

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioners,

v.

VASU HOLDINGS, LLC,
Patent Owner.

Case IPR2025-00447

Patent No. 10,206,154

**DECLARATION OF MARK LANNING IN SUPPORT
OF PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,206,154**

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. QUALIFICATIONS.....	5
III. LEGAL UNDERSTANDING.....	8
IV. BACKGROUND OF THE TECHNOLOGY.....	15
V. THE '154 PATENT	17
A. '154 Patent Overview	17
B. The Prosecution History.....	22
1. '154 Prosecution	22
2. '181 (Parent) Prosecution.....	22
C. Priority Date of the Claims.....	24
VI. LEVEL OF ORDINARY SKILL IN THE ART	26
VII. CLAIM CONSTRUCTION.....	27
VIII. GROUNDS OF UNPATENTABILITY.....	28
IX. SPECIFIC GROUNDS FOR CHALLENGE	29
A. GROUND 1: Iizuka in View of Enzmann (Claims 1, 2, 4, 43, and 45-47).....	30
1. Overview of Iizuka (Ex. 1004, U.S. Patent App. Pub. 2005/0282541)	30
2. Overview of Enzmann (Ex. 1011, U.S. Patent Pub. 2005/0136927)	37
3. Motivation to Apply Enzmann's Teachings to Iizuka.....	39
4. Invalidity of Claims 1, 2, 4, 43, and 45-47 Over Iizuka in View of Enzmann.....	45
B. GROUND 2: Iizuka in View of Enzmann and Inoue (Claims 1, 2, 4, 43, and 45-47).....	99

C. GROUND 3-4: Iizuka in View of Enzmann and Sundar, and Iizuka
in View of Enzmann, Inoue, and Sundar (Claims 45-47).....103

X. SECONDARY CONSIDERATIONS110

XI. CONCLUSION112

I. INTRODUCTION

1. My name is Mark Lanning and I am currently the President of Telecom Architects, Inc., and Reticle Consulting, LLC. I have been retained on behalf of Samsung Electronics Co. Ltd. and Samsung Electronics America Inc. (“Samsung”), to provide my opinions on certain issues related to U.S. Patent No. 10,206,154 (“the ’154 patent”) in connection with the above-captioned inter partes review (IPR) proceeding. In particular, I have been asked to provide my insights, analysis, and opinions regarding whether claims 1, 2, 4, 43, and 45-47 of the ’154 patent (“Challenged Claims”) are obvious over the prior art references identified below.

2. I understand that the ’154 patent is titled “Mobile Device WiFi/Cellular Seamless Roaming, Seamless Session Continuity, Always Connected Switching Controller,” names as inventor Vasudevan Ganesan, and is currently owned by Vasu Holdings, LLC. I have considered the ’154 patent. I understand that the ’154 patent has been provided as Ex. 1001.

3. I understand that the file history of the ’154 patent has been provided as Ex. 1002. I have considered this file history, and I will refer to it as the “’154 File History” or by its exhibit number.

4. I understand that the ’154 patent is a continuation of U.S. Patent Application No. 13/240,776, which is a division of U.S. Patent Application No.

11/330,675, which claims priority to provisional application No. 60/643,829 (“’829 Provisional”), and a continuation-in-part of U.S. Patent Application No. 11/031,498 (“’498-CIP”), which claims priority to provisional application No. 60/534,466 (“’466 Provisional”).

5. I also understand that the ’154 patent claims a priority date of Jan. 6, 2004, the filing date of provisional application No. 60/534,466. As I discuss in Section V.C, the Challenged Claims are not entitled to the benefit of at least the ’466 Provisional, ’829 Provisional, and ’498-CIP filing dates. I have been asked to assume the Challenged Claims are entitled to the Jan. 11, 2006 filing date of application No. 11/330,675 for the purposes of rendering my opinions in this declaration. I have not been asked to opine on whether the claims of the ’154 patent are entitled to the Jan. 11, 2006 priority date, and do not provide any opinion on that subject.

6. My analysis and conclusions set forth in this declaration are based on my educational background and experiences in the field (see Section II). I am qualified to opine concerning what a person of ordinary skill in the art would have known and understood during that time. Before Jan. 11, 2006, my level of skill in the art was at least that of a person of ordinary skill. I am qualified to opine concerning what a person of ordinary skill in the art would have known and understood at the time of the ’154 patent’s purported invention. My analysis and

conclusions herein are from the perspective of a person of ordinary skill in the art as of Jan. 11, 2006.

7. As part of my independent analysis for this declaration, I have considered the following: the background knowledge/technologies that were commonly known to persons of ordinary skill in this art during the time before the earliest claimed priority date for the '154 patent; my own knowledge and experiences gained from my work experience in the field of the '154 patent and related disciplines; and my experience in working with others involved in this field and related disciplines.

8. I have considered the following non-exhaustive list of references in preparing my declaration. I have been instructed to assume that each of these references qualifies as prior art.

- **U.S. Patent Application Publication No. 2005/0282541 (“Iizuka”)** to Fumiyuki Iizuka et al. (“Iizuka”), titled “Mobile terminal, program for controlling mobile terminal, program for call-management server, and call management process,” filed on December 6, 2004 and published on December 22, 2005. I understand that a copy of this reference has been designated as Exhibit 1007. Throughout my declaration, references to Iizuka are to Exhibit 1004.
- **U.S. Patent Application Publication No. 2005/0136927 (“Enzmann”)** to Mark Enzmann (“Enzmann”), titled “Method and Apparatus for Providing Seamless Call Handoff Between Networks that use Dissimilar Transmission Methods,” filed on December 19, 2003 and published on June 23, 2005. I understand that a copy of this reference has been designated as Exhibit 1011. Throughout my declaration, references to Enzmann are to Exhibit 1011.

- **U.S. Patent Application Publication No. 2007/0146475 (“Inoue”)** to Masugi Inoue (“Inoue”), titled “Wireless Communications System,” filed on November 19, 2003 and published on June 28, 2006. I understand that a copy of this reference has been designated as Exhibit 1012. Throughout my declaration, references to Inoue are to Exhibit 1012.
- **U.S. Patent Application Publication No. 2003/0134638 (“Sundar”)** to Rangamani Sundar et al. (“Sundar”), titled “Method, System and Apparatus for Providing Mobility Management of a Mobile Station in WLAN and WWAN Environments,” filed on January 17, 2002 and published on July 17, 2003. I understand that a copy of this reference has been designated as Exhibit 1013. Throughout my declaration, references to Sundar are to Exhibit 1013.

9. I understand that there is a pending district court litigation between Petitioners and Vasu Holdings LLC (“Samsung Litigation”) involving the ’154 patent.

10. I am being compensated by Samsung at my standard hourly consulting rate of \$550 for my time on this matter. My compensation is not dependent on the outcome of this proceeding or any other proceeding between the parties.

11. In forming my opinions, I relied on the documents cited in this declaration and the documents identified in the attached Appendix B. These documents comprise patents, file histories, printed publications, and other related documents. As I discuss below, each document is a type that experts in my field would have reasonably relied upon when forming their opinions. Further, experts in my field would have had access to each document either through the applicable

patent offices and/or well-known libraries, conferences, or publications in the field.

My opinions are also based upon my personal and professional experience.

II. QUALIFICATIONS

12. I am qualified by education and experience to testify as an expert in the field of telecommunications including circuit-switched networks, multiple generations of cellular networks, and packet-switched networks. The following overview of my background pertains to my qualifications for providing expert testimony in this matter.

13. I am currently the president of two consulting companies: Telecom Architects, Inc. and Reticle Consulting, LLC. Telecom Architects provides consulting services to fixed and wireless telecom service providers and their equipment suppliers. I have been President of Telecom Architects since 1999.

14. I have over 40 years of experience working in the telecommunications industry that began in the U.S. Army Signal Corp. My experience relevant to this case includes my work as an architect of various telecommunications systems and my work developing equipment used in telecommunications systems. This experience includes extensive design, implementation and testing work on the wireless interface functionality (between the base station and mobile phones) for multiple generations of cellular standards.

15. I received a B.S. in Computer Science from Southern Methodist

University (SMU) in 1983.

16. DSC, now a part of Alcatel, hired me in 1983 where I was a software development manager on the team responsible for updating DSC's PSTN telephone switch into a Mobile Switching Center (MSC) for Motorola to sell as a part of their cellular product offering in the U.S. and many other countries.

17. In 1991, I began working as a consultant to Motorola for its "SuperCell" base station product and as a consultant to British Telecom to upgrade its current analog cellular network, and I was one of the network architects responsible for the design and rollout of its Global System for Mobile Communications (GSM) network known as Cellnet. Beginning in the early 1990s, I was responsible for implementation of the SMS service, including working with suppliers of the SMS Center (SMSC), Mobile Switching Centers (MSCs) and cellular phones to define and roll out the functionality that was to be provided.

18. I was personally involved with Nokia, Ericsson, Motorola and other equipment suppliers in this effort.

19. 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 MMS and advanced data communications capability.

20. In addition to my cellular experience listed above, for at least the past ten years, I have kept up to date my knowledge of the present-day 3G, 4G, and 5G cellular network and wireless standards and their associated equipment and protocols. I have done this 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, and baseband chipsets. I have also evaluated thousands of cellular technology patents, and most of these were for cellular phone and/or base station functionality.

21. 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). While employed at DSC, I was a member of the ANSI T1 and T1X1 standard groups responsible for the definition and standardization of the Advanced Intelligent Network (AIN) and Signaling System 7 (SS7) protocol.

22. A detailed record of my professional qualifications, including a list of publications, awards, and professional activities, is set forth in my curriculum vitae attached to this report as Appendix A.

III. LEGAL UNDERSTANDING

A. My Understanding of Priority Dates and Priority Claims

23. I have been informed that for a claim in a later-filed application to be entitled to the benefit of the filing date of a prior application, the specification of the prior application must contain a written description of the invention and the manner and process of making and using the claimed invention, in such full, clear, concise, and exact terms to enable an ordinarily skilled artisan to practice the invention claimed in the later patent application. Additionally, the priority application must describe the later claimed invention in sufficient detail that a person having ordinary skill in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought. I understand this analysis is performed on a claim-by-claim basis.

B. My Understanding of Claim Construction

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

25. I have been informed that patent claims are construed from the

viewpoint of a person of ordinary skill in the art of the patent at the time of the invention. I have been informed that patent claims generally should be interpreted consistent with their plain and ordinary meaning as understood by a person of ordinary skill in the art in the relevant time period (i.e., at the time of the purported invention, or the so called “effective filing date” of the patent application), after reviewing the patent claim language, the specification, and the prosecution history (i.e., the intrinsic record).

26. I have further been informed that a person of ordinary skill in the art must read the claim terms in the context of the claim itself, as well as in the context of the entire patent specification. I understand that in the specification and prosecution history, the patentee may specifically define a claim term in a way that differs from the plain and ordinary meaning. I understand that the prosecution history of the patent is a record of the proceedings before the U.S. Patent and Trademark Office and may contain explicit representations or definitions made during prosecution that affect the scope of the patent claims. I understand that an applicant may, during the course of prosecuting the patent application, limit the scope of the claims to overcome prior art or to overcome an examiner’s rejection, by clearly and unambiguously arguing to overcome or distinguish a prior art reference, or clearly and unambiguously disavowing claim coverage.

27. In interpreting the meaning of the claim language, I understand that a

person of ordinary skill in the art may also consider “extrinsic” evidence, including expert testimony, inventor testimony, dictionaries, technical treatises, other patents, and scholarly publications. I understand this evidence is considered to ensure that a claim is construed in a way that is consistent with the understanding of those of ordinary skill in the art at the time of the claimed invention. For example, this can be useful for a technical term whose meaning may differ from its ordinary English meaning. I understand that extrinsic evidence may not be relied on if it contradicts or varies the meaning of claim language provided by the intrinsic evidence, particularly if the applicant has explicitly defined a term in the intrinsic record.

C. My Understanding of Anticipation

28. I understand that a patent claim is invalid as “anticipated” if all the limitations of the claim are present, either expressly or inherently, in a single prior art publication or patent.

29. I also understand that a prior art reference can disclose a claimed feature because the feature is expressly described or because the feature is inherent in the disclosure. I understand that something is inherent in a prior art reference if the missing descriptive matter must necessarily be present, not merely probably or possibly present, and it would be so recognized by a person of ordinary skill in the art as of the priority date of the patent. I understand that it is acceptable to examine evidence outside of the prior art reference (i.e., extrinsic evidence) in determining

whether a feature, while not expressly discussed in the reference, is necessarily present in it.

30. I have further been informed that where a reference discloses multiple embodiments, the reference should not be limited to a preferred embodiment. Instead, each disclosed embodiment may anticipate.

31. Moreover, I have been informed that as part of an anticipation analysis, it is proper to take into account not only specific teachings of the reference, but also the inferences that one skilled in the art would reasonably be expected to draw therefrom. A reference can anticipate a claim even if it does not expressly spell out all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would at once envisage the claimed arrangement or combination.

D. My Understanding of Obviousness

32. I understand that a claim may be invalid if the subject matter described by the claim as a whole would have been obvious to a hypothetical person of ordinary skill in the art in view of a prior art reference or in view of a combination of references at the time the claimed invention was made. Therefore, I understand that obviousness is determined from the perspective of a hypothetical person of ordinary skill in the art and that the asserted claims of the patent should be read from the point of view of such a person at the time the claimed invention

was made. I further understand that a hypothetical person of ordinary skill in the art is assumed to know and to have all relevant prior art in the field of endeavor covered by the patent in suit.

33. I have been informed that there are two criteria for determining whether prior art is analogous and thus can be considered prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the patentee's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the patentee is involved. I have also been informed that the field of endeavor of a patent is not limited to the specific point of novelty, the narrowest possible conception of the field, or the particular focus within a given field. I have also been informed that a reference is reasonably pertinent if, even though it may be in a different field from that of the patentee's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to a patentee's attention in considering their problem.

34. I have also been advised that an analysis of whether a claimed invention would have been obvious should be considered in light of the scope and content of the prior art, the differences (if any) between the prior art and the claimed invention, and the level of ordinary skill in the pertinent art involved. I understand as well that a prior art reference should be viewed as a whole.

35. I have also been advised that in considering whether a claimed invention would have been obvious over a combination of prior art references, I may assess whether there are apparent reasons to combine known elements in the prior art in the manner claimed in view of interrelated teachings of multiple prior art references, the effects of demands known to the design community or present in the marketplace, and/or the background knowledge possessed by a person of ordinary skill in the art. I understand that other principles may be relied on in evaluating whether a claimed invention would have been obvious, and that these principles include the following:

- A combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results;
- When a device or technology is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or in a different one, so that if a person of ordinary skill can implement a predictable variation, the variation is likely obvious;
- 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 the technique is obvious unless its actual application is beyond their skill;
- An explicit or implicit teaching, suggestion, or motivation to combine two prior art references to form the claimed combination may demonstrate obviousness, but proof of obviousness does not depend on or require showing a teaching, suggestion, or motivation to combine;
- Market demand, rather than scientific literature, can drive design trends and may show obviousness;
- In determining whether the subject matter of a patent claim would have

been obvious, neither the particular motivation nor the avowed purpose of the named inventor controls whether the claim is obvious;

- One of the ways in which a patent's subject can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims;
- Any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed;
- "Common sense" teaches that familiar items may have obvious uses beyond their primary purposes, 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;
- A person of ordinary skill in the art is also a person of ordinary creativity, and is not an automaton;
- A patent claim can be proved obvious by showing that the claimed combination of elements was "obvious to try," particularly when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions such that a person of ordinary skill in the art would have had good reason to pursue the known options within his or her technical grasp; and
- One should be cautious of using hindsight in evaluating whether a claimed invention would have been obvious.

36. I further understand that, in making a determination as to whether the claimed invention would have been obvious to a person of ordinary skill, the Board may consider certain objective factors if they are present, such as: commercial success of products practicing the claimed invention; long-felt but unsolved need; teaching away; unexpected results; copying; and praise by others in the field. These factors are generally referred to as "secondary considerations" or "objective

indicia” of nonobviousness. I understand, however, that for such objective evidence to be relevant to the obviousness of a claim, there must be a causal relationship (called a “nexus”) between the claim and the evidence, and that this nexus must be based on a novel element of the claim rather than something in the prior art. I also understand that even when they are present, secondary considerations may be unable to overcome primary evidence of obviousness (such as motivation to combine with predictable results) that is sufficiently strong.

IV. BACKGROUND OF THE TECHNOLOGY

37. The ’154 patent’s purported invention is a method for a mobile communication device to roam between different types of wireless networks (e.g., from a WiFi (also Wi-Fi) network to a cellular network) without disrupting an in-progress phone call by using an “interface server” (or “nomadic server”) to facilitate switching between the networks. ’154, 2:54-67, 6:10-16, 6:44-47, 14:11-35. The signal strength of the in-progress call is monitored until it drops below a predetermined threshold at which point a second communication link is established. *Id.*, 3:12-27, 10:37-48. As I discuss further below in my summary of the relevant prosecution history, the allegedly inventive concept that led to allowance of the claims—as confirmed by the prosecution history of the very similar claims of the ’154 patent’s parent, U.S. Patent No. 8,886,181 (“’181 patent”)—was establishing the second communication link “without disrupting the

first communication link,” which allows the mobile device to roam between different network types during a call. *Id.*, 1:46-59; Ex. 1008 (’181FH), 577, 620.

38. However, methods for roaming between multiple different types of wireless networks during an ongoing call, and using an interface server, were already well known in the art. For example, Iizuka (Ex. 1004) discloses a method that enables a mobile terminal to roam between different types of networks, such as between a wireless local area network (LAN) and a wireless telephone network. In Iizuka’s method, when the signal strength “deviates from a predetermined criterion,” the mobile terminal notifies a call-management server by “originat[ing] a call to switching processing unit 212 in the call-management server.” Iizuka, [0159]-[0160]. The call-management server then establishes a voice call through the mobile telephone network as a second communication link while the VoIP call “still continues.” *Id.*, [0160]-[0162], [0170]-[0175].

39. As I discuss below, the claims of the ’154 patent are obvious over the prior art. Further, there were no technological barriers to combining these teachings from the prior art and a person of ordinary skill in the art would have been motivated to combine these teachings and would have understood that the combination would have yielded predictable results.

V. THE '154 PATENT

A. '154 Patent Overview

40. The purported “invention” of the '154 patent relates to an “**interface server**, referred to as a **nomadic server**, and a related system that provides seamless roaming of a **mobile communication device** between **different types of wireless networks**.” '154, 2:54-57.

41. The '154 patent purports to solve the problem that most telephones are allegedly “restricted for use with only one specific network.” *Id.*, 1:47-48.

42. More specifically, the '154 patent describes a method “in which a **nomadic server 80** is coupled to a” **system of different networks**, including a **cellular network** (including mobile switching center 20, public land mobile network 30, and base stations 10) and **wireless IP network** (including access points 40 coupled to internet 50), and a **mobile communication device 90** that “provides VoIP client functionality over a WiFi network and GSM/CDMA mobile telephony functionality over a cellular network.” *Id.*, 6:10-16, 6:34-36, 6:44-47, Figs. 1, 2.

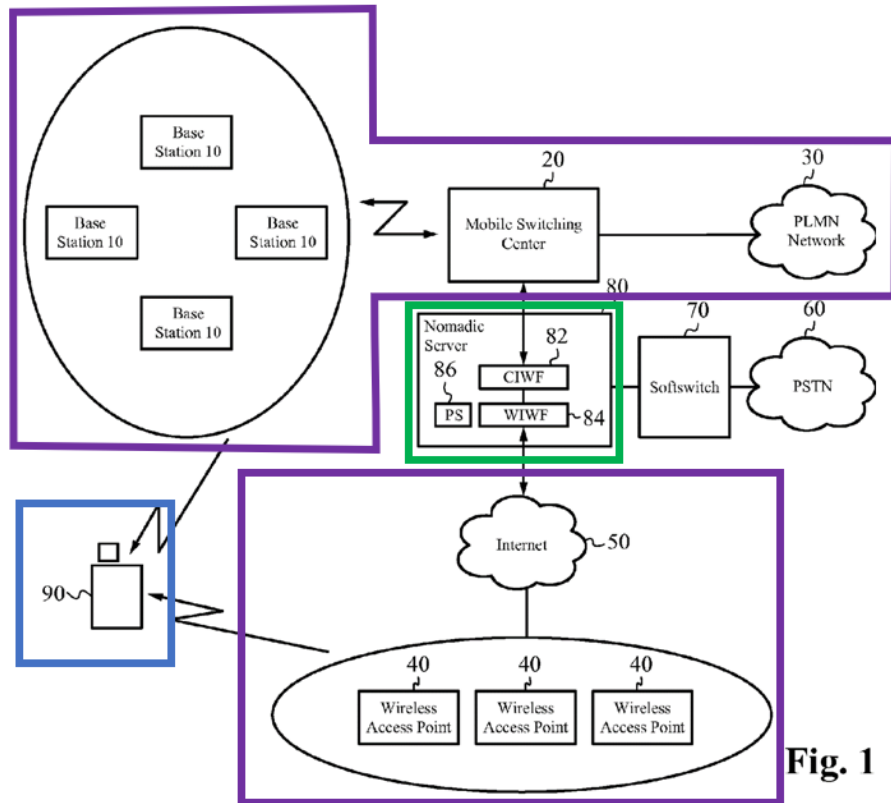


Fig. 1

43. The only two embodiments of the '154 patent that discuss “redirecting”—a concept recited in the Claims—are the “second scenario” and “third scenario,” which are nearly identical to each other, with the main difference being whether the initial call is “over a VoIP network” or involves a “back end of the call over a cellular network.” *Id.*, 10:21-12:2. Both embodiments involve roaming from WiFi coverage to non-WiFi coverage. *Id.* This overview will focus on the “second scenario,” with annotated Figure 1 below.

44. In the second scenario, when the **mobile communication device** makes a call over a VoIP network within a first WiFi coverage area, and a “**WiFi**

communication link is established between the mobile communication device and a first wireless access point associated with the first WiFi coverage area.” *Id.*, 10:21-32. The device also registers with the **nomadic server**. *Id.*, 10:32-35.

