instead of the single antenna disclosed by Gilhousen865. Mr. Denning was not able to answer these questions. As a result, Mr. Denning was asked

by counsel for Petitioner at the end of his deposition if the Gilhousen865 Patent would work while the plane was parked on the ground.³ I attended Mr. Denning’s deposition and I interpreted this question as a concession that Gilhousen865 had multiple obstacles for using a plurality of spatially separated antennas while in flight as the title, specification, claims and Fig. 1 shown below state that the plane is intended to be “airborne.”



EX 1009, Fig. 1.

³ See, e.g., Denning Deposition, Ex. 2108: 86:2-6 (discussing regulations or requirements from FAA); 87:5-9 (discussing FAA concerns); 87:10-23 (Denning admitted he was not versed in FAA guidelines as to where you can have an antenna or what channels it can communicate at what times); and 87:25-89:17 (discussing antenna separation and placement on a plane). Petitioner’s Follow-Up Questions 132:9-21 (discussing if planes are only in the air and if any issues while on the ground).

104. I further note that *Gilhousen865* fails to disclose the design and circuitry details for a base station.

105. For at least the reasons above, a POSITA would have understood that *Gilhousen865* does not disclose or imply that a plurality of antennas can be used for its “airborne based subsystem.” A POSITA would have further understood there were many obstacles to adding one or more antenna to the aircraft. Some of these obstacles are described below.

106. Based on my personal experience of maintaining aircraft radios while I was in the U.S. army and my experience as a commercial pilot and flight instructor, there are many technical and regulatory obstacles that need to be overcome before a transmitting antenna can be added to a small or large plane. For example, the additional antenna on the plane would be using a transmitter in a power range similar to the communication and navigation radios on the plane and could cause significant interference and would need to be tested and certified by at least the FAA before it could be used. The location of the additional antenna would also need to be tested and certified by at least the FAA for each type of plane used.

107. *Gilhousen865* does not disclose any of the additional circuitry required for its repeater to use multiple antennas and how these multiple signals would be processed and ultimately used by the repeater. In addition, a POSITA cannot merely transfer the circuitry from a ground based system with multiple antennas to cure the

issues of the airborne system because additional significant technical obstacles of fading exist for an airborne plane in contrast to those experienced for a ground based system in order for it operate properly. For example, the multipath characteristics of the signal would be different for a plane travelling much faster than a ground based vehicle. The Doppler shift (described above in VIII.B for Gardner) would also be much different for a car with an average speed of 50 MPH versus a commercial plane with an average speed of 500 MPH. As I also describe above in VIII.B for Gardner, “[a]t 22 miles per hour and 900 MHz [a common cellular frequency], the median Doppler offset is about 30 hertz. Therefore, the Doppler offset for a plane flying 500 MPH would be over 22 times larger. As previously discussed, this massive increase in fading cannot be cured by merely employing the circuitry from a ground based system that has multiple antennas into the airborne system of Gilhousen⁸⁶⁵ because the ground based system was not designed to overcome a Doppler offset that is over 22 times larger. For at least the above reasons, the circuitry to support multiple antennas on a plane is significantly different than the current invention and would not have been obvious to a POSITA.

108. As also discussed in detail in at least Section IX.D below, moving the transmitter power controls from a ground based system with maximum vehicle speeds of approximately 50 MPH to a commercial jet at 500 MPH requires the power

control signaling and circuitry to operate 10 times faster, which it does not. Therefore, calls would be disconnected, and handovers would not be able to occur.

109. Mr. Denning opines “[t]herefore, a POSITA would have been motivated to look to the prior art, such as Gilhousen390, for methods of reducing the negative effects on signals during wireless transmission. Gilhousen390 would have been a particularly relevant starting point, as it is by the same inventor as Gilhousen865.” EX1003 ¶159. I disagree. I have followed Klein Gilhousen’s work for many years. He is a founder of Qualcomm, has over 50 patents and is a pilot and it is my opinion that he understood there were significant differences between his invention for a wireless system for ground based vehicles in Gilhousen390 and his invention for a wireless system for airborne planes in Gilhousen865.

IX. THERE IS NO MOTIVATION TO COMBINE THE PURPORTED PRIOR ART AS THE PETITIONER AND MR. DENNING CLAIM

110. For Ground 1, the Ito reference is used as the primary reference. As I explain in at least Section VIII.A above, the invention of the Ito Patent only improves the convenience of handsets for the mobile radio communication system by eliminating (1) the cord between the “automobile telephone unit,” located in the trunk of a car and the cradle that holds the handset typically located around the dash of the vehicle; and (2) the curled cord used between the cradle and the handset with Ito’s “mobile base device” in conjunction with Ito’s “portable device”.