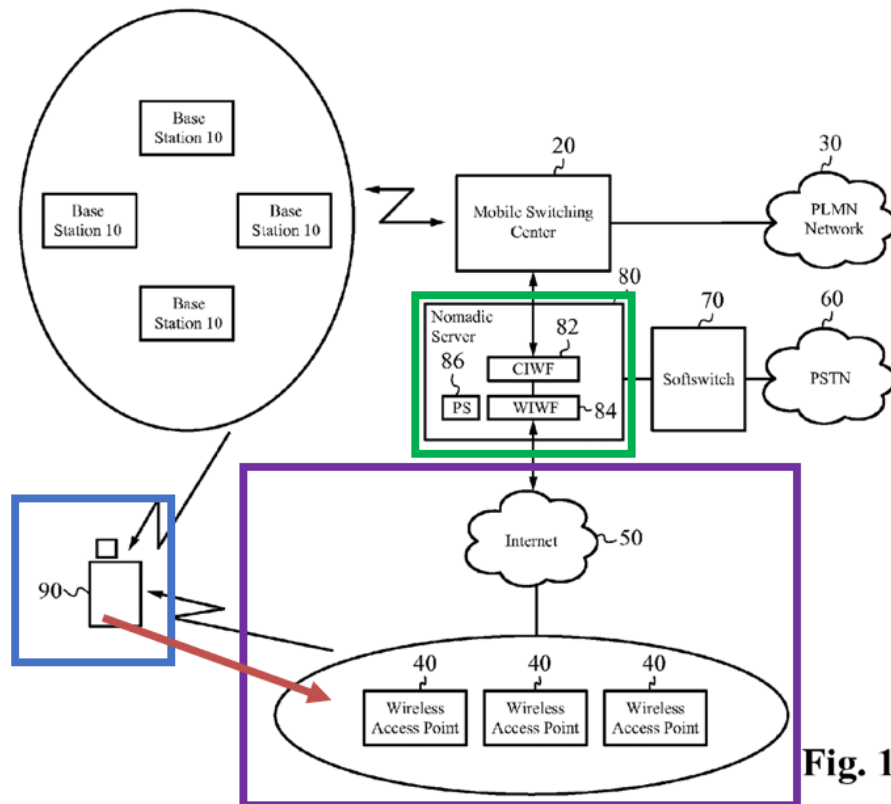
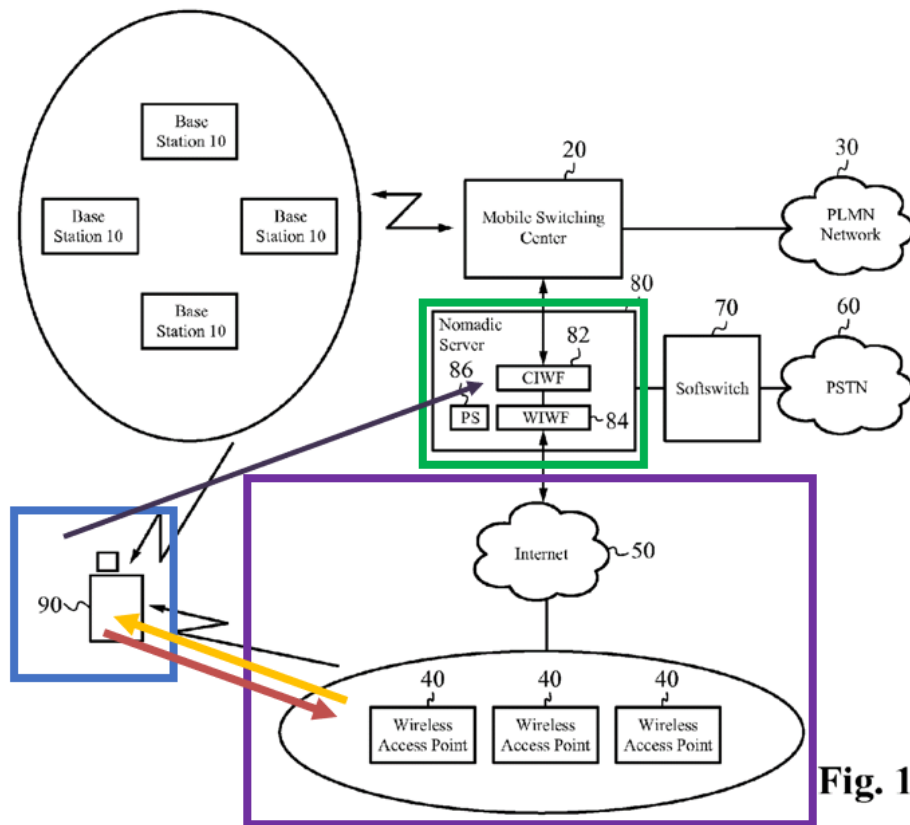


Fig. 1

45. The “**mobile communication device monitors a signal strength ...** of the **WiFi communication link**” so that when it “drops below a predetermined threshold, the mobile communication device registers with the nearest mobile switching center.” *Id.*, 10:37-43. Thus, even before a second call is established, the mobile communication device is already in communication with the mobile switching center of the cellular network (this is as expected—the mobile

communication device would need to be connected to the cellular network to know whether a switch is possible). In other embodiments, the **mobile communication device** also “**notifies the nomadic server.**” *Id.*, 8:65-9:1. The '154 patent does not specify or limit the communication path of this notification.



46. The **mobile communication device** then “sends a call setup request to the home mobile switching center for a second call with the same end destination as the first call,” and in response a “second call is setup by the home mobile switching center, and the second call is routed to the CIWF block within the home **nomadic server.**” *Id.*, 10:43-48. The CIWF block of the nomadic server is a

“cellular inter-working function block” which is connected to the mobile switching center of the cellular network. *Id.*, 7:33-38, Fig. 1. The home mobile switching center sends a message to the mobile communication device, and in response “the mobile communication device stops media streaming over the WiFi communication link and powers down the WiFi part.” *Id.*, 10:50-58. Next, “[m]edia streaming associated with the first call is then **redirected to the [cellular inter-working function] CIWF block [of the nomadic server], where the media is then switched over to the home mobile switching center.**” *Id.*, 10:63-66. After this step, “media associated with the first call is now associated with the second call, where the media is now streamed from the VoIP network to the [WiFi inter-working function] WIWF block to the [cellular inter-working function] block to the home mobile switching center to the mobile communication device.” *Id.*, 10:66-11:3.

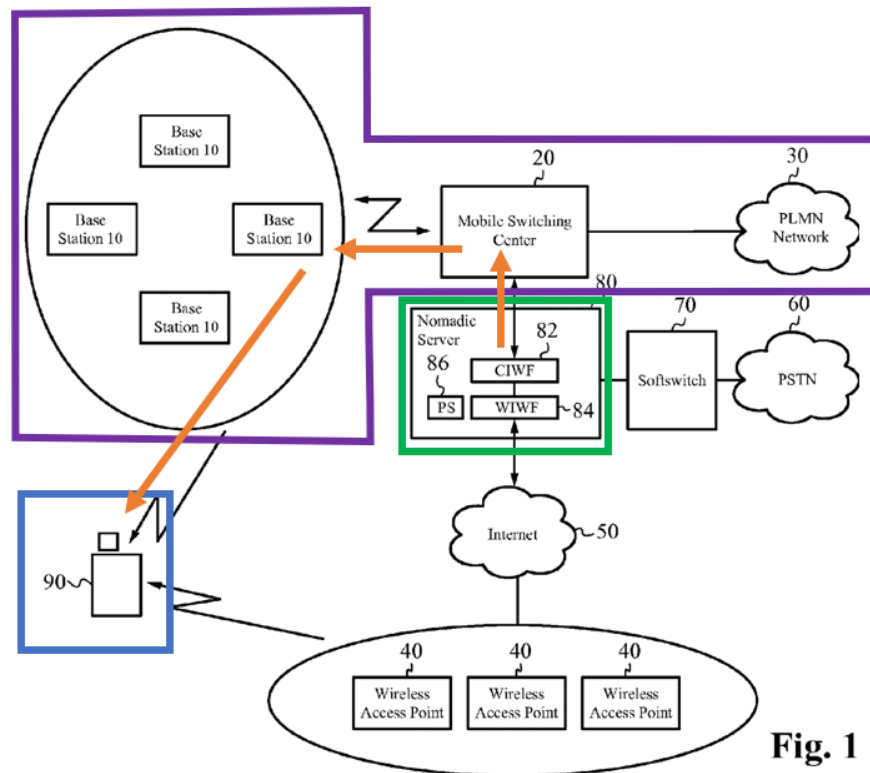


Fig. 1

B. The Prosecution History

1. '154 Prosecution

47. The '154 patent issued from U.S. Patent Application No. 14/510,766 ("'154 Application"), filed October 9, 2014. The claims were rejected for double patenting as claiming the same invention as the '181 patent, which is the parent to the '154 patent, and U.S. Patent No. 8,078,164 ("the '164 patent"), and ultimately allowed after terminal disclaimers over both were filed. '154 FH, 624-27, 708-16, 728-32, 790-94, 853-61.

2. '181 (Parent) Prosecution

48. As the above history indicates, the '154 patent claims overlap

extensively with the claims of the parent '181 patent.

49. During prosecution of the '181 patent, the Examiner issued a series of Office Actions rejecting the claims under pre-AIA Section 103(a) based on various references. *See generally* '181 FH, 376-521.

50. On April 27, 2013, the Examiner issued a final Office Action again rejecting all pending claims under Section 103(a). *Id.*, 535-46. On September 17, 2013, Applicant filed a Request for Continued Examination and amended independent claims 1, 14, and 38. *Id.*, 577-80, 600-01. Claim 1 was amended to recite a second communication link would be established “without disrupting the first communication link.” *Id.*, 577. Claims 14 and 18 (claims that Applicant eventually cancelled) were also amended. *Id.*, 581.

51. On November 15, 2013, the Examiner allowed claims 1-13 and rejected claims 14-18 and 38. '181 FH, 608. The Examiner pointed to Applicant's September 17, 2013 amendments and arguments with respect to independent claim 1 as a reason for allowance for claims 1-13. *Id.*, 620. Thus, these claims were allowed because the prior art of record allegedly did not teach that a second communication link would be established “without disrupting the first communication link.” *Id.*, 696.

52. The “without disrupting the first communication link” limitation that apparently led to allowance of the '181 patent claims is also recited in the

Challenged Claims of the '154 patent, which did not have any other prior art-based rejections during its prosecution.

C. Priority Date of the Claims

53. Based on my understanding of a priority date for a claim described in Section III.A above, the Challenged Claims are not entitled to the 2004 and 2005 filing dates of their two provisional applications (Nos. 60/534,466 (“’466 Provisional,” Ex. 1008) and 60/643,829 (“’829 Provisional,” Ex. 1009)), or the 2005 filing date of the continuation-in-part application (No. 11/031,498, now U.S. Patent No. 7,991,399 (“’498-CIP,” Ex. 1010)) because each does not provide written description support for at least the following limitations: (a) “notifying an interface server,” (b) “establishing a second communication link between the interface server and the end destination device without disrupting the first communication link, with [a/the] client” and (c) “re-directing[, with the client,] the second communication link from the interface server to the [mobile] communication device.”

54. In addition to not describing the above notifying, establishing, and re-directing steps involving an interface server, these applications also do not disclose an “interface server”:

55. *First*, ’466 Provisional’s disclosure is limited to subcomponents internal to a mobile communication device, a “radiotelephone.” *See* Ex. 1008 (’466

Provisional), 2:2-5:20.

56. *Second*, '829 Provisional does not use the terms “server,” “interface server,” or “nomadic server,” and while it references an “interface,” there is no discussion of the “interface” being used for the above-listed notifying, establishing, or re-directing steps—in fact, those steps are not discussed at all. The '829 Provisional broadly defines “interface” as “any device, system or part thereof that interacts between one unit and the other unit” and states it that can implemented “hardware, firmware or software, or some combination of at least two.” Ex. 1009 ('829 Provisional), [0008]. The term appears again only in the description of Figure 1, where it is again used merely to describe standard interfaces between components. Ex. 1009 ('829 Provisional), [0011]. For instance, a controller connected to a CELL Telephone Network includes a “‘Cellular Network’ hardware and software interface” and an entirely separate controller connected to a VOIP Telephone Network has a “‘VOIP Network’ hardware and software interface.” Ex. 1009 ('829 Provisional), [0011]. Any such controller is not the '154 patent’s “interface server” (or “nomadic server”) that connects to multiple network types. '154, 6:10-13, Fig. 1. Likewise, the various “interfaces” shown as arrows in Fig. 1 of the '829 Provisional are merely connections between various components and are not an “interface server.” Ex. 1009 ('829 Provisional), [0011], Fig 1.

57. *Lastly*, '498-CIP does not refer to a “server,” “interface server,” or

“nomadic server,” and while it refers generally to network components, such as an “access point” (Ex. 1010 (’498-CIP), [0005]), a person of ordinary skill in the art would not have understood this network component, or any other component disclosed, to be the ’154 patent’s interface server that connects to multiple network types. ’154, 6:10-13, Fig. 1. For example, a person of ordinary skill in the art would have understood that the primary function of an access point is to provide connectivity, which is distinct from the function of interfacing between networks “to provide hand-off between [the] networks.” ’154, 3:3-5.

VI. LEVEL OF ORDINARY SKILL IN THE ART

58. In rendering the opinions set forth in this declaration, I was asked to consider the patent claims and the prior art through the eyes of a person of ordinary skill in the art at the time of the alleged invention. I understand that the factors considered in determining the ordinary level of skill in a field of art include the level of education and experience of persons working in the field; the types of problems encountered in the field, the teachings of the prior art, and the sophistication of the technology at the time of the alleged invention. I understand that a person of ordinary skill in the art is not a specific real individual, but rather is a hypothetical individual having the qualities reflected by the factors above. I understand that a person of ordinary skill in the art would also have knowledge from the teachings of the prior art, including the art cited below.

59. As I discuss above, the Challenged Claims are not entitled to the benefit of at least the '466 Provisional, '829 Provisional, and '498-CIP filing dates. I have been asked to assume the Challenged Claims are entitled to the Jan. 11, 2006 filing date of application No. 11/330,675 for the purposes of this declaration only.

60. Upon consideration of these factors, and based on my knowledge and experience in the field and my review of the '154 patent and file history, I believe that a person having ordinary skill in the art in this matter would have had at least a Bachelor's degree in electrical engineering, computer engineering, computer science, or the equivalent thereof, and approximately two years of professional experience working with networking and wireless communications systems. Additional education could substitute for professional experience, or vice-versa.

61. Based on my experiences, I have at least the skills of a person having ordinary skill in the art as well as a good understanding of the capabilities of a person having ordinary skill in the art. To be clear, all of my opinions in this declaration are from the perspective of one of ordinary skill in the art as I have defined it here during the relevant timeframe.

VII. CLAIM CONSTRUCTION

62. I have been instructed that the Challenged Claims of the '154 patent are to be given their ordinary and customary meaning as understood by one of

ordinary skill in the art at the time of the alleged invention in light of the specification and the prosecution history pertaining to the patent. I have followed these principles in my analysis set forth in this document.

63. I understand that the parties have not proposed constructions for the '154 patent in the Samsung Litigation.

VIII. GROUNDS OF UNPATENTABILITY

64. As I explain above in Section IV, methods for roaming between multiple different types of wireless networks during an ongoing call, and using an interface server were already well-known in the art.

65. In this section, I will explain why the teachings or combinations of teachings from the following references render obvious each of the Challenged Claims:

Name	Ex.	Publication/ Patent No.	Published/ Issued
Iizuka	1004	US2005/0282541	December 22, 2005
Enzmann	1011	US2005/0136927	June 23, 2005
Inoue	1012	US2007/0146475	June 28, 2006
Sundar	1013	US2003/0134638	July 17, 2003

I have been instructed to assume that each of these references qualifies as prior art.

66. As I explain below, the Challenged Claims are invalid based upon the following prior art grounds:

- **Ground 1:** Challenged Claims 1, 2, 4, 43, and 45-47 of the '154 patent are rendered obvious by Iizuka in view of Enzmann.
- **Ground 2:** Challenged Claims 1, 2, 4, 43, and 45-47 of the '154 patent are rendered obvious by Iizuka in view of Enzmann and Inoue.
- **Grounds 3-4:** Challenged Claims 45-47 of the '154 patent are rendered obvious by Iizuka in view of Enzmann and Sundar, and Iizuka in view of Enzmann, Inoue and Sundar.

67. It is my opinion that Challenged Claims of the '154 patent are unpatentable as explained below. I note that in this discussion, I may focus on the particular language in the specific claims, but it should be understood that my analysis applies to the corresponding elements of all Challenged Claims containing identical or substantially identical language.

IX. SPECIFIC GROUNDS FOR CHALLENGE

68. As I explain in Section IV above, although the '154 patent purports to have invented a method for a mobile communication device to roam between different types of wireless networks without disrupting an in-progress phone call by using an “interface server” to facilitate switching between the networks, but such methods were well-known in the art. As described below, the cited prior art provides these teachings.

69. In this section, I explain why claims 1, 2, 4, 43, and 45-47 of the '154 patent are rendered obvious by the teachings of Iizuka, Enzmann, Inoue, and Sundar. I note that, in this discussion, I may focus on the particular language in

specific claims, but it should be understood that my analysis applies to the corresponding limitations of all claims containing identical or substantially identical language.

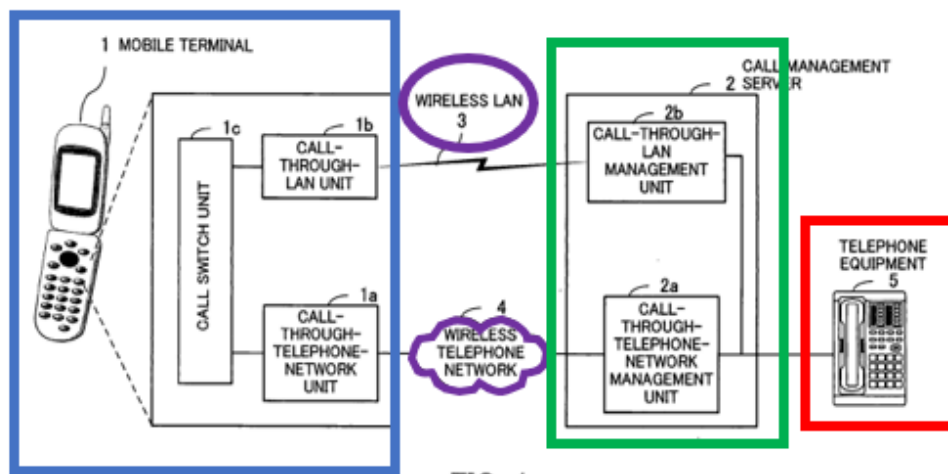
A. GROUND 1: Iizuka in View of Enzmann (Claims 1, 2, 4, 43, and 45-47)

1. Overview of Iizuka (Ex. 1004, U.S. Patent App. Pub. 2005/0282541)

70. Iizuka, titled “Mobile terminal, program for controlling mobile terminal, program for call-management server, and call management process,” discloses a method that enables a **mobile terminal** to “dynamically switch[] between [a] **plurality of communication mediums** during a call,” such as between a **wireless local area network (LAN)** and a **wireless telephone network**. Iizuka, [0014], [0057]. Like the ’154 patent, Iizuka recognizes the problem of “dynamically switch[ing]” between the different types of networks “so as to smoothly continue a call.” *Id.* [0010]. Iizuka addresses this by providing “a mobile terminal, a program for controlling a mobile terminal, a program for a call-management server, and a call-management process for performing wireless communication,” which enable a continuous wireless call by “dynamically switching between [a] plurality of communication mediums during a call.” *Id.* [0014].

71. Figures 1 and 2 of Iizuka, annotated below, illustrate an exemplary system with a **mobile terminal** “connected through a **call-management server**

200,” which functions as an interface server, to **wireless LAN 3** (via wireless LAN access point 23) and **mobile telephone network 10**. *Id.* [0057]-[0059], Figs. 1-2. The **mobile terminal** makes a call to a **telephone** (e.g., **IP telephone 21**) through one of the networks, for example through the **wireless LAN**. *Id.* [0061]-[0062]. When the quality of the call “deteriorates and deviates from a predetermined criterion during a call through the wireless LAN, the call is switched from a connection through the wireless LAN to a connection through a **wireless telephone network**.” *Id.* [0212]. This allows the system to “dynamically switch the call between a connection through the wireless LAN and a connection through the wireless telephone network.” *Id.*



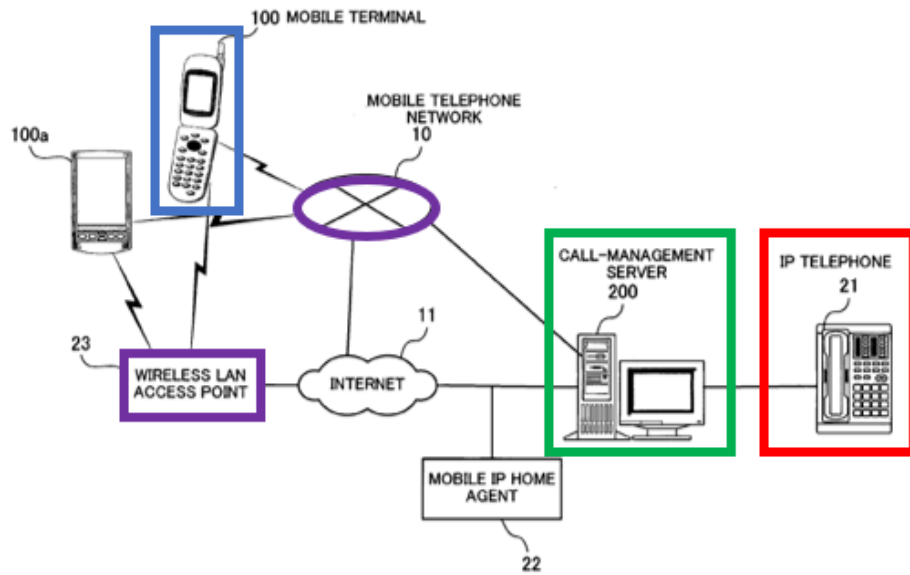


FIG. 2

72. Iizuka describes in detail the process of switching a call from a wireless LAN to a wireless telephone network. Iizuka describes the same switching embodiment in connection with Figure 13, which illustrates functional units of the mobile terminal and call-management server, and Figure 14, which illustrates a sequence diagram for the switching process. Iizuka, [0033]-[0034], [0157]-[0162], [0163]-[0176]. Accordingly, I include parallel citations to the relevant disclosures for both Figures 13 and 14. It also would have been obvious to a person of ordinary skill in the art to use the disclosures of both together because they describe compatible teachings for Iizuka's process of "switching (roaming) from a VoIP call to a voice call through the mobile telephone network." Iizuka, [0033]-[0034]. Indeed, the accompanying explanations for Figures 13 and

14 are talking about the same system, and there is no explanation in Iizuka that the figures are different ways to implement the system.

73. Iizuka's **mobile terminal** makes a call to **IP telephone 21** (i.e., a **first communication link**), which can be a Voice over Internet Protocol (IP) (VoIP) call made "through the **wireless LAN**" which is connected to the internet. *Id.*, [0039], [0061]-[0062], [0109], [0204], Fig. 13; *see also* Iizuka, [0158], [0169]. Thus, the process establishes "wireless communication" (i.e., **first wireless communication link**) between the **mobile terminal** and the **wireless LAN** (via the **wireless LAN access point**). *Id.*, [0061], [0064], Fig. 14 (arrow labelled "S76"); *see also* Iizuka, [0158], [0169].

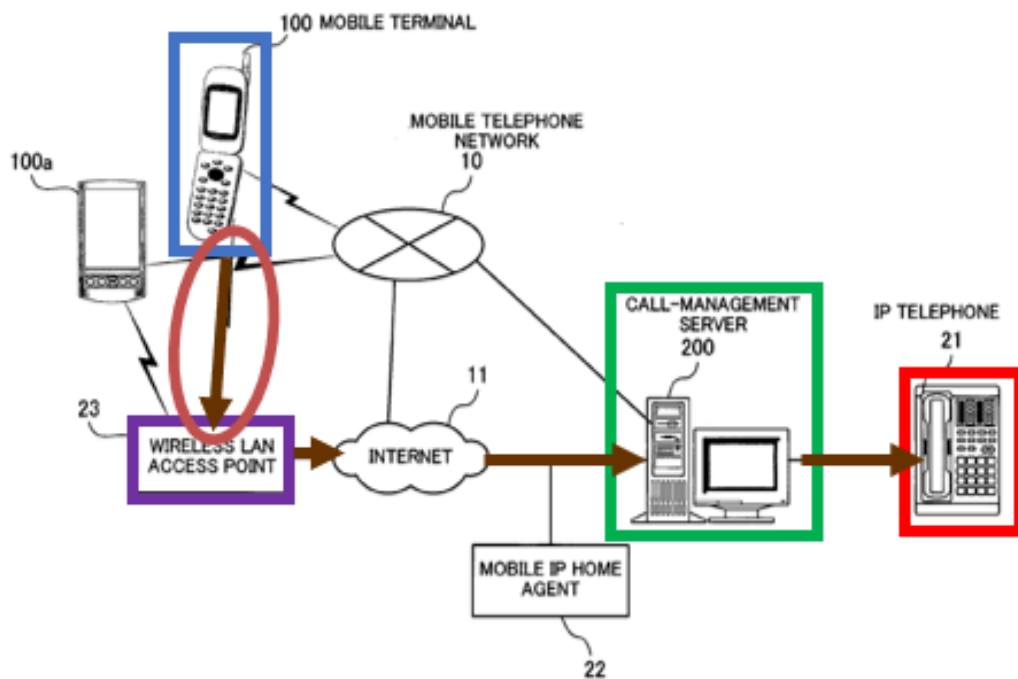


FIG. 2

74. Iizuka's **mobile terminal** includes a **medium monitor unit 117** that “monitors the conditions of the network mediums,” including **monitoring the “intensity of a radio wave”** received from the wireless LAN access point (i.e., the **first wireless communication link**). *Id.*, [0045], [0078], [0105], Fig. 4. During the call, these conditions such as the intensity of the radio wave are monitored to determine “when the condition of the communication deviates from a predetermined criterion.” *Id.*, [0060]-[0061], [0159], Fig. 13; *see also* Iizuka, [0159]-[0160], [0170].

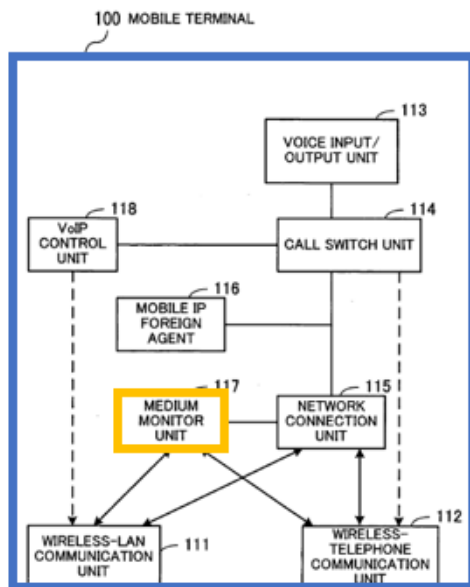


FIG. 4

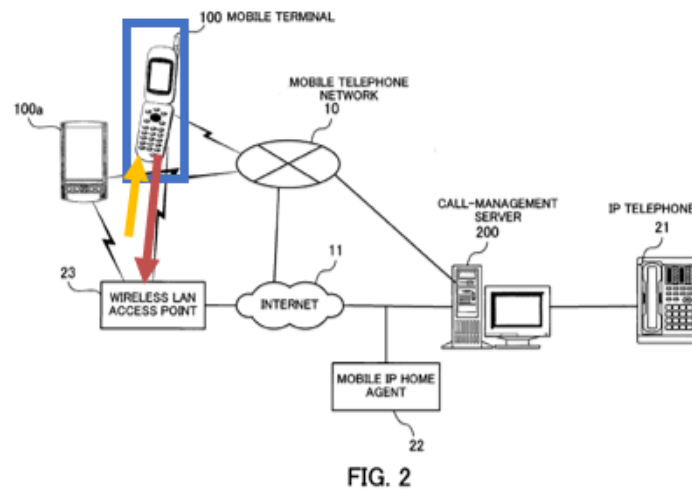


FIG. 2

75. When the signal strength “deviates from a predetermined criterion,” the **mobile terminal** notifies the **call-management server** by “originat[ing] a call to the switching processing unit 212 in the call-management server 200 by

dialing.” *Id.*, [0159]-[0160]; *see also* Iizuka, [0162], [0170].

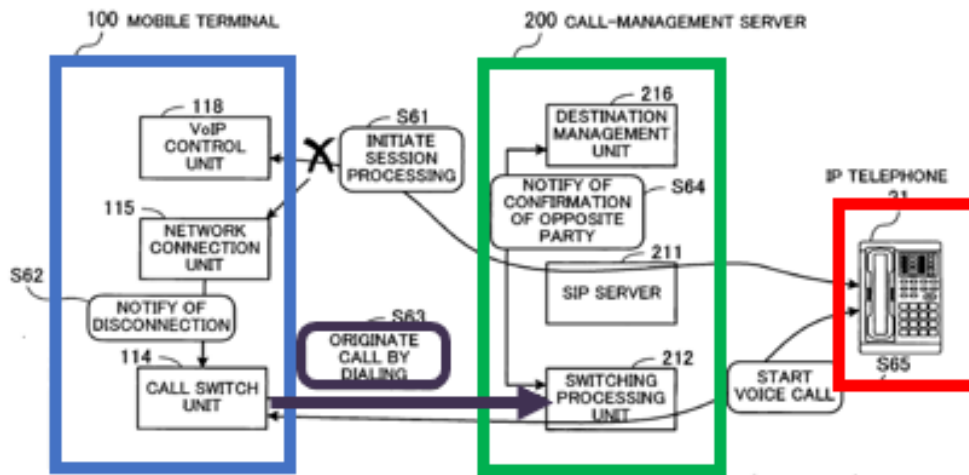


FIG. 13

76. The **call-management server** then establishes a voice call through the mobile telephone network while the VoIP call (over the **first communication link**) “still continues.” *Id.*, [0160]-[0162], [0170]-[0176]. As part of this process of establishing a voice call, the method proceeds in stages. First, an RTP or Real-time Transport Protocol connection (i.e., **second communication link**) “is established between the **IP telephone** [(end destination device)]” and the **call-management server** (interface server) as depicted in Iizuka’s Fig. 14 (arrow labelled “S82”). Iizuka, Fig. 14, [0175].

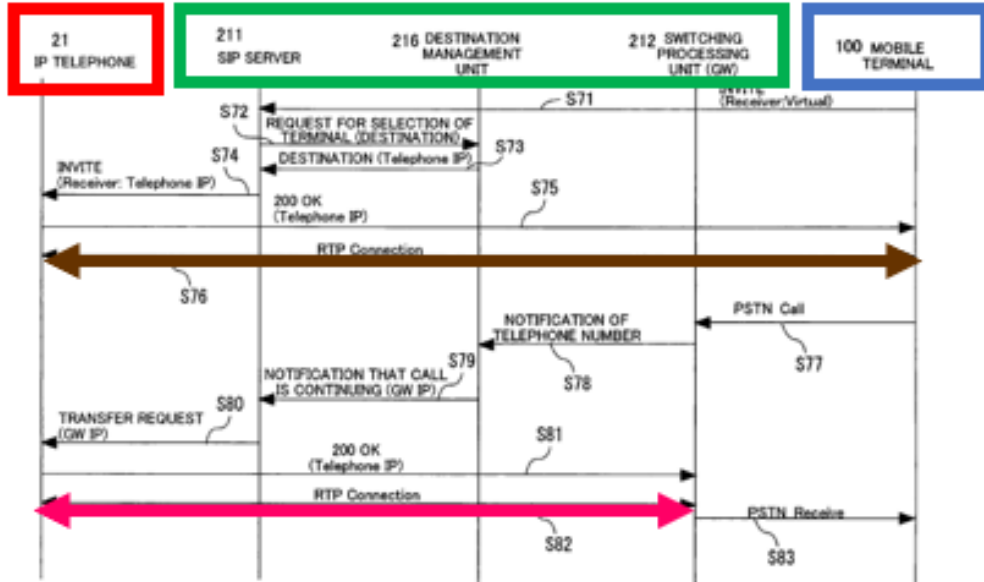


FIG. 14

77. As shown below, after the RTP connection between the **call-management server** and **IP telephone** is established (i.e., **second communication link**), the switching processing unit 212 of the call-management server 200 “returns a response” to mobile terminal 100. Iizuka, [0176]; *see also* Iizuka, [0162]. Iizuka explains that this response “**establishes a connection through the mobile telephone network 10**” between the **call-management server** and the **mobile terminal**. Iizuka, [0176]; *see also* Iizuka, [0162]. This process thus establishes a “voice call” between the mobile terminal and IP telephone, which uses the mobile telephone network (arrows labelled “S82” and “S83”). Iizuka, [0162], [0176].

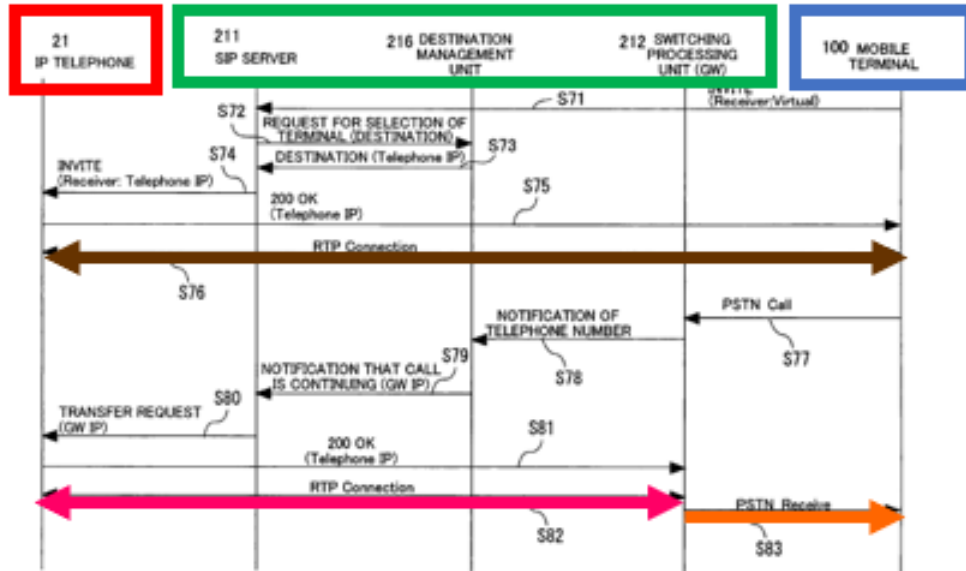


FIG. 14

78. After the voice call is established, the SIP server 211, located within call-management server 200, “disconnects the session which has been established through the Internet 11 between the mobile terminal 100 and the call-management server 200” (i.e., terminates transmission over the **first communication link**) such that the call can continue through the voice call. Iizuka, [0162]; *see also* Iizuka, [0176].

2. Overview of Enzmann (Ex. 1011, U.S. Patent Pub. 2005/0136927)

79. Enzmann, titled “Method and Apparatus for providing seamless call handoff between networks that use dissimilar transmission method,” is directed to a handoff procedure. Enzmann, Abstract. Specifically, Enzmann discloses a network roaming procedure that roams between two wireless networks (a wireless

(802.1x) network and a cellular network) and “perform[s] seamless handoff from the 802.1x network 2 to the cellular network 6.” Enzmann, [0025]; *see also* Enzmann, Figs. 3A and 3B. This procedure entails monitoring “signal levels” associated with a “call session” that “is active” in the wireless 802.1x network (i.e., “the strengths of the signals from the access point 7”), and also monitoring “cellular ... signal levels” in the cellular network (i.e., “the strengths of the signals ... from the cellular network 6”). Enzmann, [0025]. Enzmann further discloses monitoring “strength of the signal[s]” from both the 802.1x network and cellular network so that “a determination is made as to whether” the switch from the wireless network to the cellular network should occur because “the strength of the signal from the access point 7 [of the 802.1x network] has dropped below a certain threshold level” and “the strength of the signal from the cellular network is at or above a certain threshold level.” Enzmann, [0025] (“While the call is being service by the 802.1x network 2, the strengths of the signals from the access point 7 and from the cellular network 6 are detected by the wireless device 1, as indicated by block 22. A determination is made as to whether the strength of the signal from the access point 7 has dropped below a certain threshold level, as indicated by decision block 23.”); *see also* Enzmann, [0032] (“Until a session is active, a handoff cannot occur. Once a determination is made that a session is active, the process proceeds to block 62 and the server 10 retrieves both the cellular and 802.1x signal levels. A

determination is then made at block 63 as to whether the 802.1x signal level is exceeds the cellular level plus an amount “X”. The value of X can be 0 or any other value, positive or negative.”).

3. Motivation to Apply Enzmann’s Teachings to Iizuka

80. Iizuka and Enzmann are analogous art, in the same field as the ’154 patent, which includes wireless communications, and reasonably pertinent to alleged problems addressed by the ’154 patent of allowing mobile communication devices to communicate over multiple networks. ’154, 1:43-54; Iizuka, Abstract, [0007], [0010], [0014], [0052]; Enzmann, [0002], [0005], [0007], [0009], [0019], [0021], [0025]-[0026]. For example, both Iizuka and Enzmann disclose a mobile communication device that is capable of communicating through multiple wireless networks and of seamlessly switching from communication over a first network, a WLAN network, to communicating over a second network, a cellular network. Iizuka, Abstract, [0005], [0014], [0015], [0039], [0041], [0042], Figs. 1-2; Enzmann, [0004]-[0007], [0009], [0019], [0021], [0025]-[0026].

81. In my opinion, a person of ordinary skill in the art would have been motivated to apply Enzmann’s teachings of monitoring a first context of a communication link over a WLAN network, monitoring a second context of the cellular network, and switching to communicating over the cellular network when the second context is preferred over the first to Iizuka to advantageously increase

efficiency of the system such that switching does not occur unless two conditions are determined to have been met: (1) the signal strength of the WLAN signals are insufficiently strong to support an on-going call and (2) the signal strength of cellular signals is sufficiently strong enough to support communication over the cellular network. Handover would not need to occur if the signal strengths of the WLAN signals are sufficiently strong to support the on-going call. Moreover, handover to a cellular network should not occur if the cellular network would not be able to support the ongoing call. A person of ordinary skill in the art would have recognized that restricting switching in this manner prevents the mobile device from switching to a cellular network when the WLAN is better suited to service the call based on signal reception. A person of ordinary skill in the art would have further recognized that the modifying Iizuka's method in this way would prevent switching to a cellular network when the cellular network cannot adequately support the call. Since Iizuka already discloses mobile communication devices that monitor signal intensities from both a WLAN and cellular network, the incorporation of triggering the switching procedure after the measured signal intensities meet specific thresholds would have been a straightforward modification of Iizuka. Iizuka, [0069], [0078], [0105] (disclosing that "medium monitor unit 117" of a mobile terminal (*see* Iizuka, [0069]) determines "information indicating the intensity of a radio wave which the wireless-LAN

communication unit 111 can receive from the wireless LAN access point 23” as well as “information indicating the intensity of a radio wave which the wireless-telephone communication unit 112 can receive from a base station of the mobile telephone network 10” _). This modification would entail merely implementing control logic to utilize the information that Iizuka’s mobile terminals already acquire as part of Iizuka’s method.

82. Thus, a person of ordinary skill in the art would have found it straightforward and advantageous to apply Enzmann’s teachings of conditioning a switching procedure on the measured signal strengths of a first network and a second network to Iizuka’s method, and would have known such a combination (yielding the claimed limitations) would predictably work and provide the expected functionality.

83. A person of ordinary skill in the art would further have been motivated to apply Enzmann’s teachings of using an 802.1x network (i.e., a WiFi network) and an 802.1x access point in a wireless LAN network to Iizuka’s roaming method. A person of ordinary skill in the art would have recognized that adapting a standardized protocol, specifically an 802.1x protocol, would have advantageously: one, improved performance of data transmission and maximized the compatibility and, two, interoperability between mobile communication devices. Regarding improved performance, a person of ordinary skill in the art

would have recognized that an 802.1x communication protocol would have increased the overall wireless communication performance because IEEE 802.11: (1) is designed to minimize delays, collisions, and retransmissions by at least using the collision avoidance techniques (i.e., CSMA/CA techniques) I have described above as well as basic access and request-to-send/clear-to-send (RTS/CTS) mechanisms, each of which improves overall throughput and reduce latency of data transmissions; (2) has error detection and correction mechanisms, such as employing a cyclic redundancy check (CRC) and forward error correction (FEC) techniques, which improve data reliability and reduce the need for transmissions; and (3) is designed to optimize performance based on network conditions, for example by using dynamically switching between adaptive modulation and coding scheme and dynamic rate switching, based on channel conditions, ensuring the efficient management of network resources. Regarding increasing compatibility and interoperability, a person of ordinary skill in the art would have recognized that making Iizuka's method compatible with the 802.1x standard would have increased the likelihood that Iizuka's mobile communication devices are compatible with and interoperable with each other in the communication system. For example, even before the time of filing the earliest provisional application of the '154 patent, the 802.11 protocol family, which underpins Wi-Fi technology, had achieved widespread industry adoption. In 2001, at least three years before the

earliest provisional application, there were approximately 15 million Wi-Fi devices world-wide and Wi-Fi (802.11) dominated the WLAN market, capturing nearly 100% of the market share. Ex. 1016 (Jim Zyren, Intersil Corporation, “IEEE 802.11g Explained” (2001), available at

https://www.3g4g.co.uk/Other/WiLan/802_11g/WP_IEEE802gExpla_12_06.pdf)

(“At present, there are more than 15 million Wi-Fi devices world-wide, and this number will likely double by the end of 2002. Wi-Fi currently dominates the WLAN market with nearly a 100% share. In other words, it’s going to be around for a long time to come.”; Ex. 1017 (Guide to IEEE 802.11 Wireless LAN Standards, EE Times (May 23, 2003), available at <https://www.eetimes.com/guide-to-ieee-802-11-wireless-lan-standards/>) (“The IEEE 802.11b standard has achieved a level of support and customer acceptance that is truly the envy of other standards in that space such as HomeRF. Customers have learned that things from different manufacturers that are compatible with this standard really do in fact interoperate, and more to the point they operate well.”). Ex. 1016 was published by Intersil Corporation, a well-known semiconductor company that is now a subsidiary of Renesas, on the “Technical Papers” section of their website (that would have been accessible to a person of ordinary skill in the art). *See*

<https://web.archive.org/web/20021113233336/http://www.intersil.com/design/prism/papers/> (showing Intersil’s publication of “IEEE 802.11g Explained”). Ex. 1017

is a May 2003 article for the well-known and readily accessible EE Times publication (that would have been accessible to a person of ordinary skill in the art).

84. In addition, a person of ordinary skill in the art would have regarded the application of Enzmann's teachings to Iizuka's method to be routine and straightforward. The standard's widespread adoption indicates there would have been no undue technical hurdles and that a person of ordinary skill in the art would have had a reasonable expectation of success. Moreover, Iizuka discloses using a CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance) technique that is used with the 802.1x standard. *See* Iizuka, [0012] ("The MAC-layer processing in the wireless LAN devices is performed in accordance with CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance)..."); *see also* Orava, [0020] ("In accordance with the IEEE 802[.]11 standard, the MAC layer uses what is called a CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance) technique."). In light of the above, a person of ordinary skill in the art would have known that the combination (yielding the claimed limitations) would predictably work and provide the expected functionality.

4. Invalidity of Claims 1, 2, 4, 43, and 45-47 Over Iizuka in View of Enzmann

85. As I discuss below, Claims 1, 2, 4, 43, and 45-47 are rendered obvious by Iizuka in view of Enzmann. In addition to my discussion in Section IX.A.1, the following discussion identifies example disclosures followed by bulleted excerpts that each disclose Claims 1, 2, 4, 43, and 45-47.

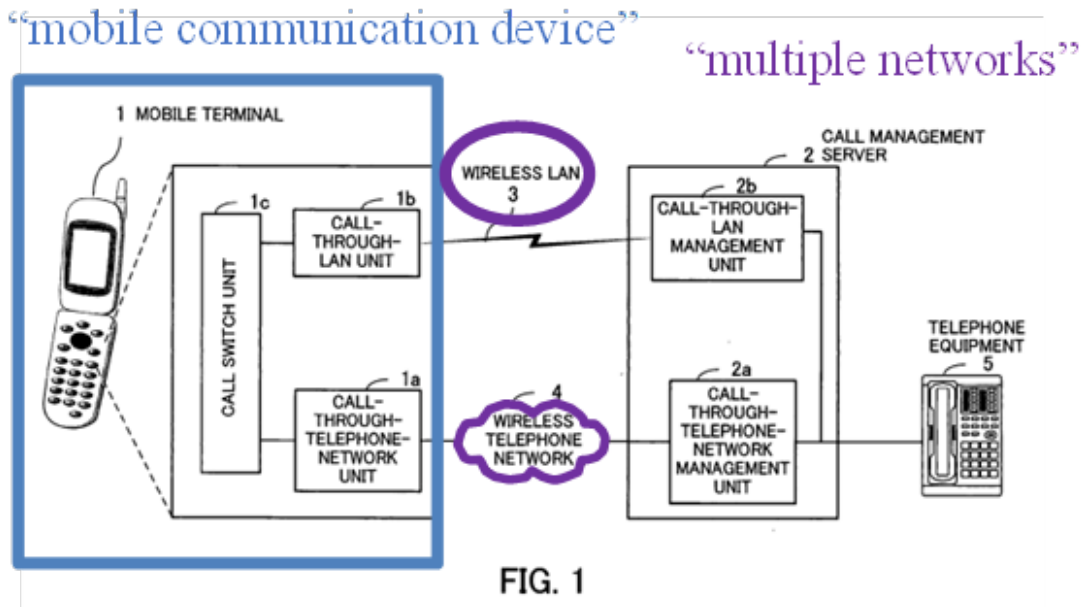
a. Element [1.pre]

86. **Element [1.pre] recites “A method of providing communications for a mobile communication device that roams between multiple networks, the method comprising.”** This element is met by Iizuka.

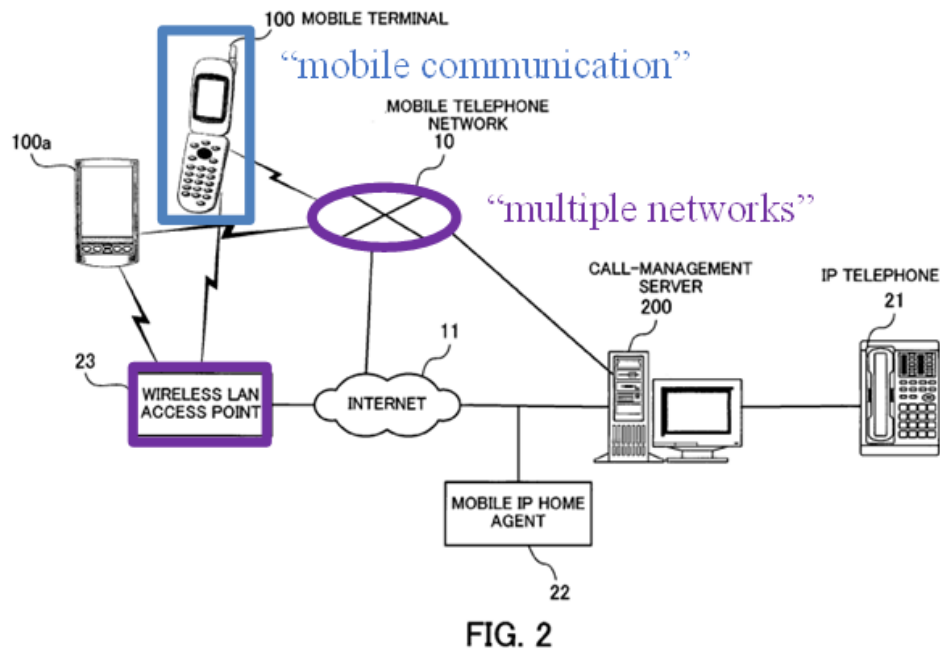
87. To the extent the preamble is limiting, Iizuka discloses a method of providing communications (*e.g.*, providing “wireless communication”) for a mobile communication device (*e.g.*, for “mobile terminal [1, 100]”) that roams (*e.g.*, “switching (roaming)”) between multiple networks (*e.g.*, “from a connection through the wireless LAN to a connection through a wireless telephone network”).

See, e.g., Iizuka:

- **Fig. 1:**



• Fig. 2:



- [0014] (“The present invention is made in view of the above problems, and the object of the present invention is to provide a mobile terminal, a program for controlling a mobile terminal, a program for a call-management server, and a call-management process *for performing wireless communication which are able to use a plurality of communication mediums enabling a wireless call, by dynamically*

switching between the plurality of communication mediums during a call.”)

- [0057] (“FIG. 2 is a diagram illustrating an example of a construction of a system of the embodiment of the present invention. In the present embodiment, ***a mobile telephone network 10 and the Internet 11 containing a wireless LAN are provided as the communication mediums through which calls can be made.*** An IP telephone 21 is connected through a call-management server 200 to the mobile telephone network 10 and the Internet 11. The IP telephone 21 has a function of making a VoIP call.”)
- [0015] (“In order to accomplish the above object, a mobile terminal for making a wireless call is provided. ***The mobile terminal comprises: a call-through unit which has a function of making a call through a wireless LAN; a call-through-telephone-network unit which has a function of making a call through a wireless telephone network; and a call switch unit which establishes a connection through the call-through-telephone-network unit and switches from a first call through the call-through-LAN unit to a second call through the call-through-telephone-network unit*** when a condition of communication realized by the call-through-LAN unit deteriorates and deviates from a predetermined criterion during the first call, and switches from a third call through the call-through-telephone-network unit to a fourth call through the call-through-LAN unit when the condition of communication realized by the call-through-LAN unit is restored to satisfy the predetermined criterion during the third call.”)
- [0212] (“According to the present invention, when the condition of communication through a wireless LAN deteriorates and deviates from a predetermined criterion ***during a call through the wireless LAN, the call is switched from a connection through the wireless LAN to a connection through a wireless telephone network.*** ... Therefore, it is possible to dynamically switch the call between a connection through the wireless LAN and a connection through the wireless telephone network according to the condition of communication so that the wireless LAN is preferentially used.”)