111. For Ground 2, the Gilhousen865 reference is used as the primary reference. As I explain in Section VIII.D above, the invention of Gilhousen865 is directed towards improving receiver design in a CDMA cellular telephone for enhancing the reliability and communications in the cellular telephone environment. See Ex. 1007 at Abstract, 1:8-11.

A. No Motivation to Combine Ito With Gardner

112. For Ground 1, the Ito reference is used as the primary reference and Gardner is used as the secondary reference. A POSITA, however, would not have been motivated to combine Ito with Gardner, as Petitioner and Mr. Denning propose, for several reasons set forth below.

113. First, a POSITA would not have been motivated to combine Ito with Gardner because such a combination would not result in a portable device that can receive signals from a fixed port. If a POSITA were to simply replace the single antenna of the “automobile telephone unit” of Ito with the spatially separated antennas of Gardner, as Mr. Denning and Petitioner propose, this would result in an inoperable device because it would be unable to correctly receive or process any signals from the spatially separated antennas. I further note that Ito does not disclose the necessary techniques to process multiple receive signal input paths as a result of Petitioner’s incorporation of the spatially separated antennas; therefore, any signals

sent to the spatially separated antennas employed in the “automobile telephone unit” of Ito will not be received.

114. Second, a POSITA would not have been motivated to combine Ito with Gardner because such a combination would have required much new circuitry—not disclosed in either Ito or Gardner—(i) to control the multiple antennas; (ii) to process multiple receive signal input paths; and (iii) to determine how to use the signal received from these multiple paths.

115. Third, as described in detail in Section VIII.B above, Gardner does not provide any guidance on how its device can be used for the different types of cellular networks and it would not have been obvious to a POSITA how the “modulated RF carrier” invention of Gardner could be combined with the many different RF carrier frequencies used in an FDMA/TDMA system as disclosed by Ito

116. For at least the reasons discussed herein, combining Gardner’s spatial diversity with Ito’s “portable device” (PSS) is not merely incorporating a well-known concept into a well-known system.

117. Therefore, it’s my opinion that a POSITA would not be motivated to combine Ito with Gardner for at least the reasons stated in this Section and in Section VIII.

B. No Motivation to Combine Gilhausen865 and Gilhausen390

118. For Grounds 4-5, the Gilhousen865 reference is used as the primary reference.

119. Gilhousen390 is a CDMA network for ground-based (terrestrial) vehicles. Gilhousen390 teaches that signal fading is a significant problem for a moving vehicle with a rate of fading based on the speed of the vehicle that can be extremely disruptive with:

For example, in the 850 MHz cellular radio frequency band, *this fading can typically be as fast as one fade per second per mile per hour of vehicle speed. Fading on this order can be extremely disruptive to signals in the terrestrial channel* resulting in poor communication quality. EX1007 3:19-24.

120. As explained in the passage above, a cellular phone in a vehicle would experience 60 fades per second. This rate of fading, based on my personal experience, was a very significant challenge for the cellular phones and their associated circuitry in the 1989-1994 timeframe for the filing dates of Gilhousen390 and Gilhousen865, respectively.

121. To combat this fading, CDMA systems use power control for the transmitters in a mobile station and a base station. For example, as the transmitted signal from the mobile fades at the base station's receiver, the base station sends power control commands to the mobile to increase its power. However, if the mobile is travelling more than 50 MPH in the CDMA system disclosed by Gilhousen390,

the mobile will not be able to increase its power fast enough and the call will be dropped. The passage from the CDMA reference book below describes the power control bits sent to the mobile for increasing/decreasing its power are sent at 800 bits per second.

Because the closed-loop power control is meant to combat fast Rayleigh fading, the mobile's response to these power-control commands must be very fast. For this reason, these PCBs are directly sent over the traffic channel. What actually happens is that bits are *robbed* from the traffic channel in order to send these PCBs. Figure 4.10 shows a simplified block diagram of a portion of the forward traffic channel generation.

The output from the vocoder and input into the convolutional encoder is 9.6 Kbps (at full rate for Rate Set 1). The Rate 1/2 convolutional encoder doubles the baseband rate to 19.2 Kbps. Prior to spreading, the PCBs at 800 bps are multiplexed onto the baseband stream at 19.2 Kbps. The PCBs are integrated into the traffic channel by robbing selected bits from the baseband stream. This way, a separate "channel" at 800 bps (for power-control purposes) exists beneath the traffic channel. The stream of PCBs at 800 bps is therefore called the *power-control subchannel* (PCS). These PCBs are continuously transmitted to the mobile by the base station. Note that since the rate of PCB transmission is 800 bps, a PCB is sent once every (1/800) second, or 1.25 ms.

Ex. 2109 at p. 89.

122. Another CDMA system patent by Gilhousen (Ex. 2112), which has a filing date of Aug. 23, 1991 and uses very similar (if not identical) figures as Gilhousen³⁹⁰ states that the maximum vehicle speed for power control is 50 MPH when the power control bits are sent at a rate of 1,000 per second, which is 200 bits faster per second than the CDMA system standard listed directly above.

The power adjustment command is transmitted by the cell-site transmitter at a relatively high rate, typically on the order of about one command every millisecond. The rate of transmission of the power adjustment command must be high enough to permit Rayleigh fading on the inbound link path to be tracked. It is further desirable for the outbound link path Rayleigh fading impressed on the inbound link path signal to be tracked. One command per millisecond is adequate to track the fading processes for vehicle speeds in the range of 25–50 miles per hour for 850 MHz band mobile communications. It is important that the latency in determining the power adjustment command and the transmission thereof be minimized so that channel conditions will not change significantly before the mobile unit receives and responds to the signal.

Ex. 2112 at 7:7-23

123. For the airborne invention of Gilhousen⁸⁶⁵, the average speed of a single engine airplane is 150 MPH but the average speed of a commercial jet (plane) is 500 MPH⁴. Thus, at 500 MPH a commercial jet is travelling 10 times faster than the maximum speed than the Gilhousen³⁹⁰ system can support. Therefore, for at least these reasons, the CDMA invention of Gilhousen³⁹⁰ is only designed to operate correctly below vehicle speeds of 50 MPH.

124. Second, a POSITA would have known that installing “spatially separated antennas” on a plane would have many technical and regulatory obstacles and require more than just picking a spot on a plane to mount the antenna and

⁴ I have used these speeds based on my own personal experience as a commercial pilot and flight instructor.

running a wire to the signal repeater in the plane. Therefore, it is my opinion that Mr. Denning has failed to show support that Claim 10 is disclosed or obvious based on the combination of Gilhousen865 and Gilhousen390 because none of these factors are disclosed by Mr. Denning or these two references.

125. In addition, to a cellular phone user, dropped calls, blocked calls, and calls with static are unacceptable. Users expect to remain connected while traveling through cells of a service area. Users also expect to be able to make calls at any time and to have good, clear connections. Handoff is an important aspect of the user experience. Handoff makes a continuous connection possible by transferring a mobile user from one cell to another. Combining Gilhousen865 with Gilhousen390 would also not support handoffs because the commercial jet is flying up to 10 times the maximum designed speed of Gilhousen390. Even the small airplane would be travelling at three times the maximum speed. Therefore, when a plane flies across a cell boundary and needs to connect to another base station, the handover would not be accomplished in time to connect to both cells as opined by Mr. Denning. Thus, any calls in progress for the plane's passengers would be dropped and the handover process disclosed by Gilhousen390 when combined with Gilhousen865 would not work.

126. Therefore, based on the above, the Gilhousen390 patent would simply not work when combined with the Gilhousen865 for airborne planes. I note that

Klein Gilhousen is the inventor for both patents and it is my opinion that Gilhousen390 does not reference Gilhousen865 for at least these reasons.

127. Therefore, it's my opinion that a POSITA would not be motivated to combine Gilhousen865 with Gilhousen390 for at least the reasons stated in this Section and in Section VIII above.

X. DETAILED CLAIM ANALYSIS

128. As I describe in at least Sections VII and VIII above and herein, the references used by the Petitioner and Mr. Denning, used alone or in combination, do not disclose all the elements of Claims 10, 15, 17 and 18 and would not have been obvious to a person of ordinary skill in the art at the time of the invention of the '701 Patent. In the Subsections below, I address each of the Grounds included in the Petition and/or Mr. Denning's declaration.

A. Ground 1: Claims 10, 15, 17 and 18 are Not obvious over Ito in view of Gardner

Claim 10

- i. [10.4] a transmitter configured to transmit radio frequency signals to a mobile device corresponding to the received fixed port signals*

129. Ito does not disclose “a transmitter configured to transmit radio frequency signals to **a mobile device** corresponding to the received fixed port signals” as required by this claim.

130. Mr. Denning opines that Ito discloses this limitation: “According to Ito, the mobile base device MSS “receive[s] a signal from the base station BSS2 and forward[s] it to the portable device PSS2.” Denning ¶ 124 citing Ex. 1005 at 13:15-18. Ito discloses a portable device (PSS) however this portable does not register with or directly communicates with the cellular network as required for a “mobile device” in the context of the entire ’701 Patent.