- [0157] (“FIG. 13 is a diagram illustrating processing for ***switching (roaming)*** from a VoIP call to a voice call through the mobile telephone network.”)
- [0039] (“FIG. 1 is a conceptual diagram illustrating the present invention which is realized in the embodiment. As illustrated in FIG. 1, a mobile terminal 1 and a call-management server 2 can communicate with each other through two wireless communication mediums, a wireless LAN 3 and a wireless telephone network 4. Telephone equipment 5 is connected to the call-management server 2, so that a call can be made between a user of the telephone equipment 5 and a user of the mobile terminal 1.”)
- [0043] (“When the condition of a connection realized by the call-through-LAN unit 1 b deteriorates and deviates from a predetermined criterion ***during a call through the call-through-LAN unit 1 b, the call switch unit 1 c establishes a connection through the call-through-telephone-network unit 1 a, and switches from the call through the call-through-LAN unit 1 b to a call through the call-through-telephone-network unit 1 a.*** When the condition of the connection realized by the call-through-LAN unit 1b is restored to satisfy the predetermined criterion during a call through the call-through telephone-network unit 1a, the call Switch unit 1c Switches from the call through the call-through-telephone-network unit 1a to a call through the call-through-LAN unit 1b”)
- ***See also [0157]-[0176] describing Figures 13 and 14.***

88. Iizuka discloses a method that enables a mobile terminal (including “mobile terminal [1, 100]”) to roam between multiple networks, such as between a wireless local area network (LAN) (including “wireless LAN [3],” which contains “Internet 11”) and a wireless telephone network (including “wireless telephone network 4” and “mobile telephone network 10”). Iizuka, [0014], [0057]. For example, a call initiated over a wireless LAN may be “switched from a connection through the wireless LAN to a connection through a wireless telephone network.”

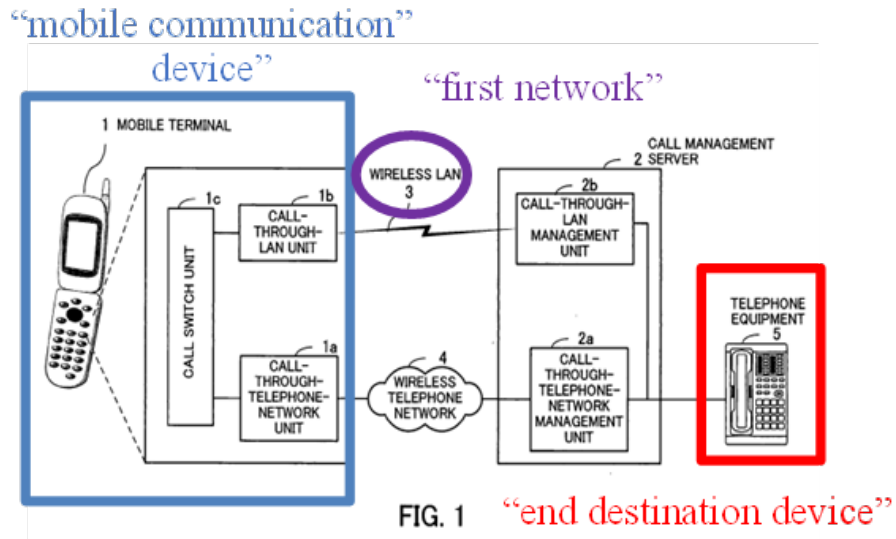
Iizuka, [0015], [0212].

b. Element [1.a]

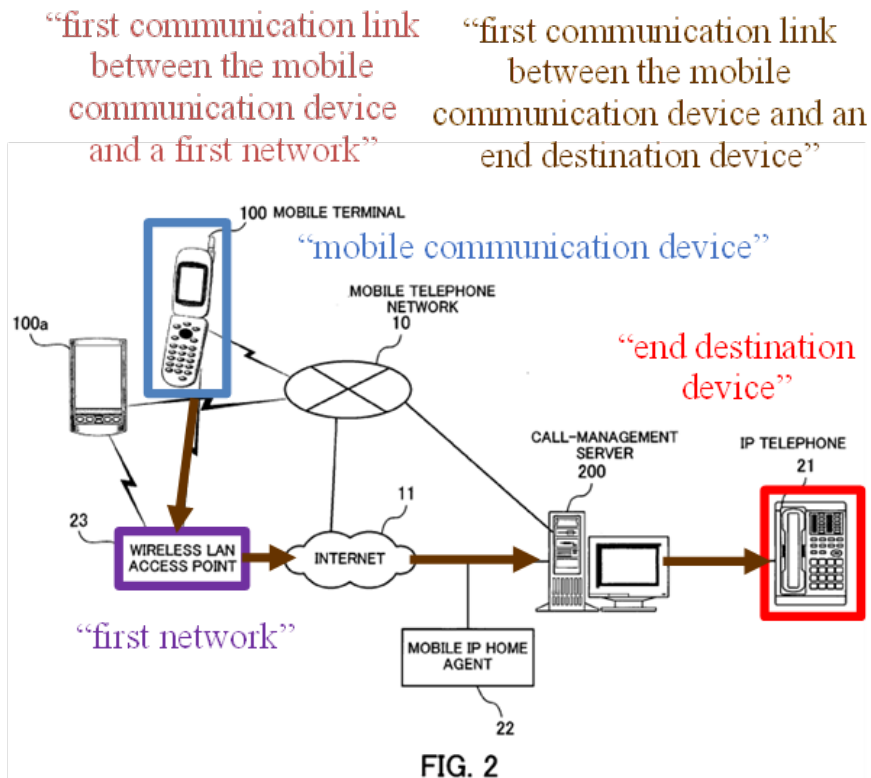
89. **Element [1.a] recites “establishing a first communication link between the mobile communication device and an end destination device, wherein the first communication link comprises a first communication link between the mobile communication device and a first network.”** This element is met by Iizuka.

90. Iizuka discloses establishing a first communication link (*e.g.*, establishing a “VoIP call”) between the mobile communication device (*e.g.*, between “mobile terminal [1, 100]”) and an end destination device (*e.g.*, and “telephone equipment 5,” “IP telephone 21”), wherein the first communication link comprises a first communication link between the mobile communication device and a first network (*e.g.*, “VoIP call” includes “wireless communication” between “mobile terminal [1, 100]” and the “wireless LAN”). *See, e.g.*, Iizuka:

- **Fig. 1:**

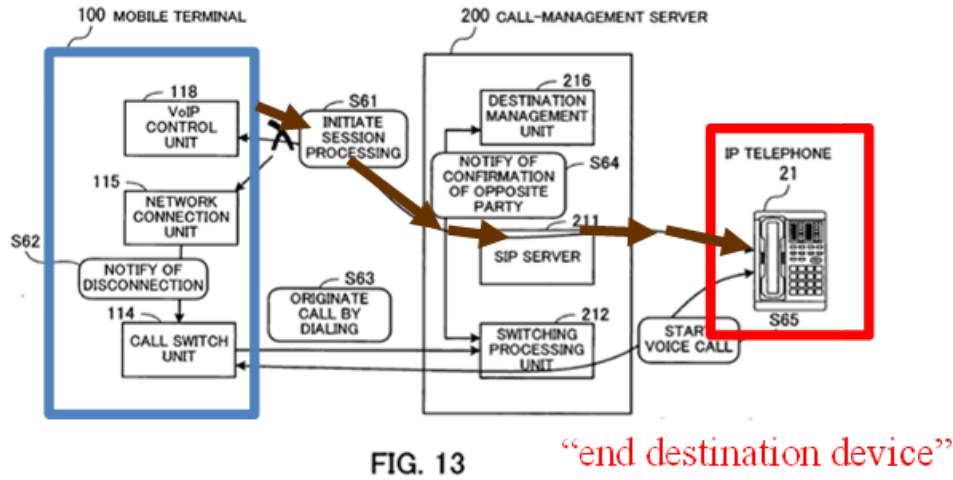


- Fig. 2:



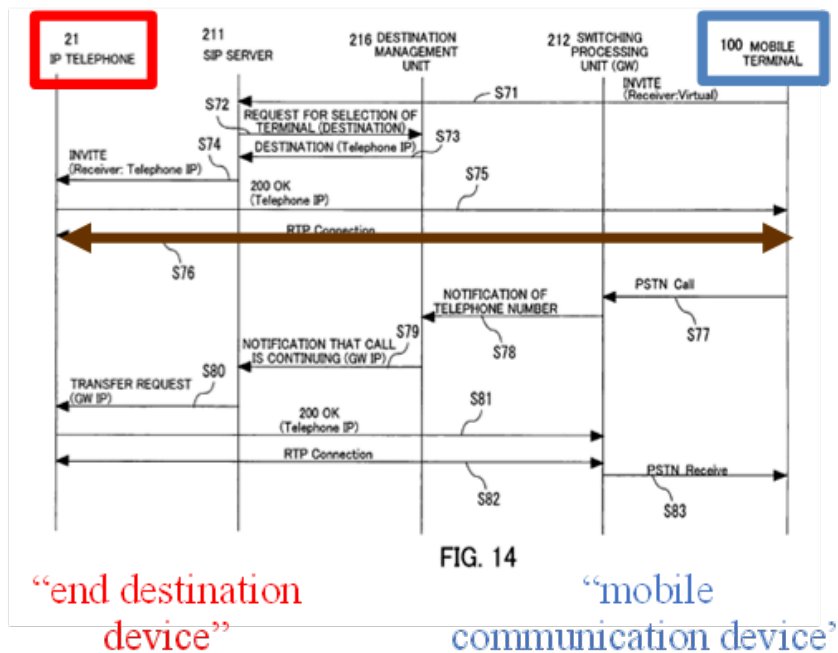
- Fig. 13:

“first communication link between the mobile communication device and an end destination device”



- Fig. 14:

“first communication link between the mobile communication device and an end destination device”



- [0039] (“As illustrated in FIG. 1, a mobile terminal 1 and a call management server 2 can communicate with each other through two

wireless communication mediums, a wireless LAN 3 and a wireless telephone network 4. Telephone equipment 5 is connected to the call-management server 2, so that ***a call can be made between a user of the telephone equipment 5 and a user of the mobile terminal 1.***)

- [0049] (“When a connection is established through the wireless telephone network 4 in response to an incoming call, the call-through-LAN management unit 2 b disconnects a corresponding session which has been set between the call-management server 2 and the mobile terminal 1 through the wireless LAN 3. In addition, when the call-management server 2 receives from the mobile terminal 1 information indicating restoration of communication between the call-management server 2 and the mobile terminal 1 through the wireless LAN 3, the call-through-LAN management unit 2 b ***establishes a session between the call-management server 2 and the mobile terminal 1 through the wireless LAN 3.***”)
- [0058] (“The call-management server 200 is connected to the mobile telephone network 10 and the Internet 11 performs medium conversion between the telephone line and the VoIP, and transfers call data. In addition, ***the call-management server 200 establishes and switches connections between the IP telephone 21 and the mobile terminals 100 and 100 a.***”)
- [0061] (“The mobile terminals 100 and 100 a each have a function of making a call through the mobile telephone network 10 and a function of making a VoIP call through the Internet 11. ***When each of the mobile terminals 100 and 100 a makes a call through the Internet 11, the mobile terminal performs wireless communication with the wireless LAN access point 23, and establishes a connection between the mobile terminal and the call-management server 200 through the wireless LAN access point 23.***”)
- [0064] (“The wireless-LAN communication circuit 101 ***performs wireless data communication with the wireless LAN access point 23*** through an antenna 101 a. The wireless-telephone communication circuit 102 performs wireless data communication with a base station of the mobile telephone network through an antenna 101 b.”)

- [0158] (“[Step S61] *After an SIP session is initiated between the mobile terminal 100 and the IP telephone 21, a VoIP call is started.*”)
- [0169] (“[Step S76] *A VoIP call between the mobile terminal 100 and the IP telephone 21 is started.*”)
- [0088] (“The SIP server 211 manages communication through the Internet 11 using the SIP (Session Initiation Protocol), which is a communication protocol for setting, releasing, and controlling sessions, where each of the sessions is formed with a series of VoIP messages.”)
- [0109] (“[Step S14] The call switch unit 114 initiates *a VoIP call through the wireless LAN.*”)
- [0204] (“In addition, a standby operation for receiving an incoming call is performed at the wireless-telephone communication unit 112 in the mobile terminal 100, and *a VoIP call is placed by establishing a connection to a network such as a wireless LAN with a network device* when the mobile terminal 100 receives an incoming call.”)
- [0169] ([Step S76] A VoIP call between the mobile terminal 100 and the IP telephone 21 is started.”)

91. Iizuka discloses establishing a first communication link between the mobile terminal and a telephone. For example, Iizuka discloses establishing a VoIP call between a mobile terminal (including mobile device 1 and mobile device 100) and an IP telephone (including “telephone equipment 5” and “IP telephone 21”). Iizuka, [0039], [0158], [0169].

92. Iizuka further discloses the VoIP call includes a first wireless communication link between the mobile terminal and a wireless network (a wireless LAN). For example, the VoIP call is “through the wireless LAN.” Iizuka, [0109], [0204], Fig. 2. And when the mobile terminal makes a VoIP call, it

“performs wireless communication” with the “wireless LAN access point 23” of the wireless LAN. Iizuka, [0061]; *see also* Iizuka, [0064].

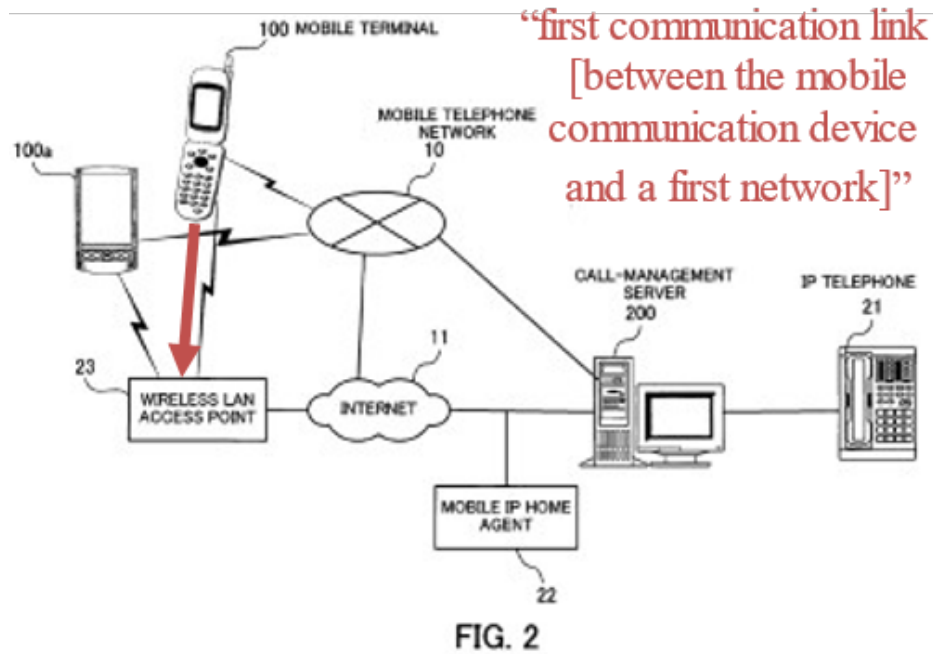
93. To initiate the VoIP call, a Session Initiation Protocol (SIP) session is first established between the mobile terminal and a call-management server (including “call-management server 2” and “call-management server 200”). Iizuka, [0049], [0061], [0088], [0158]; *see also* Iizuka, [0169]. Next, the call management server completes the connection with IP telephone, fully establishing the SIP session between the mobile terminal and the IP telephone. Iizuka, [0058]. The VoIP call is started after this SIP session has been established. Iizuka, [0158]; *see also* Iizuka, [0169]; Figs. 13-14.

c. Element [1.b]

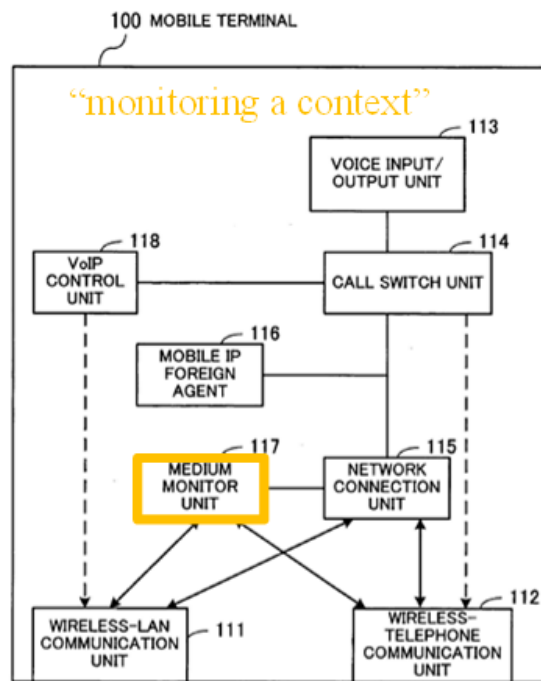
94. **Element [1.b] recites “monitoring a context of the first communication link.”** This element is met by Iizuka.

95. Iizuka discloses monitoring a context of the first communication link (*e.g.*, monitoring the “intensity of a radio wave” transmitted from wireless LAN to mobile terminal 100; and transmitted from IP telephone 21 to mobile terminal 100). *See, e.g.*, Iizuka:

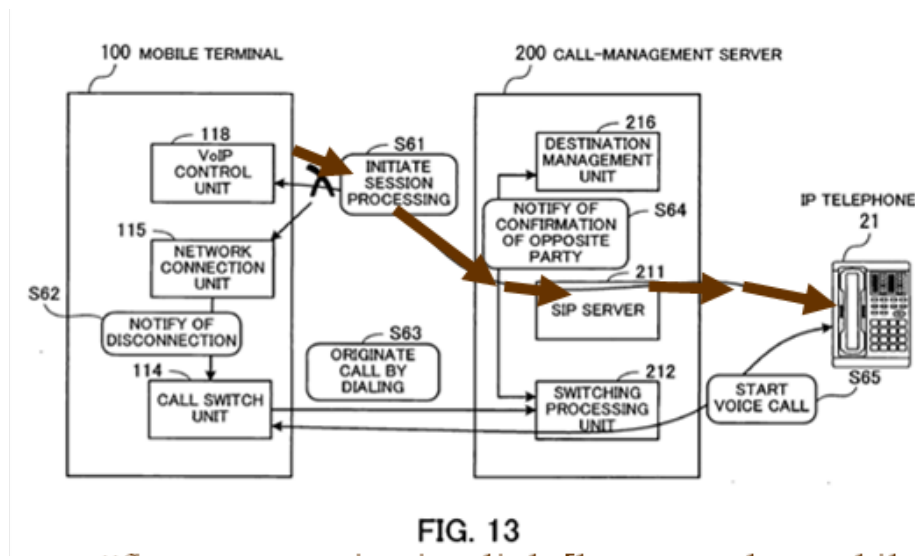
- **Fig. 2:**



- Fig. 4:



- Fig. 13:



“first communication link [between the mobile communication device and an end destination device]”

- [0045] (“The condition of the connection realized by the call-through-LAN unit 1 b (which is used as a reference for determining whether or not the connection is to be switched) can be determined based on, *for example, the intensities of signals received from an access point, to which the LAN is to be connected.* In this case, a threshold value of the intensities of signals can be determined to be the predetermined criterion.”)
- [0078] (“The medium monitor unit 117 monitors the conditions of the network mediums. That is, the medium monitor unit 117 *monitors the conditions of the wireless-LAN communication unit 111 and the wireless-telephone communication unit 112, and passes to the network connection unit 115 information on the conditions of the connections connected to the wireless-LAN communication unit 111 and the wireless-telephone communication unit 112.*”)
- [0105] (“Specifically, the call switch unit 114 outputs to the network connection unit 115 a request for information on a communication medium which is currently usable. Then, *the network connection unit 115 receives from the medium monitor unit 117 information indicating the conditions of communication at the wireless-LAN communication unit 111 and the wireless-telephone communication unit 112. For example, the medium monitor unit 117 passes to the network*

connection unit 115 information indicating the intensity of a radio wave which the wireless-LAN communication unit 111 can receive from the wireless LAN access point 23 and information indicating the intensity of a radio wave which the wireless-telephone communication unit 112 can receive from a base station of the mobile telephone network 10.”)

- [0060] (“A wireless LAN access point 23 is connected to the Internet 11, and performs communication with the mobile terminals 100 and 100 a through the wireless LAN.”)
- [0061] (“The mobile terminals 100 and 100 a each have a function of making a call through the mobile telephone network 10 and a function of making a VoIP call through the Internet 11. When each of the mobile terminals 100 and 100 a makes a call through the Internet 11, the mobile terminal performs wireless communication with the wireless LAN access point 23, and establishes a connection between the mobile terminal and the call-management server 200 through the wireless LAN access point 23.”)
- [0106] (“In the present embodiment, the functions of the wireless-LAN communication unit 111 can be stopped during the absence of communication. In this case, *the medium monitor unit 117 confirms the condition of a connection through the wireless LAN* by activating the wireless-LAN communication unit 111.”)
- [0159] (“[Step S62] Thereafter, when *communication through the wireless LAN becomes impossible (for example, when the condition of the communication deviates from a predetermined criterion)*, the network connection unit 115 notifies the call switch unit 114 of the condition of the communication.”)
- [0170] (“[Step S77] Thereafter, the mobile terminal 100 detects the condition of the radio wave. When the mobile terminal 100 determines that use of the wireless LAN is impossible, the mobile terminal 100 originates a PSTN call to the switching processing unit 212 by dialing.”)

96. Regardless of whether “the first communication link” refers to either of the two recitations of “a first communication link” in [1.a], Iizuka discloses this

limitation as both include at least the link between the mobile communication device and a first network.

97. Iizuka discloses monitoring a context of “a first communication link between the mobile communication device and a first network” (*see* [1.a]). For example, mobile terminal 100 includes a medium monitor unit 117 that “monitors the conditions of the network mediums.” Iizuka, [0078], [0105]. This monitoring process involves detecting the “intensity of a radio wave” received from a wireless access point, including wireless LAN access point 23. Iizuka, [0045], [0105].

98. Intensity of radio waves is a context because it is a measurable quantity of the network conditions. In addition, a measure of the intensity of a radio wave is a measure of signal strength, and at minimum it would have been obvious to measure signal strength as part of “intensity” in determining whether to switch networks. *See* [1.c] (applying Enzmann’s teachings). For example, a person of ordinary skill in the art would have understood that the intensity of a radio wave refers to the amount of power carried by the wave per unit area as it is received, which is correlated to the received signal strength. “Context” as used in the ’154 patent includes signal strength. ’154 claims 43, 26, 27.

99. During the VoIP call (*see* [1.a]), mobile terminal 100 communicates with wireless LAN access point 23 through the wireless LAN, receiving radio waves from wireless access point 23 as part of this communication. Iizuka, [0060]-

[0061], [0159]; *see also* Iizuka, [0170]. The mobile terminal's medium monitor unit measures the signal strength of these radio waves to, for example, determine "when the condition of the communication deviates from a predetermined criterion." Iizuka, [0159]; *see also* Iizuka, [0170].

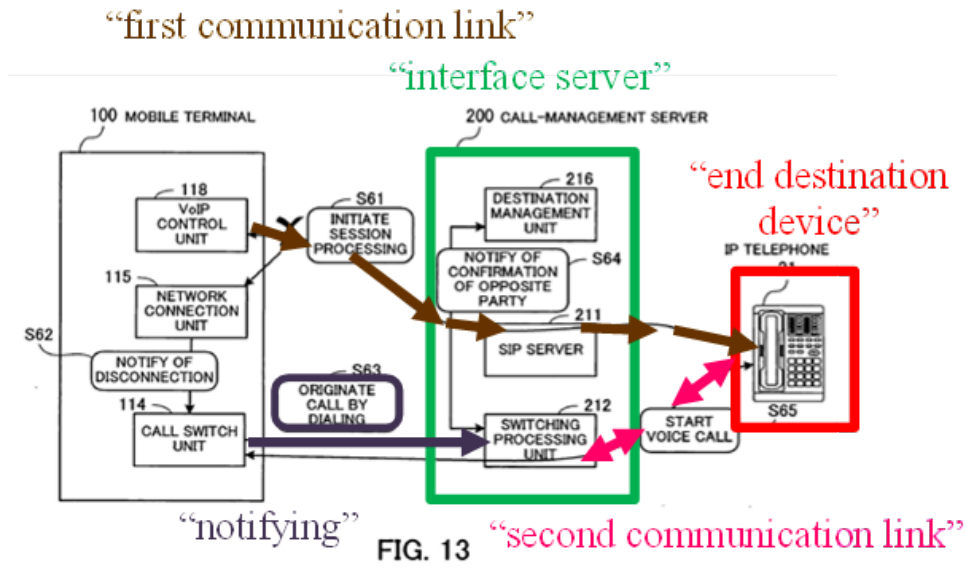
d. Element [1.c]

100. **Element [1.c] recites "when a second context is preferred over the context of the first communication link, notifying an interface server and establishing a second communication link between the interface server and the end destination device without disrupting the first communication link, with a client."** This element is met by Iizuka in view of Enzmann.

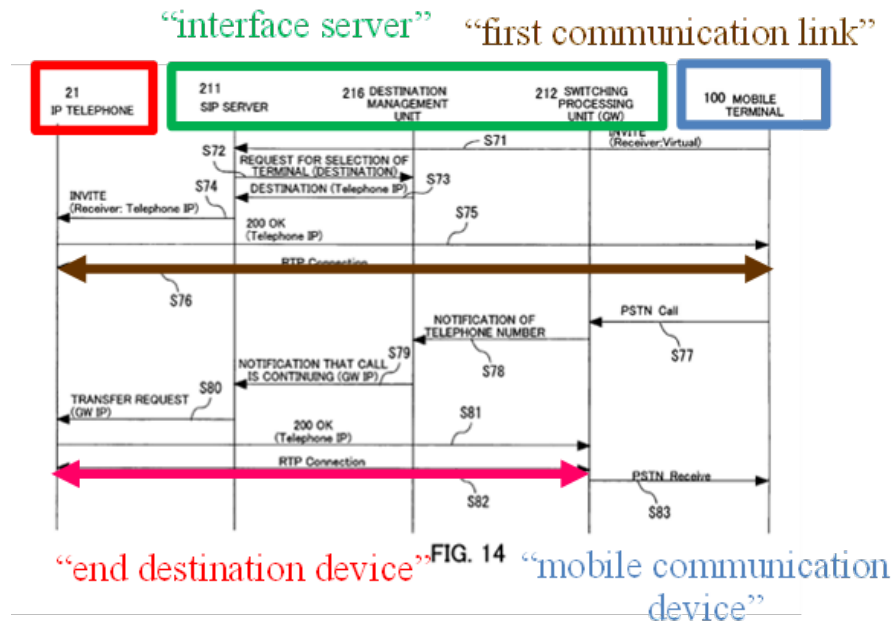
101. Iizuka discloses when the context of the first communication link is not preferred (*e.g.*, when the "intensity of [a] signal[]" received from a wireless access point, including wireless LAN access point 23, (*see* [1.b]), is detected as being below a "predetermined criterion" or "threshold value" such that "communication through the wireless LAN becomes impossible"), notifying an interface server (*e.g.*, "originat[ing] a call to the switching processing unit 212 in the call-management server 200") and establishing a second communication link between the interface server and the end destination device (*e.g.*, establishing a "voice call through the mobile telephone network 10" between call-management server 200 and IP telephone 21) without disrupting the first communication link

(the “VoIP call” (*see* [1.a]) “still continues” while the voice call is being established), with a client (*e.g.*, with a client on the mobile terminal 100). *See, e.g.*, Iizuka:

- **Fig. 13:**



- **Fig. 14:**



"second communication link"

- Fig. 5:

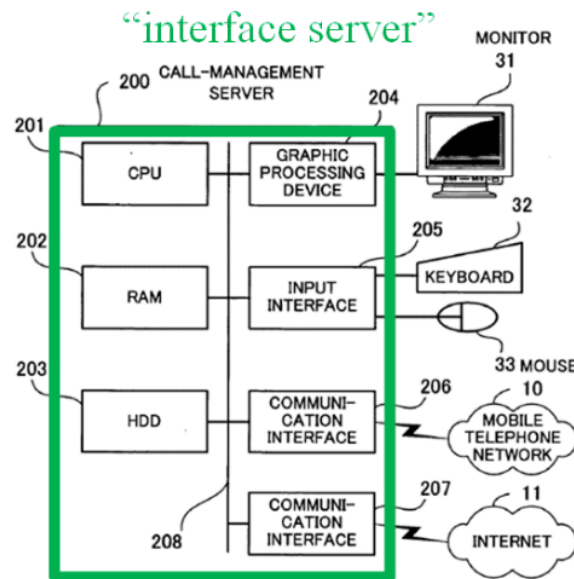


FIG. 5

- [0159] ("[Step S62] Thereafter, *when communication through the wireless LAN becomes impossible (for example, when the condition of*

- the communication deviates from a predetermined criterion), the network connection unit 115 notifies the call switch unit 114 of the condition of the communication.”)*
- [0160] (“[Step S63] *The call switch unit 114 originates a call to the switching processing unit 212 in the call-management server 200 by dialing.*”)
 - [0175] (“[Step S82] *A connection for originated call is established between the IP telephone 21 and the switching processing unit 212.*”)
 - [0146] (“[Step S56] The mobile terminal 100 recognizes the call originated by the switching processing unit 212, and detects the condition of the radio wave in the wireless LAN. At this time, the mobile terminal 100 detects that *the condition of the radio wave is not sufficiently good to perform communication (i.e., connection through the wireless LAN is impossible)*, and transmits a PSTN response (“PSTN receive”) to the switching processing unit 212.”)
 - [0057] (“FIG. 2 is a diagram illustrating an example of a construction of a system of the embodiment of the present invention. In the present embodiment, a mobile telephone network 10 and the Internet 11 containing a wireless LAN are provided as the communication mediums through which calls can be made. *An IP telephone 21 is connected through a call-management server 200 to the mobile telephone network 10 and the Internet 11.* The IP telephone 21 has a function of making a VoIP call.”)
 - [0058] (“*The call-management server 200 is connected to the mobile telephone network 10 and the Internet 11* performs medium conversion between the telephone line and the VoIP, and transfers call data. In addition, the call-management server 200 establishes and switches connections between the IP telephone 21 and the mobile terminals 100 and 100 a.”)
 - [0084] (“The communication interface 206 is connected to the mobile telephone network 10, and exchanges data with the mobile terminals 100 and 100 a through the mobile telephone network 10.”)

- [0085] (“The communication interface 207 is connected to the Internet 11, and exchanges data with the mobile terminals 100 and 100 a through the Internet 11.”)
- [0069] (“FIG. 4 is a block diagram illustrating functions of the mobile terminal 100. **The mobile terminal 100 comprises** a wireless-LAN communication unit 111, a wireless-telephone communication unit 112, a voice input/output unit 113, **a call switch unit 114**, a network connection unit 115, a mobile IP foreign agent (FA) 116, a medium monitor unit 117, and a VoIP control unit 118. These functions are realized by the control circuit 110 controlling the devices around the control circuit 110.”)
- [0073] (“The call switch unit 114 activates the VoIP control unit 118 and performs a telephone dialing operation in response to a request from the user for a call. In addition, when the mobile terminal 100 receives an incoming call, and a communication circuit through an interface network is selected, the call switch unit 114 activates the VoIP control unit 118. Further, **the call switch unit 114 switches calls between the wireless LAN and the wireless telephone network according to the conditions of a connection through the wireless LAN and a connection through the wireless telephone network.** The network connection unit 115 supplies an instruction for the switching operation to the call switch unit 114.”)
- [0170] (“[Step S77] Thereafter, the mobile terminal 100 detects the condition of the radio wave. When the mobile terminal 100 determines that use of the wireless LAN is impossible, the mobile terminal 100 originates a PSTN call to the switching processing unit 212 by dialing.”)
- [0175] (“[Step S82] A connection for originated call is established between the IP telephone 21 and the switching processing unit 212.”); *see also* [0171]-[0174]
- [0198] (“[Step S114] The SIP server 211 outputs to the mobile terminal 100 a request for initiation of a session (INVITE).”)

102. See my discussion of elements [1.a]-[1.b] above (Section IX.A.4.b and IX.A.4.c).

103. Iizuka discloses that the mobile terminal informs an interface server when the context of the first communication link is not preferred (*see* [1.b]), such as when it is detected as being below a threshold. For example, mobile terminal 100 monitors the signal strength of the communication through the wireless LAN (*see* [1.b]) to determine when the communication degrades to the point that it becomes “impossible.” Iizuka, [0159], [0170]. This occurs when the mobile terminal detects that the signal strength has weakened sufficiently, and, thus, “deviates from a predetermined criterion.” Iizuka, [0159]; *see also* Iizuka, [0146], [0170]. When this criterion is detected, the context is no longer preferred and the mobile terminal 100 notifies the call-management server 200 by “originat[ing] a call to the switching processing unit 212 in the call-management server 200 by dialing.” Iizuka, [0159]-[0160]; *see also* Iizuka, [0170]. The call-management server 200 is an interface server at least because it interfaces with both the wireless LAN and the mobile telephone network (*see* [1.pre]). Iizuka, [0057]-[0058].

104. Iizuka discloses that after the context of the first communication link is no longer preferred, establishing a second communication link between the interface server and the end destination device without disrupting the first communication link. For example, after being dialed, the switching processing unit 212 in call-management server 200 establishes a voice call through the mobile telephone network 10 to IP telephone 21. Iizuka, [0160]-[0162], [0170]-[0175].

This voice call is established while the VoIP call (*see* [1.a]) “still continues.”
Iizuka, [0162].

105. As part of this process of establishing a voice call, the method proceeds in stages. A second communication link (an RTP (Real-time Transport Protocol) connection for real-time audio streams) is established between the interface server and the end destination device as depicted by arrow “S82” in Iizuka’s Fig. 14. Iizuka, Fig. 14, [0175]. I discuss the subsequent step that redirects this link to the mobile terminal below in connection with [1.e].

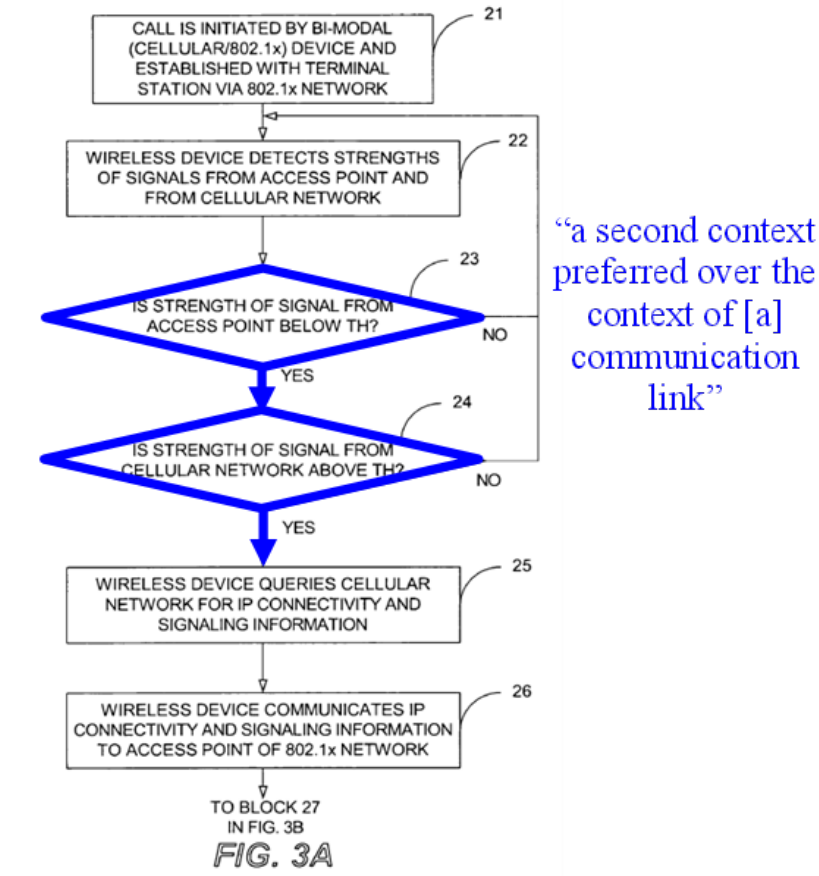
106. A person of ordinary skill in the art would have understood that Iizuka’s mobile terminal is the “client,” and therefore that the above steps are performed with a client. The term “client” in the client-server context applicable to the ’154 at least encompasses a computer, like Iizuka’s mobile terminal, that obtains information from a server. ’154, 6:44-47 (mobile communication device provides client functionality over a network), 6:64-7:2 (same), 15:58-61 (client can be a standalone device like “an access point or a base station”); Ex. 1023 (Dictionary of Computer Science, Engineering, and Technology), 78; Ex. 1024 (Microsoft Computer Dictionary, Fifth Edition), 102; Iizuka, [0198] (describing the mobile terminal getting information from SIP server). Ex. 1023 and Ex. 1024 are well-known and readily accessible technical dictionaries that would have been accessible to a person of ordinary skill in the art.

107. If further disclosure is required of “with a client,” a person of ordinary skill in the art would have also understood that a client (e.g., a SIP client) on Iizuka’s mobile terminal is involved in the notification and establishing the voice call, or at minimum found it obvious to do so. For example, Iizuka’s mobile terminal uses the SIP protocol to communicate with the call-management server that includes a SIP server and the second communication link is established only after the mobile terminal dials (notifies) the call-management server. Iizuka, [0087]-[0088], [0158], [0160]-[0162], [0170]-[0176]. And it was well known to use a SIP client on the mobile terminal for such functionality. For example, Ex. 1015 (U.S. Patent Pub. No. 2004/0009761 (“Money”)) teaches that a “SIP client can be a software application running on [a] mobile station 100.” Ex. 1015 (Money), [0060]; *see also* Ex. 1015 (Money), [0020], [0021] (a “mobile station” “may be a cellular phone, a mobile phone, a personal digital assistant (“PDA”), an Internet equipped computer, or another wireless device”), [0046] (“SIP is an application-layer control protocol for creating, modifying and terminating sessions with one or more participants. Sessions can include, but are not limited to, Internet multimedia conferences, Internet telephone calls, multimedia distribution, TCP/IP sessions or instant messaging sessions.”), [0047].

108. Enzmann discloses when a second context is preferred over the context of the first communication link (e.g., “strength of the signal from the

cellular network [being] at or above a certain threshold level” is preferred over “the strength of the signal from the access point...dropp[ing] below a certain threshold level”). *See, e.g.,* Enzmann:

- **Fig. 3A:**



- **Fig. 6:**

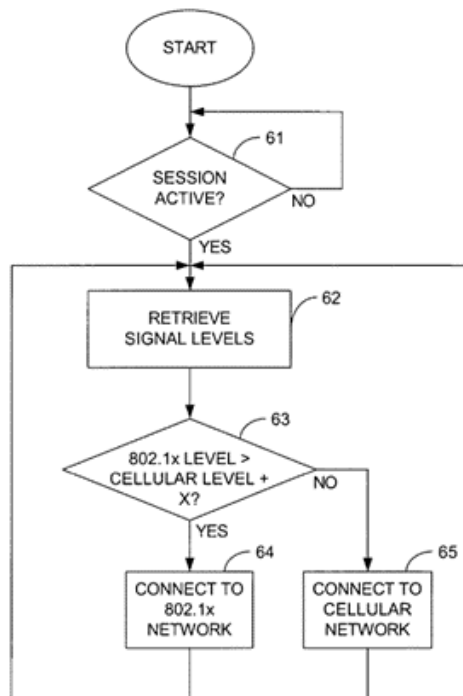


FIG. 6

- [0025] (“FIGS. 3A and 3B illustrate a flow chart of the method of the present invention in accordance with the preferred embodiment for performing a seamless handoff from the 802.1x network 2 to the cellular network 6. The call is initiated by the wireless device 1 and established between the wireless device 1 and the terminating station 3, as indicated by block 21. While the call is being service by the 802.1x network 2, the strengths of the signals from the access point 7 and from the cellular network 6 are detected by the wireless device 1, as indicated by block 22. ***A determination is made as to whether the strength of the signal from the access point 7 has dropped below a certain threshold level, as indicated by decision block 23. If so, a determination is made as to whether the strength of the signal from the cellular network is at or above a certain threshold level, as indicated by decision block 24.*** If the answer to either of these questions is no, the process returns to block 22. The order in which steps 23 and 24 are performed can be reversed.”)
- [0032] (“The server 10 determines whether or not a call session is active, as indicated by block 61. Until a session is active, a handoff cannot occur. Once a determination is made that a session is active, the process proceeds to block 62 and the server 10 retrieves both the cellular and

802.1x signal levels. A determination is then made at block 63 as to whether the 802.1x signal level exceeds the cellular level plus an amount “X”. The value of X can be 0 or any other value, positive or negative. When ***a determination is made at block 63 that the 802.1x signal level exceeds the cellular level plus X, the call control server 10 causes the media gateway 5 to switch the call from connection 53 to connection 52*** unless connection 52 already exists, as indicated by block 64. If connection 52 already exists, no handoff needs to occur, and so connection 52 will continue to be maintained. If connection 52 does not yet exist because the call is currently being handled by the cellular network, connection 52 will be made and connection 53 will be eliminated to free up the resources that were being used for the call over the cellular network.”)

109. Enzmann discloses, in a network roaming procedure that roams between two wireless networks (an 802.1x network and a cellular network), monitoring a context of first communication link (“signal levels” associated with a “call session” that “is active”) and a second context for the second type of network (“cellular ... signal levels”)._Enzmann, [0025]. Specifically, Enzmann discloses monitoring “strength of the signal[s]” from both the 802.1x network and cellular network to decide if handover from the 802.1x network to the cellular network should occur because “the strength of the signal from the access point 7 [of the 802.1x network] has dropped below a certain threshold level” and “the strength of the signal from the cellular network is at or above a certain threshold level.” Enzmann, [0025], [0032].

110. In implementing Enzmann’s teachings in Iizuka’s method, the second communication link would be established only if both the signal strength of the

cellular network is sufficient and the signal strength of the 802.1x network is insufficient, whereby a sufficient cellular signal is preferred over an insufficient 802.1x signal so that the ongoing VoIP call is not dropped.

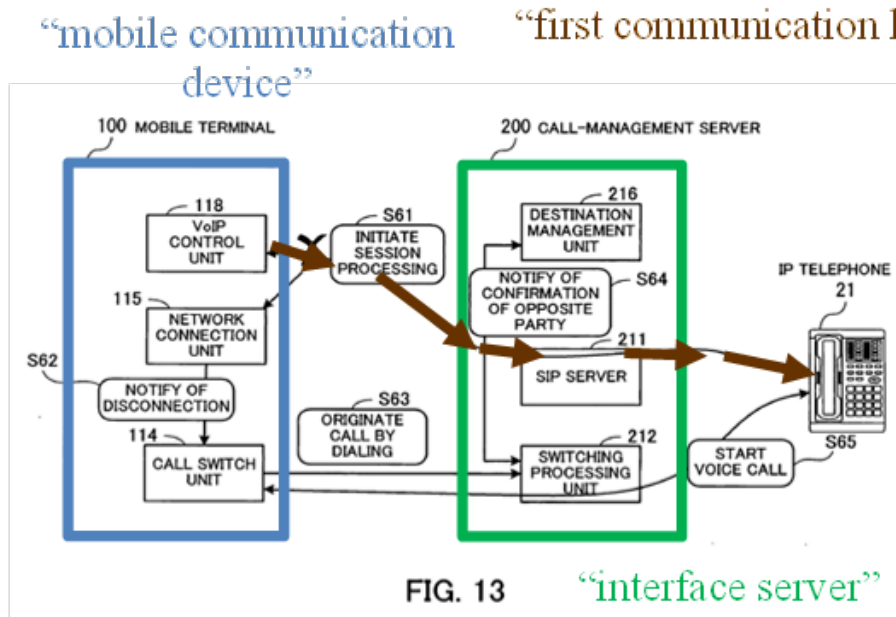
111. As I discuss in Section IX.A.3, a person of ordinary skill in the art would have been motivated to apply Enzmann's teachings of detecting both a context of the wireless network (such as an 802.1x network) and a context of cellular network to Iizuka's roaming method.

e. Element [1.d]

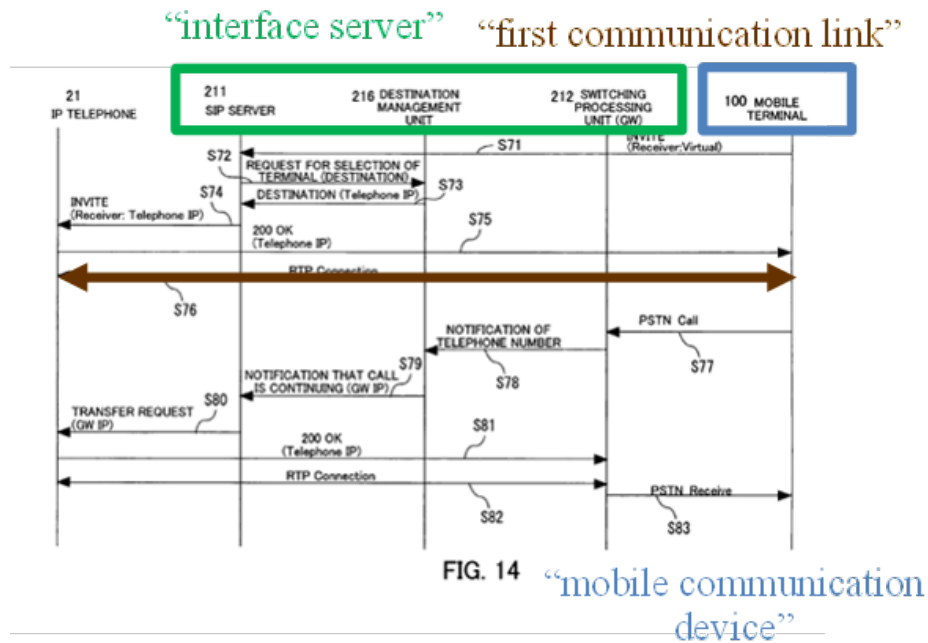
112. **Element [1.d] recites “notifying the mobile communication device to terminate transmission over the first communication link.”** This element is met by Iizuka.

113. Iizuka renders obvious notifying the mobile communication device to terminate transmission over the first communication link (*e.g.*, notifying the mobile terminal to terminate transmission before “SIP server 211” of “call-management server 200” “disconnects the session which has been established through the Internet 11 between the mobile terminal 100 and the call-management server 200”). *See, e.g.*, Iizuka:

- **Fig. 13:**



- Fig. 14:



- [0162] (“[Step S65] The switching processing unit 212 realizes a voice call through the mobile telephone network 10 while the VoIP call which has already been established still continues. Thereafter, *the SIP server 211 disconnects the session which has been established through the*

Internet 11 between the mobile terminal 100 and the call-management server 200.)