131. As I discuss in at least Section VII.A above, the ’701 Patent specification requires that this “mobile unit” must be capable of directly communicating with either a fixed cellular base station or a moving base station. *See, e.g.*, Ex. 1001, 4:46-49; 10:50-57. The mobile unit’s capability to switch back-and-forth between either a direct connection with the fixed base station or a connection with a moving base station is discussed repeatedly and throughout the specification. *See, e.g., id.* at 10:50-57; 10:57-62; and 10:62-65. Additionally, the “mobile unit” “**must** register” with a cellular network so the mobile unit is able to receive calls coming from the cellular network. *Id.* at 9:49-56.

132. As I explain in detail in Section VIII.A above, Ito’s “portable device” (PSS) is a type of “cordless telephone” because Ito’s “portable device” (PSS) can only connect to a telephone network through Ito’s “mobile base device” (MSS). Therefore, Ito’s “portable device” (PSS) is not capable of registering with the

cellular network because Ito’s “portable device” is not capable of directly communicating with a cellular network.

133. As I discuss in Section VIII.B, the Gardner Patent is not directed toward and does not disclose a Moving Base Station as disclosed by the ’701 Patent. Instead, the Gardner Patent only discloses direct communication between a mobile unit and base station.

134. As discussed above, the elements of Claim 10 are not disclosed in Ito or Gardner, individually or in combination, and a POSITA would not have found the claim elements obvious based upon Ito and Gardner.

Claim 15

- ii. [15] a controller configured to compare the received fixed port signals received through the spatially separated antennas and to select a best signal***

135. Claim 15 requires “A movable base station in accordance with claim 10, further comprising a controller configured to compare the received fixed port signals received through the spatially separated antennas and to select a best signal.”

136. The Petitioner and Mr. Denning rely on the combination of *Ito* and *Gardner* to satisfy this limitation. Neither *Ito* nor *Gardner* disclose “a controller configured . . . to select a best signal” as required by Claim 15. The ’701 Patent provides that “a best signal” is more than just the strongest signal: “[t]he procedures for determining whether a mobile unit is to be served by a fixed base station or a

moving base station are as described earlier herein in determining which moving base station is selected to serve a mobile unit, i.e., based on signal strength and error rate.” Ex. 1001, 10:57-62. At a minimum, “best signal” includes an analysis of the error rate in addition to the signal strength when viewed in the entire context of the ’701 Patent.

137. While Gardner does disclose the method of “selection diversity,” Gardner does not disclose the required limitation of a controller selecting “a best signal” in the context of the entire ’701 Patent. In an attempt to satisfy this limitation Mr. Denning equates *Gardner’s* disclosure of selecting “the strongest signal” to that of the ’701 Patent’s required limitation of selecting “a best signal.” Mr. Denning opines that selection diversity is the method of “comparing properties of multiple received signals for the purpose of selecting a preferred one of the signals.” Ex. 1003, ¶127. Mr. Denning, however, fails to provide any explanation as to how or why a POSITA would only focus on “strongest signal” while ignoring other factors such as signal quality (i.e., error rate) when determining the “best signal” and fails to provide any evidentiary support for his conclusory assertion. Based upon my experience, the strongest signal may not be the best signal received by the mobile device, as Mr. Denning opines, because the strongest received signal may not be coming from the correct cellular network operator or the strongest signal may have some type of distortion that would cause errors in the data being received.

138. I further note that Mr. Denning’s Gardner and Acampora references also directly contradict Mr. Denning’s description of spatial diversity. Gardner discloses that selection diversity involves “cho[osing] the antenna that provides *the strongest signal*.” Ex. 1006, 1:25-27. Acampora discloses that “[w]ith selection diversity, the receiver selects for reception the signal from that antenna with the highest signal power.” Ex. 1010 at 13.

139. As discussed above, the elements of Claim 15 are not disclosed in Ito or Gardner, individually or in combination, and a POSITA would not have found the claim elements obvious based upon Ito and Gardner.

Claims 15, 17 and 18

140. Claims 15 and 17 of the ’701 Patent both depend from independent Claim 10. Claim 18 depends from dependent Claim 17, which also depends, from independent Claim 10. As Ito and/or Gardner fail to disclose or make obvious all the limitations of Claim 10, Claims 15, 17, and 18 are not disclosed or made obvious to a POSITA for the same reasons.