- [0158] (“[Step S61] After an SIP session is initiated between the mobile terminal 100 and the IP telephone 21, a VoIP call is started.”)
- [0052] (“Further, when the condition of the connection realized by the call-through-LAN unit 1 b deviates from the predetermined criterion during a call through the call-through-LAN unit 1 b, the call switch unit 1 c establishes a connection through the call-through-telephone-network unit 1 a, and switches from the call through the call-through-LAN unit 1 b to a call through the call-through-telephone-network unit 1 a. That is, the call-through-telephone-network unit 1 a originates a call to the call-management server 2 through the wireless telephone network 4. In response to the origination of the call, the call-through-telephone-network management unit 2 a in the call-management server 2 establishes a connection between the mobile terminal 1 and the telephone equipment 5 through the wireless telephone network 4. ***Then, the call-through-LAN management unit 2 b disconnects a corresponding session which has been established between the mobile terminal 1 and the call-management server 2 through the wireless LAN 3.***”)
- [0176] (“The switching processing unit 212 returns to the mobile terminal 100 a response to the origination of the call by dialing, and establishes a connection through the mobile telephone network 10. Thus, a call between the IP telephone 21 and the mobile terminal 100 becomes possible.”)

114. Iizuka discloses terminating transmission over the first communication link (the VoIP call; *see* [1.a]). For example, Iizuka discloses that SIP server 211, located within call-management server 200, “disconnects the session which has been established through the Internet 11 between the mobile terminal 100 and the call-management server 200.” Iizuka, [0162]; *see also* Iizuka, [0176]. Iizuka further discloses that the mobile terminal is involved in the

termination process: “call-through-LAN management unit 2b [of mobile terminal] disconnects a corresponding session which has been established between” the mobile terminal and call-management server through the wireless LAN. Iizuka, [0052]. The disconnected session formed one leg of the complete SIP session established between the mobile terminal 100 and the IP telephone 21, as part of the VoIP call. Iizuka, [0158]. By disconnecting the session between the mobile terminal 100 and the call- management server 200, the transmission over the VoIP call is terminated.

115. A person of ordinary skill in the art would have understood, or at minimum found obvious, that to disconnect (and thereby terminate transmission over) a SIP session with the mobile terminal, the server notifies the mobile terminal by sending a message a SIP BYE message such that the mobile phone knows to disconnect the session.¹ For example, a person of ordinary skill in the art would understand that a SIP BYE message is a typical message used in SIP

¹ See Preston, [0043] (disclosing that termination of a SIP session involves transmitting a “SIP BYE message” to the phone, and that the phone replies with an “OK” message before the server “officially end[s] the communication”); Inoue, [0103]-[0104], [0119] (disclosing transmitting a “BYE request signal” to “wireless communication terminal (10B)” followed by a response to finish the connection).

protocol to allow a mobile terminal to have a synchronized understanding that communication session termination is imminent. As one example, Preston (U.S. Patent Pub. 2002/0126654) discloses that a server (“server module 38”) “will send a SIP BYE message (step 236) to the SIP proxy server 20,” which will then “forward the BYE message to the SIP telephone (step 238).” Ex 1005 (U.S. Patent Pub. 2002/0126654), [0043]. Then, the “SIP telephone will respond with a 200 OK (step 240) to the SIP proxy server 20, which will forward the 200 OK to the server module 38 to officially end the communication (step 242).” Ex. 1005, [0043]. As another example, Inoue discloses transmitting a “BYE request signal” to “wireless communication terminal (10B)” followed by a response to finish the connection. Inoue, [0103]; *see also* Inoue, [0119] (disclosing “transmi[ting] a BYE signal to the wireless communication terminal (10B),” to “thereby finish connection.”).

116. Therefore, Iizuka renders obvious notifying the mobile terminal to terminate transmission over the first communication link.

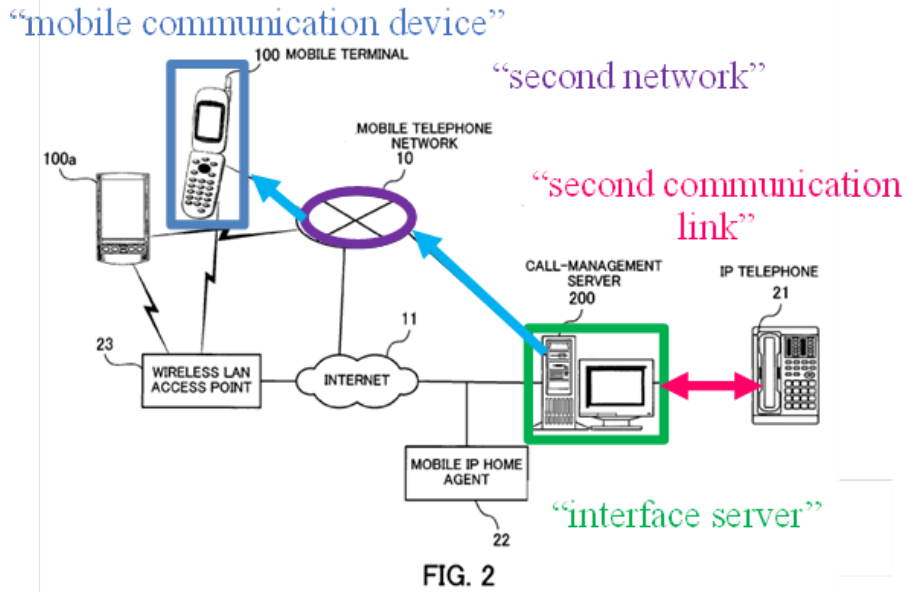
f. Element [1.e]

117. **Element [1.e] recites “re-directing the second communication link from the interface server to the mobile communication device, thereby establishing a second communication link between the mobile communication device and a second network, wherein the second network is within a set of known networks or from a newly discovered network.”** This element is met by

Iizuka.

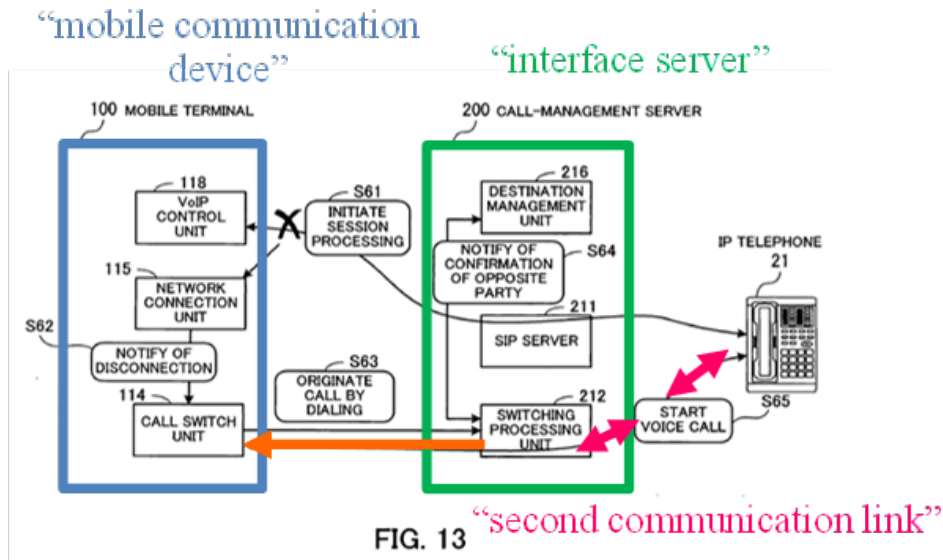
118. Iizuka discloses re-directing the second communication link (*e.g.*, voice call over the RTP connection, *see* [1.c]) from the interface server (*e.g.*, from “call-management server 200”) to the mobile communication device (*e.g.*, to “mobile terminal 100” by providing a response), thereby establishing a second communication link between the mobile communication device and a second type network (*e.g.*, providing the response “establishes a connection” to mobile terminal 100 “through the mobile telephone network 10”), wherein the second network is within a set of known networks or from a newly discovered network (*e.g.*, either the “mobile telephone network” is already known or it is newly detected by the “mobile terminal 100”). *See, e.g.*, Iizuka:

- **Fig. 2:**



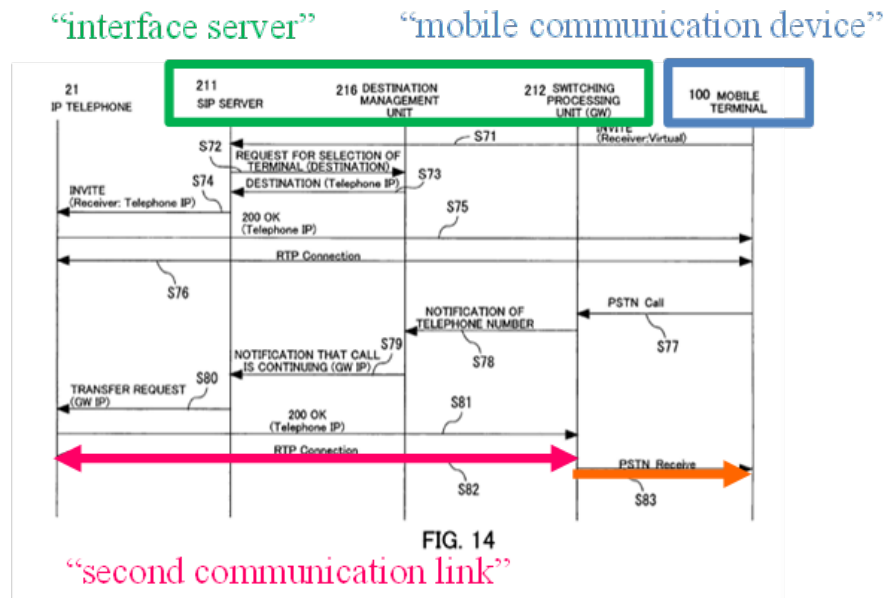
“second communication link between the mobile communication device and a second network”

- Fig. 13:



“re-directing the second communication link from the interface server to the mobile communication device”

• **Fig. 14:**



“re-directing the second communication link from the interface server to the mobile communication device”

- [0160] (“[Step S63] The call switch unit 114 originates a call to the switching processing unit 212 in the call-management server 200 by dialing.”)
- [0176] (“[Step S83] The switching processing unit 212 returns to the mobile terminal 100 a response to the origination of the call by dialing, and *establishes a connection through the mobile telephone network 10. Thus, a call between the IP telephone 21 and the mobile terminal 100 becomes possible.*”)
- [0162] (“[Step S65] The switching processing unit 212 *realizes a voice call through the mobile telephone network 10* while the VoIP call which has already been established still continues. Thereafter, the SIP server 211 disconnects the session which has been established through the Internet 11 between the mobile terminal 100 and the call-management server 200.”)

- [0104] (“The call switch unit 114 acquires from the network connection unit 115 *information on a communication medium which is currently usable.*”)
- [0105] (“Specifically, the call switch unit 114 outputs to the network connection unit 115 a request for *information on a communication medium which is currently usable.* Then, the network connection unit 115 receives from the medium monitor unit 117 information indicating the conditions of communication at the wireless-LAN communication unit 111 and the wireless-telephone communication unit 112. For example, the medium monitor unit 117 passes to the network connection unit 115 information indicating the intensity of a radio wave which the wireless-LAN communication unit 111 can receive from the wireless LAN access point 23 and information indicating the intensity of a radio wave which the wireless-telephone communication unit 112 can receive from a base station of the mobile telephone network 10.”)
- [0107] (“The network connection unit 115 can determine whether or not communication can be realized through each communication medium (i.e., whether or not to be able to secure a condition of communication which can guarantee a predetermined call quality level through each communication medium), based on information on the intensity of a radio wave transmitted through the communication medium from the opposite party at one of the wireless-LAN communication unit 111 and the wireless-telephone communication unit 112 connected to the communication medium. Then, the network connection unit 115 notifies the call switch unit 114 whether or not communication through each communication medium is possible.”)

119. Iizuka discloses re-directing the second communication link from the call-management server 200 to mobile terminal 100. For example, after the second communication link between the call-management server 200 and IP telephone 21 is established by making a voice call to IP telephone 21 over an RTP link (*see* [1.c]), the switching processing unit 212 of the call-management server 200 returns a response to mobile terminal 100. Iizuka, [0176]; *see also* Iizuka, [0162]. This

response “establishes a connection through the mobile telephone network 10” between call-management server 200 and mobile terminal 100. Iizuka, [0176]; *see also* Iizuka, [0162]. Thus, this response, labeled “PSTN Receive” in step S83 in Fig. 14, establishes the second communication link between the call-management server 200 and mobile terminal 100. Iizuka, Fig. 14, [0176]; *see also* Iizuka, [0162]. As illustrated in Figure 2, the “PSTN receive” process passes through mobile telephone network 10, such that a wireless connection for this communication link is established between mobile terminal 100 and mobile telephone network 10. Thereafter, a voice call between the IP telephone 21 and the mobile terminal 100 through mobile telephone network 100 becomes possible. Iizuka, [0176]; *see also* Iizuka, [0162].

120. In Iizuka, the second network is either newly discovered or within a set of known networks—either way the claim is met. The “call switch unit 114,” located within mobile terminal 100, can obtain “information on a communication medium which is currently usable” from the “network connection 115,” also within mobile terminal 100. Iizuka, [0104]. Thus, by identifying the second network as a usable communication medium, Iizuka either discovers a new network or identifies an already known network.

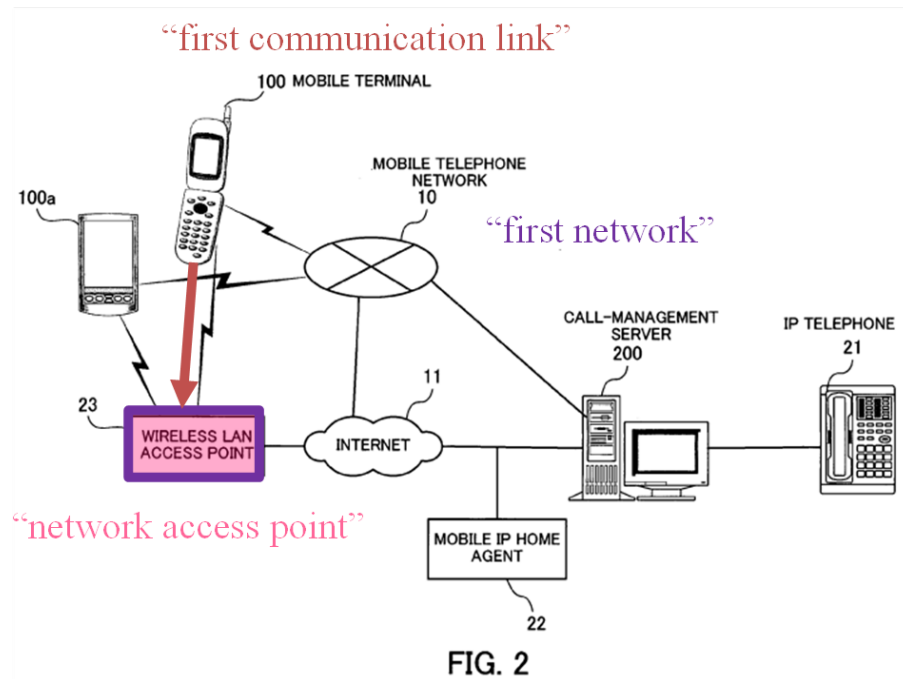
g. Claim 2

121. **Claim 2 recites “The method of claim 1 wherein the first**

communication link comprises a WiFi communication link, and the first network comprises a WiFi network access point.” This element is met by Iizuka in view of Enzmann.

122. See my discussion of the elements of claim 1 above (Section IX.A.4.a-f). Iizuka discloses the first communication link (e.g., “wireless communication” between “mobile terminal [1, 100]” and the “wireless LAN”; see [1.a]) and that the first network (e.g., wireless LAN; see [1.a]) comprises a network access point (e.g., “wireless LAN access point 23”). See, e.g., Iizuka:

- **Fig. 2:**



- [0060] (“A *wireless LAN access point 23* is connected to the Internet 11, and *performs communication with the mobile terminals 100 and 100 a through the wireless LAN.*”)

- [0045] (“The condition of the connection realized by the call-through-LAN unit 1b (which is used as a reference for determining whether or not the connection is to be switched) can be determined based on, for example, the intensities of signals received from *an access point, to which the LAN is to be connected.*”); *see also* [0180]
- [0061] (“*When each of the mobile terminals 100 and 100 a makes a call through the Internet 11, the mobile terminal performs wireless communication with the wireless LAN access point 23, and establishes a connection between the mobile terminal and the call-management server 200 through the wireless LAN access point 23.*”)

123. See my discussion of element [1.a] in Section IX.A.4.b. Iizuka further discloses that the wireless LAN includes a “wireless LAN access point 23.” Iizuka, [0060]. The wireless LAN is connected to the access point. *See* Iizuka, [0045], [0180].

124. Enzmann discloses a WiFi communication link (*e.g.*, a “call ... serviced by the 802.1x network”) and a WiFi network access point (*e.g.*, an “802.1x network access point”).

- [0005] (“An *802.1x network access point* has a limited distance over which it can communicate with a wireless device. When the 802.1x device moves out of range of the access point, the call is dropped. The call may be communicating voice, data, video or audio at the time it is dropped. There may be times when an 802.1x-capable device, such as a PDA, for example, is out of range of a 802.1x access point, but within range of a cellular base station transmitter. However, even though devices exist that have both cellular and 802.1x capabilities, such devices do not have the capability to seamlessly switch from *communicating over an 802.1x network* to communicating over a cellular network, or vice versa.”)
- [0007] (“The present invention provides for seamless call handoff from an 802.1x network to a cellular network. The wireless device of the

present invention has both cellular and 802.1x capability. In order for handoffs to occur automatically and seamlessly, signal strength detection circuitry in the wireless device detects the strength of a cellular signal being transmitted by a cellular network and of an 802.1x signal being transmitted from an access point of an 802.1x network. If ***a call is taking place over the 802.1x network*** and the strength of the 802.1x network signal drops below a particular level while the strength of the cellular signal is above a certain level, the call is handed off from the 802.1x network to the cellular network.”)

- [0017] (“***a call from a wireless device 1 is being serviced by the 802.1x network 2***”)
- [0019] (“The wireless device 1 also has intelligence that enables it to sense the strength of the signal between the wireless device 1 and the ***access point 7 of the 802.1x network 2*** and the strength of the signal between the wireless device 1 and the cellular network 6.”)
- [0004] (“The transmission methods used by 802.1x networks are governed by the applicable IEEE 802.1x standard. The term 802.1x, as that term is used herein, means all of the ***IEEE standards that have the prefix 802.1***, including, but not limited to, 802.11....”)

125. Enzmann discloses “a call from wireless device 1 is ... serviced by [a] 802.1x network” and an “802.1x network access point.” Enzmann, [0017], [0005]; *see also* Enzmann, [0019]. 802.1x is refers to “IEEE standards that have the prefix 802.1, including ... 802.11.” Enzmann, [0004]. Thus, a person of ordinary skill in the art would have understood that an IEEE 802.1x standard includes and at least renders obvious a WiFi standard. For example, Ex. 1022 (U.S. Patent No. 7,664,501) confirms that “the IEEE 802.11 protocol...is known as WiFi.” Ex. 1022 (U.S. Patent No. 7,664,501), 1:54-5. As another example, Ex. 1025 (WiFi Alliance WiFi Overview) similarly confirms that “Wi-Fi networks use radio

technologies called IEEE 802.11b or 802.11a.” Ex. 1024 (WiFi Alliance WiFi Overview, archived at https://web.archive.org/web/20040603035514/http://www.weca.net/OpenSection/why_Wi-Fi.asp?TID=2). The WiFi Alliance (formerly Wireless Ethernet Compatibility Alliance (WECA)) was the well-known organization that owns the Wi-Fi trademark for Wi-Fi interoperability, and their former website weca.net (including the archived page shown in Ex. 1024) would have been readily accessible to a person of ordinary skill in the art.

126. As I explained above in Section IX.A.3, a person of ordinary skill in the art would have been motivated to apply Enzmann’s 802.1x teachings to Iizuka’s roaming method to use the 802.1x standard for carrying out wireless communication over the wireless LAN and wireless LAN access points to form a WiFi communication link and a WiFi network access point for the LAN.

h. Claim 4

127. **Claim 4 recites “The method of claim 1 wherein establishing the first communication link includes routing through a VOIP network.”** This element is met by Iizuka.

128. See my discussion of the elements of claim 1 above (Section IX.A.4.a-f). Iizuka further discloses establishing the first communication link (*e.g.*, establishing the “VoIP call,” *see* [1.a]) includes routing through a VOIP network

(e.g., transmitting “VoIP packets” to “IP addresses of ... mobile terminals” over a “computer network”). *See, e.g.,* Iizuka:

- [0005] (“In recent years, use of *the VoIP (Voice over Internet Protocol) technology for making a voice call through the Internet* or an intranet is widely spreading. *The VoIP technology enables transmission of voice information and voice calls between terminals by use of data communication protocols in computer networks.*”)
- [0079] (“[W]hen the VoIP control unit 118 receives voice data from the call switch unit 114, the VoIP control unit 118 *generates VoIP packets*, and passes the VoIP packets to the wireless-LAN communication unit 111.”)
- [0059] (“A mobile IP home agent 22 is provided on a communication path between the call-management server 200 and the Internet 11. The mobile IP home agent 22 manages the current IP addresses of the mobile terminals 100 and 100 a and the like, and *relays VoIP packets to be transmitted to the mobile terminals* 100 and 100 a. That is, the mobile IP home agent 22 performs conversion into the current IP addresses of the mobile terminals 100 and 100 a, and *transmits the VoIP packets to the mobile terminals 100 and 100 a.*”)

129. Iizuka discloses that the VoIP call uses “VoIP (Voice over Internet Protocol technology” to “transmi[t]” “voice information and voice calls” over “computer networks.” Iizuka, [0005]. This technology involves a mobile terminal engaged in a VoIP call, converting voice data into “VoIP packets,” which are then transmitted over a network to an “IP address[]” of “[a] mobile terminal[],” and receiving VoIP packets at the “IP address[]” of “[a] mobile terminal[],” that have been transmitted to it over the network. Iizuka, [0059]. A person of ordinary skill

in the art would have understood that the procedure of transmitting or receiving VoIP packets to or from IP addresses is routing those packets through the network. For example, a person of ordinary skill in the art would have understood that the VoIP packets are packets of data representative of voice, which are routed according to source and destination addresses (and other information) contained within the packets, which enable the packets to be sent to the correct destination. A person of ordinary skill in the art further would have understood that the network responsible for routing the VoIP packets of a VoIP call is a VoIP network. *See, e.g.,* Ex 1029 (U.S. Patent No. 7,359,979), 4:6-9, Fig. 1 (depicting a “VoIP network” which includes mobile communication devices that “transmit and receive VoIP packets” over the VoIP network.

i. Element [43.pre]

130. **Element [43.pre] recites “A method of providing communications for a communication device that roams between multiple networks, the method comprising.”** This element is met by Iizuka.

131. See my discussion of the element [1.pre] of claim 1 above (Section IX.A.4.a).

j. Element [43.a]

132. **Element [43.a] recites “establishing, with a client, a first communication link between the communication device and an end**

destination device, wherein the first communication link comprises a first communication link between the communication device and a first network.”

This element is met by Iizuka.

133. See my discussion of the element [1.a] of claim 1 above (Section IX.A.4.b). Limitation [43.a] adds that the “establishing” is performed “with a client.”

134. As I discuss for [1.a], Iizuka discloses that to initiate the VoIP call, a Session Initiation Protocol (SIP) session is first established between the mobile terminal and a call-management server. The mobile terminal 100 initiates the VoIP call when the “call switch unit 114 [of mobile terminal 100]” “outputs ... a request for a connection through the wireless LAN” to the call-management server 200. Iizuka, [0109]-[0110]. This request is sent as a SIP message to request the initiation of a SIP session. Iizuka, [0140]; *see also* Iizuka, [0133]. Upon detecting that the mobile terminal intends to initiate a VoIP call, the call-management server 200 initiates a “SIP session ... between the mobile terminal 100 and the IP telephone 21,” and thereafter the “VoIP call is started.” Iizuka, [0158]. The communication link is established when the “wireless-LAN communication unit 111 [of the mobile terminal 100] performs communication with the IP telephone 21.” Iizuka, [0071].

135. Thus, the mobile terminal (i.e., a client, see my discussion of [1.c])

establishes the VoIP call by it initiating it. Additionally, a person of ordinary skill in the art would have understood (or at minimum would have found it obvious) that Iizuka's mobile terminal includes a SIP client (*see* my discussion of [1.c]), which establishes the SIP session discussed above. Iizuka, [0087]-[0088], [0158], [0162]).

k. Element [43.b]

136. **Element [43.b] recites “monitoring, with the client, a first context of a signal of the first communication link, wherein the first context comprises signal strength characteristics.”** This element is met by Iizuka.