B. Ground 2: Claims 10, 15, 17 and 18 are not obvious under over Gilhousen865 with Gilhousen390

Claim 10

- i. [10.0] A movable base station configured to move relative to Earth, the movable base station comprising:*

141. Independent Claim 10 of the '701 Patent requires “a movable base station configured to move relative to Earth.” (Ex. 1001, 11:54-55). Mr. Denning and Petitioner allege that *Gilhousen865* discloses this limitation: “*Gilhousen865* describes a repeater 210 (apparatus) installed in an airplane that functions both to provide outgoing calls from the radiotelephone to the ground base station, and incoming calls originating from the ground subsystem to the airborne radiotelephone. *See* Ex. 1009 2:53-63. Because the repeater is installed in an airplane, it would have been obvious to a POSITA that the repeater is “configured to move relative to Earth” Petition p. 55. Petitioner and Mr. Denning did not apply the civil court’s construction of the term “configured to” which was construed to mean: “constructed to move with the traffic at a rate of speed which is comparable to the speed of the traffic.”

ii. [10.3] a transmitter configured to transmit radio frequency signals to a mobile device corresponding to the received fixed port signals.

142. As previously discussed in at least Section VIII.D, while *Gilhousen865* does disclose radiotelephones, *Gilhousen865* does not disclose a transmitter configured to transmit radio frequency signals to a radiotelephone that registers with or is capable of directly communicating with the cellular network as required by the limitation of a “mobile device” in the context of the entire '701 Patent.

143. *Gilhousen865* does not disclose “A Mobile Device” as required by this claim limitation. As I discuss in at least Section VII.A above, the ’701 Patent specification requires that this “mobile unit” must be capable of directly communicating with either a fixed cellular base station or a moving base station. Ex. 1001, 4:46-49. The mobile unit’s capability to switch back-and-forth between either a direct connection with the fixed base station or a connection with a moving base station is discussed repeatedly and throughout the specification. *Id.* at 10:50-57; 10:57-62; and 10:62-65. Additionally, the “mobile unit” “**must** register” with a cellular network so the mobile unit is able to receive calls coming from the cellular network. *Id.* at 9:49-56. Unlike the “mobile device” required by the claim limitation, the radiotelephones in *Gilhousen865* do not have cellular telephone capability as discussed in at least Section VIII.D.

144. Therefore, the elements of Claim 10 are not disclosed in *Gilhousen865* or *Gilhousen390*, individually or in combination, and a POSITA would not have found the claim elements obvious based upon *Gilhousen865* and *Gilhousen390*.

Claim 18

iii. [18] A movable base station in accordance with claim 17, wherein the vehicle is an automotive vehicle.

145. Mr. Denning and Petitioner rely on *Gilhousen865* to satisfy this claim limitation: “*Gilhousen865* discloses that the repeater 210 (apparatus) is mounted in

an airplane (automotive vehicle).” (Petition at 63 citing Ex. 1009 at 2:45-49; Ex. 1003, ¶182). I note that Petitioner has failed to account for the construction of the term “automotive vehicle” in the entire context of the ’701 Patent specification—“automobile.” I further note that Mr. Denning does not provide any explanation regarding why a POSITA would equate an airplane to an automobile.

146. As discussed above, the elements of Claims 18 are not disclosed in Gilhousen865 or Gilhousen390, individually or in combination, and a POSITA would not have found the claim elements obvious based upon Gilhousen390 and Gilhousen865.

Claims 15, 17, and 18

147. Claims 15, 17, and 18 of the ’701 Patent either depend directly or directly from independent Claim 10. As Gilhousen865 and/or Gilhousen890 fail to disclose or make obvious all the limitations of Claim 10, Claims 15, 17, and 18 are not disclosed or made obvious to a POSITA for the same reasons.

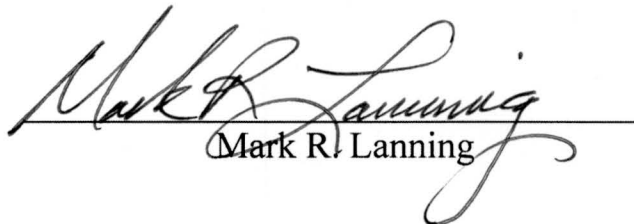
148. As discussed above, the elements of Claims 15, 17, and 18 are not disclosed in Gilhousen865 or Gilhousen390, individually or in combination, and a POSITA would not have found the claim elements obvious based upon Gilhousen390 and Gilhousen865.

XI. CONCLUSION

149. I declare that all statements made herein of my knowledge are true to the best of my ability, and that all statements made on information and belief are believed to be true to the best of my ability, 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.

Executed this 7th day of February 2020 in Greenville, Tx.

Respectfully submitted,


Mark R. Lanning