137. See my discussion of the element [1.b] of claim 1 above (Section IX.A.4.c). Limitation [43.b] adds that the “monitoring” is performed “with the client” and that the “first context” includes “signal strength characteristics.”

138. Iizuka teaches that the “monitoring” is performed “with the client.” As I discuss above for [1.b], Iizuka discloses that the mobile terminal (i.e., a client, *see* [1.c]) monitors a context. Additionally, as I discuss for [1.c]/[43.a], a person of ordinary skill in the art would have understood (or at minimum would have found it obvious) that Iizuka's mobile terminal is or includes a SIP client, and the network condition information is “passe[d] to the network connection unit 115” of the mobile terminal where it would be available to the SIP client. Iizuka, [0078]; *see also*, Iizuka, [0105].

139. Iizuka further discloses the first context comprises signal strength characteristics. As I discuss for [1.b], the mobile terminal's monitoring process involves detecting the "intensity of a radio wave" received from a wireless access point. Iizuka, [0045], [0105]. A measure of the intensity of a radio wave is a measure of signal strength, and at minimum it would have been obvious to measure signal strength as part of "intensity" in determining whether to switch networks.

I. Element [43.c]

140. **Element [43.c] recites "when a second network is detected as available and a second context of a second communication link corresponding to the second network is preferable, notifying an interface server and establishing a second communication link between the interface server and the end destination device without disrupting the first communication link, with the client."** This element is met by Iizuka in view of Enzmann.

141. See my discussion of the element [1.c] of claim 1 above (Section IX.A.4.d). Limitation [43.c] adds detecting "when a second network is detected as available" and that the second context is for "a second communication link corresponding to the second network."

142. Iizuka discloses detecting when the second network is available. The mobile terminal can determine "whether or not communication can be realized

through each [network],” which is based on the detected “intensity of a radio wave” (*see* [1.c]). Iizuka, [0107]; *see also* Iizuka, [0104]. A communication can be realized only when “the conditions of communication” would “guarantee a predetermined call quality level through” that network. Iizuka, [0107]. To guarantee a specific call quality level, the network must be able to meet certain conditions, which include, *inter alia*, parameters such as signal strength (and possible other conditions, such as bandwidth, and latency). If network does not meet certain conditions, then it effectively is unavailable to support communication through it. Thus, a person of ordinary skill in the art would have understood (or at minimum would have found it obvious) that Iizuka’s mobile terminal does not initiate the voice call to re-direct the ongoing VoIP call through the mobile telephone network (the second network) unless it first detects that communication over the mobile telephone network is possible, which is a determination that the mobile network is available.

143. Enzmann discloses that the second context for the communication link corresponds to the second network. As I discuss for [1.c], Enzmann teaches monitoring a second context for the signal for the second type of network (i.e., the cellular network).

m. Element [43.d]

144. **Element [43.d] recites “notifying the communication device to**

terminate transmission over the first communication link.” This element is met by Iizuka in view of Enzmann.

145. See my discussion of the element [1.d] of claim 1 above (Section IX.A.4.e).

n. Element [43.e]

146. **Element [43.e] recites “re-directing, with the client, the second communication link from the interface server to the communication device, thereby establishing a second communication link between the communication device and the second network, wherein the second network is within a set of known networks or from a newly discovered network.”** This element is met by Iizuka in view of Enzmann.

147. See my discussion of the element [1.e] of claim 1 above (Section IX.A.4.f). Limitation [43.e] adds that the re-directing is “with the client.”

148. Iizuka discloses that re-directing the second communication link from the call-management server 200 to mobile terminal 100 involves the mobile terminal. For example, the mobile terminal initiates the switching process by dialing the call-management server (*see* [1.c], [43.c]), and receives a response from the switching processing unit 212 of the call-management server 200 after it has established the communication link between the call-management server 200 and IP telephone 21. Iizuka, [0176]. As I discuss for [1.d], this response establishes the

second communication link between the call-management server 200 and mobile terminal 100 (i.e., redirects the communication link from the call-management server 200 to the mobile terminal 100).

149. Therefore, Iizuka discloses that the re-directing step involves the mobile terminal (i.e., a client, see my discussion of [1.c]). Additionally, as I discuss for [1.c]/[43.a], a person of ordinary skill in the art would have understood (or at minimum would have found it obvious) that Iizuka's mobile terminal includes a SIP client.

o. Claim 45

150. **Claim 45 recites “The method of claim 43 wherein the interface server is coupled to a gateway device.”** This element is met by Iizuka.

151. See my discussion of the elements of claim 43 above (Section IX.A.4.i-n). Iizuka discloses an interface server (e.g., a “call-management server 200,” see [43.c]) is coupled to (e.g., receives signals from) a gateway device (e.g., a “medium conversion unit 213”). See, e.g., Iizuka:

- **Fig. 6:**

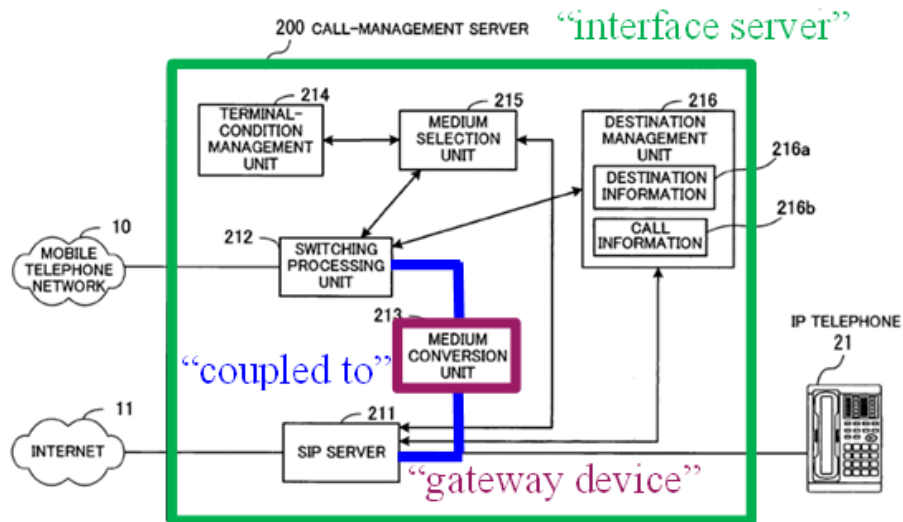


FIG. 6

- [0058] (“The call-management server 200 is connected to the mobile telephone network 10 and the Internet 11 *performs medium conversion between the telephone line and the VoIP*, and transfers call data.”)
- [0087] (“FIG. 6 is a block diagram illustrating the functions of the call-management server 200. *The call-management server 200 comprises* an SIP server 211, a switching processing unit 212, *a medium conversion unit 213*, a terminal-condition management unit 214, a medium selection unit 215, and a destination management unit 216.”)
- [0090] (“The *medium conversion unit 213 performs medium conversion (i.e., conversion of data formats) between the VoIP data format and the data format of information transmitted through the mobile telephone network 10.*”)
- [0089] (“The switching processing unit 212 performs communication with the mobile terminals 100 and 100 a through the mobile telephone network 10.”)
- [0014] (“dynamically *switching between the plurality of communication mediums during a call*”)
- [0178] (“FIG. 15 is a diagram illustrating processing for *switching (roaming) from a voice call through the mobile telephone network to a*

VoIP call. The processing illustrated in FIG. 15 is explained below step by step.”)

152. Iizuka discloses “medium conversion unit 213,” which performs “conversion of data formats.” Iizuka, [0058], [0090]. Specifically, it “convert[s] ... between the VoIP data format and the data format of information transmitted through the mobile telephone network 10.” Iizuka, [0058]. A person of ordinary skill in the art would have understood that “medium conversion unit 213” of call-management server 200 is a gateway device for at least the reason that it has the functionality of converting information from a communication protocol used by the wireless LAN network to a communication protocol used by the mobile telephone network. For example, the Fifth Edition of Microsoft Computer Dictionary (Ex. 1024) states that a gateway is any “device that connects networks using different communications protocols so that information can be passed from one to the other. A gateway both transfers information and converts it to a form compatible with the protocols used by the receiving network.” Ex. 1024, 232.

153. Iizuka discloses that “medium conversion unit 213” is coupled to “call-management server 200” because the conversion unit is internal to the call-management server and receives signals from subcomponents of the call-management server. Iizuka, [0087] (“The call-management server 200 comprises an SIP server 211, a switching processing unit 212, a medium conversion unit 213,

a terminal-condition management unit 214, a medium selection unit 215, and a destination management unit 216.”), Fig. 6. For example, “medium conversion unit 213” receives signals from switching processing unit 212, a subcomponent of call-management server. Iizuka, [0089], [0090], [0178]; *see also* Iizuka, Fig. 6 (depicting the coupling). That is, after “medium conversion unit 213” performs medium conversion, the converted data format is sent to “switching processing unit 212” that “performs communication with the mobile terminals 100 and 100a” by transmitting the converted data format to the mobile terminals. Iizuka, [0089]-[0090].

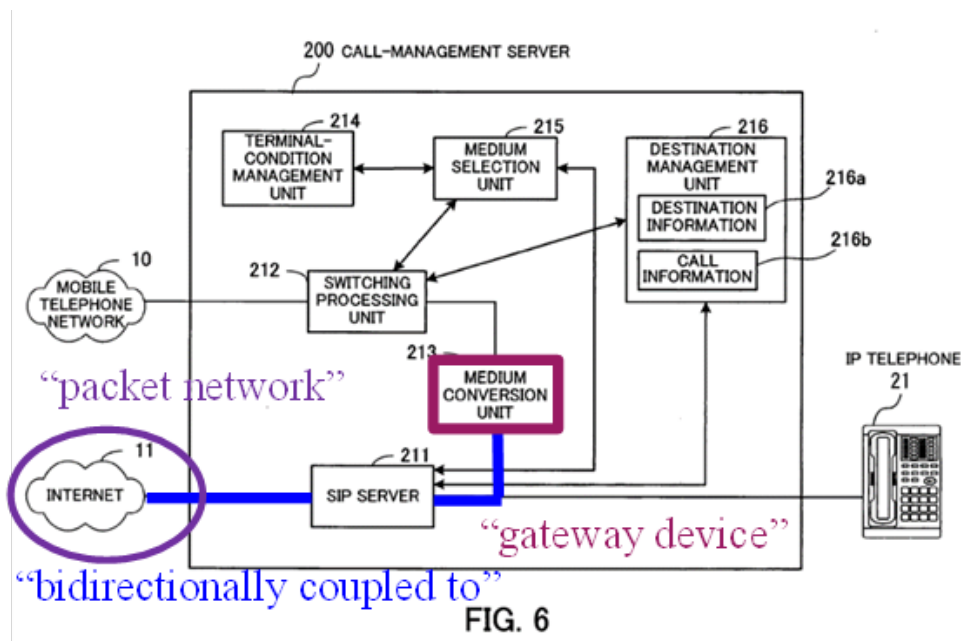
154. In addition, to the extent it is argued that the gateway must be a separate device, Iizuka teaches distributing the functions of the call-management server (e.g., the conversion function) to another server, instead of having all of the functions in the same server (Iizuka, [0100]), and therefore it would have been obvious to include the gateway functionality as a separate component external to and coupled to the interface server, for example for improved compatibility and scalability of the gateway. *See* Iizuka, [0100] (“Alternatively, it is possible to distribute the functions of the call-management server 200 over a plurality of servers so that the distributed functions cooperate with each other, *instead of arranging the functions in the single call-management server 200.*”).

p. **Claim 46**

155. Claim 46 recites “The method of claim 45 wherein the gateway device is bi-directionally coupled to a packet network.” This element is met by Iizuka.

156. See my discussion of claim 45 above (Section IX.A.4.o). Iizuka discloses the gateway device (e.g., the “medium conversion unit 213,” see [45]) is bi-directionally coupled to (e.g., receives signals from and transmitting signals to) a packet network (e.g., “Internet 11,” which the VoIP call is made through). See, e.g., Iizuka:

- **Fig. 6:**



- [0061] (“The mobile terminals 100 and 100 a each have a function of making a call through the mobile telephone network 10 and a function of making a VoIP call through the Internet 11.”)

- [0059] (“A mobile IP home agent 22 is provided on a communication path between the call-management server 200 and the Internet 11. The mobile IP home agent 22 manages the current IP addresses of the mobile terminals 100 and 100 a and the like, and relays *VoIP packets to be transmitted to the mobile terminals 100 and 100 a.*”); *see also* [0079]
- [0090] (“The *medium conversion unit 213 performs medium conversion (i.e., conversion of data formats) between the VoIP data format and the data format of information transmitted through the mobile telephone network 10.*”)

157. Iizuka discloses that the VoIP call that uses the gateway (as I discuss above for claim 45) “is made through the Internet 11.” Iizuka, [0061]. Internet 11 is a packet network because it is a network that transmits VoIP packets to facilitate a VoIP call. Iizuka, [0059], [0079], [0013]. That the Internet is a packet network is confirmed, for example, by U.S. Patent Pub. 2005/0190747, which discloses that “calls placed using VOIP would be routed to a remote VOIP gateway *or telephone over a packet network, such as Internet 38.*” Ex 1026 (U.S. Patent Pub. 2005/0190747).

158. A person of ordinary skill in the art would have understood that the gateway’s coupling to the Internet (packet network) is bidirectional. For example, Iizuka discloses the “medium conversion unit 213” (gateway device, *see* [45]) performs conversion of data formats between the VoIP format and the data format of information transmitted through the mobile telephone network. Iizuka, [0090]. Moreover, a person having ordinary skill in the art would have understood that

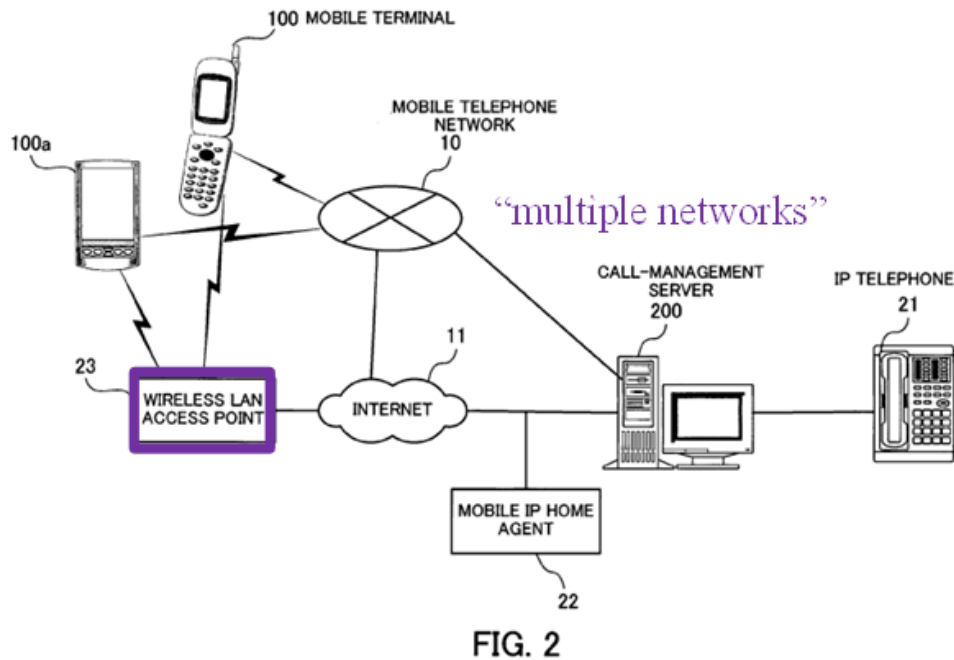
VoIP calls are bidirectional because a mobile terminal both receives voice data and transmits voice data, and, therefore, “medium conversion unit 213” converts information in both directions—and at minimum it would have been obvious to do so to accommodate both directions. Accordingly, the unit’s coupling to the Internet is likewise bidirectional.

q. Claim 47

159. **Claim 47 recites “The method of claim 46 wherein the packet network comprises packet switched telephone network.”** This element is met by Iizuka.

160. See my discussion of claim 46 above (Section IX.A.4.p). Iizuka discloses the packet network comprises [a] packet switched telephone network (*e.g.*, “Internet 11” connected to the “wireless LAN” for handling VoIP calls from mobile terminals, with VoIP call switching facilitated by the call management server 200). *See, e.g.*, Iizuka:

- **Fig. 2:**



- [0061] (“*The mobile terminals 100 and 100 a each have a function of making a call through the mobile telephone network 10 and a function of making a VoIP call through the Internet 11.* When each of the mobile terminals 100 and 100 a makes a call through the Internet 11, the mobile terminal performs wireless communication with the wireless LAN access point 23, and establishes a connection between the mobile terminal and the call-management server 200 through the wireless LAN access point 23.”)
- [0060] (“*A wireless LAN access point 23 is connected to the Internet 11, and performs communication with the mobile terminals 100 and 100 a through the wireless LAN.*”)

161. Iizuka discloses that a VoIP call is made “through Internet 11.”

Iizuka, [0061]. “Internet 11” is connected to the wireless LAN, which connects to mobile terminals. Iizuka, [0060]-[0061]. Moreover, Iizuka’s call-management server 200 facilitates the switching of the VoIP call from the wireless LAN to the mobile telephone network. See Iizuka, [0157]-[0162], [0163]-[0177]. A person of

ordinary skill in the art would have understood that “Internet 11” coupled to “wireless LAN” is a packet switched telephone network because it is a packet network (*see* [46]) that routes VoIP calls to the mobile terminals (*see* [43.pre], [43.e]), and it is connected to call-management server 200 that facilitates the switching of the VoIP call to a second type of wireless network (*see* [1.e]).

B. GROUND 2: Iizuka in View of Enzmann and Inoue (Claims 1, 2, 4, 43, and 45-47)

162. To the extent it is argued that further disclosure is required of performing various claimed functions “with [a/the] client” (*see* [43.c], [43.b], [1.c]/[43.c], [43.d]) and notifying the communication device to terminate transmission over the first communication link ([1.d]/[43.d]), Iizuka in view of Inoue renders obvious these limitations, as I discuss below.

163. For example, Inoue (Ex. 1012, U.S. Patent Pub. 2007/0146475) discloses transmitting a “BYE request signal” to “wireless communication terminal (10B).” Inoue, [0103] (“a BYE request signal is transmitted ... to the wireless communication terminal (10B)”); *see also* Inoue [0108] (“transmit[ing] a BYE request signal to the wireless communication terminal (10)”). “[W]ireless communication terminal (10B)” then “issues a response of success...to the request” (i.e., an “OK”) “thereby finish[ing] [the] connection.” Inoue, [0103]-[0104], [0119] (“transmit[ing] a BYE signal to the wireless communication

terminal (10B) to thereby finish connection”). Thus, Inoue discloses that terminating a transmission includes the step of notifying the mobile device in the form of transmitting to it a BYE message.

164. Inoue further discloses a wireless communication terminal includes a “SIP client.” Inoue, [0035]. The “SIP client” is used to manage communication links at least because it transmits “switch instruction[s]” to other entities to connect or disconnect to a wireless network. Inoue, [0050], [0057], [0080], [0082]. The “SIP client” is involved in monitoring the signal strength of a communication link because the client sends “a switch instruction” when a signal strength is measured below a threshold value. Inoue, [0048], [0049], [0050], [0051], [0054].

165. Like Iizuka and Enzmann, Inoue is analogous art in the same field as the ’154 patent, which includes wireless communications, and reasonably pertinent to alleged problems addressed by the ’154 patent of allowing a mobile communication devices to seamless and uninterrupted handover of communications between networks. ’154, 1:43-54; Inoue, [0004]. For example, Inoue discloses a method of transmitting communication from and to mobile communication devices that are capable of communicating through multiple wireless networks. Inoue, Abstract, [0010], [0011].

166. In my opinion, a person of ordinary skill in the art would have been motivated to apply Inoue’s teachings of transmitting to a mobile terminal a SIP

BYE message before terminating a communication link to Iizuka's roaming method (as modified by Enzmann) to advantageously inform a mobile communication device that it should cease transmitting over the first communication link because the link is being terminated. Iizuka's call-management server 200 includes a SIP server 211, which manages VoIP communications. Iizuka, [0087]-[0088], [0093]. Iizuka aims to "smoothly" switch an ongoing VoIP call between a mobile terminal and an IP telephone to a voice call, seeking to "prevent [any] interruption[s] of communication with the mobile terminal," and further teaches "disconnect[ing] the [SIP] session which has been established through the Internet 11 between the mobile terminal 100 and the call-management server 200," but does not provide all of the details regarding the mechanism for terminating the SIP session. Iizuka, [0010], [0033], [0093], [0099], [0162]. A person of ordinary skill in the art would have looked to a reference like Inoue, which teaches relaying signals between network entities using a SIP protocol and using a SIP BYE message (*see, e.g.*, Inoue, [0087], [0103], [00920]), in connection with terminating Iizuka's VoIP call that uses a SIP session managed by a SIP server, in order to disconnect the session as taught by Iizuka. A person of ordinary skill in the art would have understood that explicitly signaling to the mobile terminal to cease communication over that link would have advantageously followed the SIP protocol. The explicit signaling using a SIP BYE message

informs the mobile termination that a communication link is about to be terminated and that the terminal could stop transmitting data over the communication link.

Without such signaling, the mobile terminal may continue sending data on a communication link, resulting in inefficient resource utilization. Explicit signaling would prevent the mobile terminal from erroneously sending signals that would otherwise have been lost, and thus realizing Iizuka's overall goal of having a "smooth" roaming procedure without any interruptions.

167. A person of ordinary skill in the art further would have been motivated to apply Inoue's teachings of a SIP client running on a mobile communication device to Iizuka's mobile terminal (as modified by Enzmann) such that the SIP client is involved in the various steps discussed for Ground 1 (*see* [43.c], [43.b], [1.c]/[43.c], [43.d]) because a SIP client would have facilitated Iizuka's disclosed use of the SIP protocol. Because Iizuka already discloses mobile communication devices using the SIP protocol to communicate messages with a SIP server—*see, e.g.,* Iizuka, [0088] ("The SIP server 211 manages communication through the Internet 11 using the SIP (Session Initiation Protocol), which is a communication protocol for setting, releasing, and controlling sessions, where each of the sessions is formed with a series of VoIP messages.")—the incorporation of SIP client functionality in the mobile device would have been a straightforward modification of Iizuka. Iizuka, [0124] ("A connection for a call is

established between the IP telephone 21 and the mobile terminal 100 by the SIP session[.]”), [0126], [0127] (“The VoIP control unit 118 outputs to the SIP server 211 a request for initiation of a session (INVITE).”), [0164] (“The mobile terminal 100 outputs to the SIP server 211 a request for initiation of a session (INVITE). In the request, the virtual ID of the IP telephone 21 is designated as the destination.”), Figs. 13-14.

168. In view of what I discuss above, a person of ordinary skill in the art would have had a reasonable expectation of success in applying Inoue’s teachings to Iizuka’s method and mobile terminal (as modified by Enzmann), and a person of ordinary skill in the art would have known such a combination would predictably work and provide the expected functionality.

C. GROUNDS 3-4: Iizuka in View of Enzmann and Sundar, and Iizuka in View of Enzmann, Inoue, and Sundar (Claims 45-47)

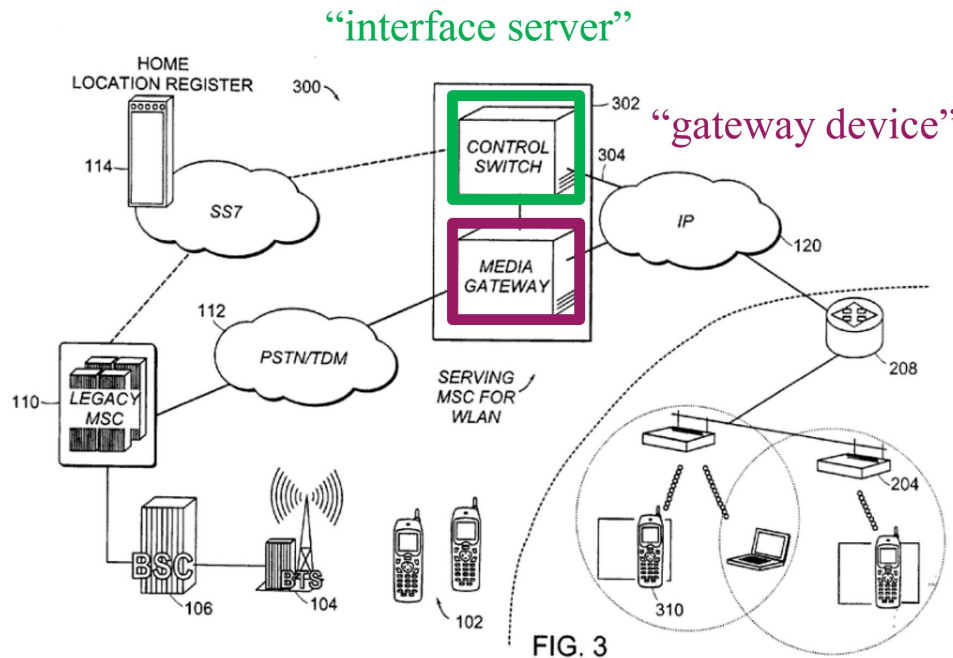
169. To the extent it is argued that further disclosure is required of claims 45 (“The method of claim 43 wherein the interface server is coupled to a gateway device”), 46 (“The method of claim 45 wherein the gateway device is bi-directionally coupled to a packet network”), and/or 47 (“The method of claim 46 wherein the packet network comprises packet switched telephone network”), Iizuka in view of Sundar renders obvious these limitations, as I discuss below.

170. Sundar (Ex. 1013, U.S. Patent Pub. No. 2003/0134638), titled

“Method, system and apparatus for providing mobility management of a mobile station in WLAN and WWAN environment,” is directed to a WLAN to WWAN handover (and vice versa) of a voice call. *See, e.g.*, Sundar, [0036], [0055] (“Voice traffic along with the associated signaling and control messages to and from the WLAN are carried on the set of IP links 304[.]”) [0075], [0081]. Specifically, Sundar discloses the limitations of claims 45-47, which require that “the interface server is coupled to a gateway device” (claim 45), “the gateway device is bi-directionally coupled to a packet network (claim 46), and “the packet network comprises packet switched telephone network (claim 47).

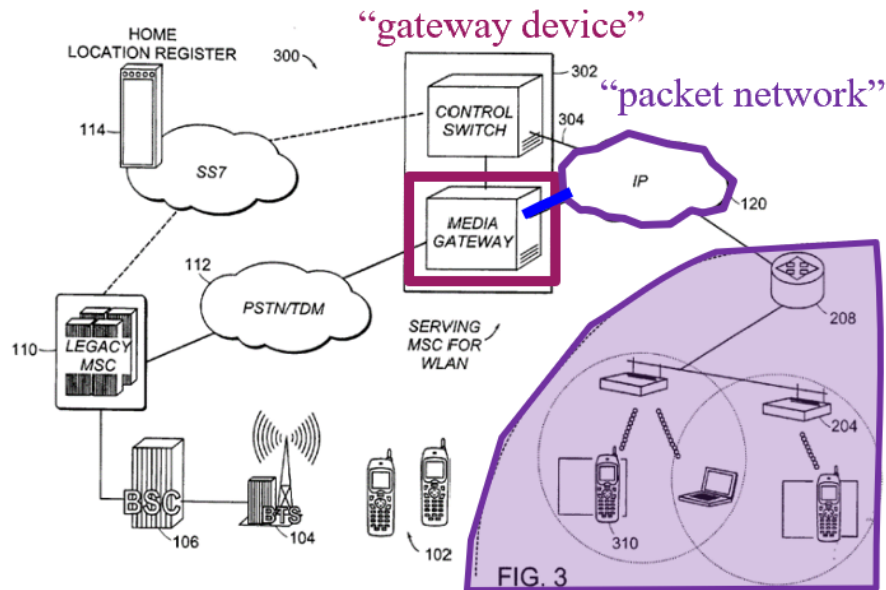
171. With respect to claim 45, Sundar discloses a “Media Gateway” (i.e., a gateway device) coupled to a control switch (i.e., an interface server), as shown below in Figure 3. (Sundar’s Fig. 3 depicts “an exemplary embodiment of the present invention,” which includes “WWAN components ... like those described above in conjunction with FIG. 1.” Sundar, [0055]. Sundar’s Fig. 1 “shows an exemplary wireless wide area network (WWAN) 100” that includes “MSC 115,” which includes a “media gateway 119.” Sundar, [0010], Fig. 1.). The control switch is an interface server because it interfaces with and handles control signals for two types of networks, in this case the wide area network (WWAN) and an IP network 120 connected to a wireless local area network (WLAN). Sundar, [0076], [0055], [0010]. The Media Gateway and control switch are collectively a type of

MSC that combines a legacy mobile switching center (MSC) with a “Media Gateway” such that it supports roaming between a WLAN and a WWAN. Sundar, [0003], [0076], Fig. 3.



172. With respect to claim 46, Sundar discloses that “Media Gateway” is bidirectionally coupled to “IP network 120,” which is connected to “WLAN 200.” Sundar, [0076], [0010], Figs. 2-3. An IP network is a packet network because voice traffic is carried over the IP network in packets. Sundar, [0093] (“In an exemplary embodiment of the present invention the voice traffic may be carried as EVRC on RTP/UDP/*IP packets* between the mobile station 310 and the Serving MSC 302.”). For example, U.S. Patent No. 6,300, 887 confirms that an “IP network” [is] provided as an example of a packet network.” Ex. 1027 (U.S. Patent

No. 6,300,887), 1:20-21. In my opinion, a person of ordinary skill in the art would have understood that that the coupling to the IP network is bi-directional such that “Media Gateway” transmits packets to and receives packets from the network, for example while carrying a voice call in both directions between the parties. Sundar, [0093], [0056]. For example, the Ex. 1027 confirms that “packets [are] transmitted and received from [an] IP network.” Ex. 1027 (U.S. Patent No. 6,300,887), 17:61-62.



“bidirectionally coupled to”

173. With respect to claim 47, a person of ordinary skill in the art would have understood that WLAN 200 that is connected to IP network 120, and which connects to an interface server (“control switch”) that facilitates the switching of a voice call (*see* [1.e]), is a packet switched telephone network. The network is a packet switched telephone network because it is used to carry voice packets (as I

discussed above), it routes phone calls to mobile terminals, for example the mobile handsets/phones 310, and it is connected to an interface server that facilitates the switching of the voice calls. Sundar, [0057]; *see also* Sundar, [0075].

174. Like Iizuka, Enzmann and Inoue, Sundar is analogous art in the same field as the '154 patent, which includes wireless communications, and reasonably pertinent to alleged problems addressed by the '154 patent of allowing mobile communication devices to communicate over multiple networks. '154, 1:43-54; Sundar, [0003], [0021], [0024], [0075]-[0076]. For example, Sundar discloses a mobile communication device that is capable of communicating through multiple wireless networks (by “internetworking between wireless local area networks and wide area mobile wireless networks”) and of seamlessly switching from communication over a first network to communicating over a second network. Sundar, [0003], [0021], [0023], [0076].

175. In my opinion, a person of ordinary skill in the art would have been motivated to apply Sundar’s teachings of a standalone gateway coupled to an interface server and bidirectionally coupled to a packet network (specifically, a packet switched telephone network) to Iizuka (as modified by Enzmann and optionally Inoue) to advantageously allow Iizuka’s roaming method to achieve interoperable capability with existing, legacy network infrastructures and to increase scalability. *First*, Iizuka expressly teaches distributing the functions of its

call-management server (e.g., the conversion function) to another device. *See* Iizuka, [0100] (“Alternatively, it is possible to ***distribute the functions of the call-management server 200 over a plurality of servers*** so that the distributed functions cooperate with each other, instead of arranging the functions in the single call-management server 200.”). And Sundar teaches one such implementation with a standalone gateway that would be used instead of Iizuka’s media conversion unit, which is internal to the call-management server 200 (interface server). A person of ordinary skill in the art would have turned to a reference like Sundar that teaches that a gateway device can be a standalone device. *Second*, a person of ordinary skill in the art would have recognized that using a standalone gateway would have more easily supported legacy infrastructure, such as legacy gateway devices. For example, legacy infrastructures were often implemented using external gateways. *Third*, a person of ordinary skill in the art would have recognized that a standalone gateway is more easily scalable. For example, an existing network could be modified to handle increased VoIP traffic by deploying additional gateways within the network infrastructure or by upgrading an existing gateway. A person having ordinary skill in the art would understand that expanding legacy infrastructure in this way was particularly important in the relevant time frame due to the rapid increase in VoIP traffic. For example, Ex. 1028 (U.S. Patent No. 7,751,316) states that “VOIP phone services have been

rapidly increasing in popularity.” Ex 1028 (U.S. Patent No. 7,751,316), 1:20-25 (“Because VOIP make it possible to have voice conversations over IP networks, VOIP allows for a cost effective alternative to the traditional public switched telephone networks (PSTNs). Because of its relatively lower costs and ease of use, ***VOIP phone services have been rapidly increasing in popularity.***”).

176. When Sundar’s teachings are applied to Iizuka, the standalone gateway would be coupled to at least Iizuka’s call-management server 200 (the interface server), IP network with WLAN connection to mobile terminals (the packet switched telephone network), and mobile telephone network, as taught by Sundar, such that the gateway provides conversion functionality, for example when a VoIP call is placed from a mobile terminal on the WLAN to a mobile terminal on the mobile telephone network. And Iizuka’s VoIP call would use bi-directional coupling to the gateway so that the mobile terminal could both transmit and receive voice packets.

177. Thus, a person of ordinary skill in the art would have found it straightforward and advantageous to apply Sundar’s teachings of a standalone gateway coupled to an interface server and bidirectionally coupled to a packet network (specifically, a packet switched telephone network) to Iizuka’s method (as modified by Enzmann and optionally Inoue), and would have known such a combination (yielding the claimed limitations) would predictably work and provide

the expected functionality.

X. SECONDARY CONSIDERATIONS

178. The Challenged Claims of the '154 patent are rendered obvious by the grounds presented herein. In my opinion, the strength of the grounds that I discuss above cannot be overcome by any alleged objective indicia.

179. Although I understand that Patent Owner has raised allegations of secondary considerations in the district court litigation (Ex. 1020 at 36-47; Ex. 1021 at 11-12), in my opinion Patent Owner has not demonstrated the required nexus between its allegations and the purported invention.

180. In addition, Patent Owner's allegations are conclusory and ostensibly relate to four different patents, but provide no explanation as to any nexus to any particular claim of the four patents, let alone the '154 patent claims. This gap in Patent Owner's analysis further confirms that there is no nexus between the alleged secondary considerations and the Challenged Claims of the '154 patent.

181. In addition to the lack of nexus, it is my opinion that Patent Owner's allegations of secondary considerations do not overcome the evidence of obviousness for the additional reasons set forth below.

182. **Commercial success:** Patent Owner provides no evidence of commercial success. While Patent Owner asserts that such success "will be shown" based on Samsung's own products (Ex. 1020 at 37), the success of

Samsung's own products has no nexus to the Claims at least because the accused phone and tablet products include many unrelated features that drive their success..

183. **Long-felt need:** Patent Owner cites portions of the '181 patent specification as purported evidence of long-felt need, but these explanations are conclusory and self-serving (Patent Owner does not cite any evidence from anyone other than the inventor), and also do not show any alleged need was "long-felt." Ex. 1020 at 38-39.

184. **Industry recognition:** Patent Owner cites an award that Samsung received for Wi-Fi Innovation, but Patent Owner has not shown the requisite nexus between that award and the Claims. *Id.*, 39. Patent Owner also argues that praise and recognition is shown by the fact that Vasu patents have been cited during prosecution of other patents, but Patent Owner does not explain how mere citation during prosecution is praise or recognition, and Patent Owner has not shown that any such citation was for any functionality that is in the Claims. *Id.*, 40-47.

185. **Skepticism in the industry:** Patent Owner argues that unidentified contemporaneous publications acknowledged the difficulty of developing the claimed invention, but Patent Owner does explain how purported challenges show "skepticism" and also does not even attempt to explain the requisite nexus to the Claims. *Id.*, 47.

186. **Copying:** Patent Owner argues that Samsung copied Patent Owner's technology, but Patent Owner's argument is conclusory and based only on alleged knowledge of "patents and application that Vasu had filed because they were cited as prior art against [Samsung's] own patent applications"— Patent Owner does not even allege that Samsung was aware of the '154 patent specifically, as opposed to other Vasu patents and application, and does not allege knowledge of the '154 patent before Samsung developed its products. Ex. 1020, at 37, 47-53; Ex. 1019, 21-26, 76-77; Ex. 1021 at 11-12..

187. To the extent Patent Owner asserts the existence of any additional secondary considerations in its responses, or presents additional evidence or arguments, I reserve my right to address any such evidence.

XI. CONCLUSION

188. In summary, I have concluded that the Challenged Claims are rendered obvious over the prior art references as discussed above. Specifically, in my opinion, for at least the reasons above, the Challenged Claims of the '154 patent obvious.

189. To the extent it is argued that any further disclosure is required for an element in the Challenged Claims that I have identified as being disclosed, a person of ordinary skill in the art would certainly have found that element obvious to include based on the sample explicit disclosure or inherent disclosures and

analysis I have identified above.

190. I reserve the right to supplement my opinions in the future to respond to any arguments that Patent Owner or its expert(s) may raise and to take into account new information as it becomes available to me.

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

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

Executed this 23rd day of January 2025, in Greenville, Texas.


Mr. Mark Lanning

APPENDIX A

Curriculum Vitae

Mark R. Lanning

4 Eagles Nest
Greenville, TX 75402-9027

Phone: 903-454-3399

Email: mark@telecom-architects.com

Mark R. Lanning

Mark is currently the President of Telecom Architects, Inc., I.N. Solutions, Inc.¹ and Reticle Consulting, LLC. Each of these companies provides professional consulting services and custom software development for one or more particular technical areas. 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. Telecom Architects was established in 1999 to provide specialized consulting services to fixed and wireless telecom service providers and their equipment suppliers. Reticle Consulting was created in 2009 to provide specialized consulting services for forensic software analysis and software source code comparison for software misappropriation cases.

Mark has over 35 years of engineering experience in all the development life cycle phases for hardware and software products. He has worked with both network operators and product suppliers regarding network architectures and product development and has acquired key insights into their perspectives and requirements as both suppliers and customers.

While working for three different product suppliers, Mark was directly responsible for the design, development and rollout of new products that have earned combined revenues in excess of one billion dollars for their respective companies. These products include: the DSC/Alcatel Signal Transfer Point (STP) product; the Teling/ADC M13 transmission multiplexer and analyzer products; and the Tandem/HP Service Control Point (SCP), Service Management System (SMS); Service Creation Environment (SCE) products and their applications.

Since starting I.N. Solutions in 1991, Mark has worked with Motorola, Sprint, Nextel, and British Telecom (BT) to roll out some of the most successful telecom applications and network expansions worldwide. Mark was directly involved in the design of Sprint's Common Channel Signaling System 7 (SS7) network and the design and rollout of its FON (calling card) and 800 number services.

Mark was also the program manager responsible for the design and rollout of BT's Advanced Cellular Network (ACN) that used AIN functionality. BT's ACN was one of the largest cellular networks in the world and also includes advanced corporate virtual private network (VPN) and pre-pay validation services.

After completing BT's ACN network upgrade in 1992, I was the program manager and lead network architect for BT's (Cellnet) GSM cellular network design, rollout, testing and upgrades. In this role, I was responsible for defining, implementing and testing all aspects of its GSM network that included the Network Switches (MSCs and Tandems for PSTN connections), Base Station Subsystems (BSC and BTS), Short Message Service Center (SMSC), Home Location Registers (HLRs), Visitor Location Registers (VLRs), Authentication Center (AuC), Equipment Identity Register (EIR), cell phones (Mobile Station-MS) from multiple suppliers, Voice Message Systems, Subscriber Information Module (SIM) programming and distribution, Operation and Support System (OSS), and prepay and post-pay billing system interfaces. The network phases began with voice calling then later added mobile terminated and mobile originated Short Message Service (SMS) functionality and ultimately included adding the GPRS advanced data capabilities for both the GSM network and its cell phones.

¹ I.N. Solutions Inc. is no longer active.

Beginning in 1998, Mark and the Telecom Architects (TAI) team were contracted by Nextel to design their 2.5G cellular iDEN switching, VoIP dispatch network² and its TDM/SONET transmission networks. After completion of the 2.5G network design, Mark and the TAI team performed a large part of the qualification, testing and rollout phases for new equipment suppliers and their applicable products into Nextel's network.

Before starting his own consulting company in 1991, Mark was initially employed as individual contributor on both hardware and software development projects, later worked as a manager on hardware and software development groups that varying in size from 5-20 engineers and eventually held several executive management positions with responsibility of over 200 engineers.

Hardware and Software Development Experience

Mark's hardware and software experience began in 1974 while in the US Army Signal Corps. Mark was initially trained as a hardware technician on data and voice crypto (encrypted transmission) communications equipment. After achieving the "top graduate" award at three different hardware and software training schools, Mark received a Top Secret security clearance and was transferred to the Army Security Agency (ASA). His assignment with the ASA included joint software development with the National Security Agency (NSA) and the white house communications staff. The software development was done on "state of the art" computer and communication systems built by DEC and GE using assembly language.

From 1978-1983, Mark worked as both a hardware and software development engineer for IT&T Defense Communications. The majority of his time was spent on building a new store and forward message switching system that was used by the white house, US embassies worldwide and two major US airlines. DEC PDP-11 and PDP-15 computers were coupled together and operated in conjunction with custom IT&T hardware for this system. The system architecture was traditional mini-computer architecture with sixteen front-end communications computers to interface with hundreds of modems and perform various communications protocols. The software was written in DEC assembly language. Many different types of communications protocols and state of the art modems were used with this system.

In 1983, Mark was hired as hardware and software development engineer by Digital Switch Corporation (now a part of Alcatel) and was later promoted to design and development manager responsible for their initial SS7 protocol and Signal Transfer Point (STP) products. The STP product performed packet switching for thousands of messages per second between telephone switches for the purpose of connecting normal phone calls worldwide and support of advanced telephony services. The STP was designed to have a fault tolerant hardware and software architecture to provide 24x7 operation and provided interfaces to various telephone company management and support systems. A typical configuration of the STP product included at least 200 separate microprocessor boards working in a closely coupled distributed system architecture. Communications between the processors was performed over parallel hardware buses using DSC's proprietary operating system. Mark was also responsible for development of all the communication protocols the STP would require to communicate with other switching, operations and administration systems. These protocols were X.25, X.75, SS7 MTP/SCCP/TCAP and FTP. The hardware used was Zilog Z-8000 and Motorola 68xxx family microprocessors. The software was written in assembly and C languages.

² Also referred to as the Nextel push-to-talk, dispatch or walkie-talkie feature that did not require a voice bearer channel.

In 1985, Mark was hired by Teling Inc. (now part of ADC) as their director of software development and was later promoted to vice president of hardware and software development. Teling was a venture capital start-up company, and their initial two products were high speed digital TDM transmission multiplexers and analyzers mainly used by telecom network operators and service providers. The hardware consisted of multiple Motorola 68xxx family processors replicated different types of custom designed high-speed gate arrays. The software was distributed and written in C and assembly language.

In 1987, Mark joined the Telecom Division of Tandem Computers, Inc. (now part of HP) as their Vice President of hardware and software development. Tandem Telecom was a new division that built products for telephone companies that leveraged its fault tolerant Guardian and Unix based computer systems. The initial products built under Mark's direction were a Service Control Point (SCP), Service Management System (SMS) and Service Creation Environment (SCE). Although these product names are unique to Intelligent Networking telephony systems, they use state of the art hardware and software to perform many standard functions. The SCP system performs on-line transaction processing for the telephone switches in a network. These transactions support phone company services like 800 number translation, calling card number validation and home location register (HLR) functionality for cellular networks. The SCP was a fault tolerant multiple processor system capable of supporting hundreds of globally located nodes with multiple processors in each node. Each SCP required specialized communications software and hardware that was build by Tandem Telecom. The full suite of commercial communications software was supported including X.25, TCP/IP and SS7. The software was written in C, C++ and assembly language. The SMS system was build to manage multiple SCP systems, update the software applications and keep their multi-million record databases synchronized. The SMS software was written in C and C++. The SCE was telephone service authoring tool used by telephone company personnel to modify or create new services on their network without requiring them to be intimately familiar with the underlying system or detailed programming. The SCE software ran on Unix or PC Windows operating systems and was written in C++ and C and the most advanced software development workbench software.

Program and Project Management Experience

Mark has been directly involved with formal project management concepts and tools since 1984. Most, if not all, the projects listed above were managed using project management concepts and tools. The main techniques used for these projects were PERT and CPM. Mark either generated the initial PERT chart and staff assignments for each project or was directly involved in defining the program logic and assignments to be used. Since 1984, every project that Mark has been responsible for has included formal product life cycle documentation, requirements tracking, problem reporting and resolution.

Since 1991, Mark has been responsible for some large development and network architecture projects with a budget in excess of \$100 million each. Two of these projects were for British Telecom's cellular network division called Cellnet. The initial project, ACN, was an on-line transaction processing (OLTP) system responsible for real-time dialed digit translation for every phone call in the Cellnet network and was required to perform thousands of transactions per second. The second project replaced Cellnet's batch-oriented billing system with a distributed real-time call detail record collection and on-demand rating and billing system. Both of these systems required custom development for a majority of the software that was done by different companies located across multiple countries and continents. The ACN project lasted about four years and involved over 100 software development personnel located in Texas, Nebraska, California, Sweden, Spain, Finland and England. The billing system project lasted more than three years and required over 600 developers at its peak that were located in England, Colorado, Texas and Sweden. Both of these systems were 24x7 mission critical to completing wireless calls and

billing.

Mark and members of the Telecom Architects group have developed innovative methods for requirements definition, design, modeling and documentation of large telecommunications networks. Some of this methodology has been published by Wireless Review Magazine.

In 1977 and 1978 Mark obtained a Private Pilot, Commercial, Instrument, and Flight Instructor ratings.

Mark received a BS in Computer Science degree from Southern Methodist University in 1983 and has been a visiting lecturer at SMU on various data and voice telecommunications subjects.

Industry Memberships

Member of IEEE and IEEE Standards Association.

Member of ACM (Association for Computing Machinery).

Telecom Standards Definition

Mark is one of the Advanced Intelligent Network (AIN) and Signaling System Number 7 (SS7) pioneers. He was a contributing member of the first ANSI T1X1 standards group that defined and approved the initial North American AIN and SS7 requirements and was actively involved with this group for three years. These standards were later adopted by the ITU.

Telephony Systems

Mark has been directly involved with the development and/or detailed functional analysis of the following systems: DSC/Alcatel DEX-STP, DEX-400, DEX-600 and MegaHub circuit switches; Nortel DMS circuit switch for class IV and MSC applications; Ericsson AXE circuit switch for class IV, MSC and HLR applications; Lucent's 5ESS circuit switch in class IV, class V and MSC applications; Tandem/HP SCP, SMS, SCE and HLR.

Mark has also been intimately involved with the design, analysis and/or network implementation of many different PSTN and cellular network elements including at least: MSC, VLR, HLR, BSC, BTS, SMSC, MMSC, GGSN/SGSN, eNodeB, and RNC.

Network Design Experience Summary

Mark has extensive telecommunications network design experience for both North American and European fixed and wireless networks. He has participated in the creation of RFIs and RFPs and the evaluation of supplier responses; negotiated supplier equipment contracts; written requirements for custom hardware and software features and has led engineering teams in the design and rollout of new networks and network expansions. These network designs included LANs, WLANs, WANs, TDM and SONET transmission networks, signaling system 7 (SS7) networks, ATM/IP data switching/routing, mission critical on-line transaction processing enterprise networks and voice switching networks using traditional circuit switches, soft switches and media gateways.

Software Development Languages and Tools

Assembly language for DEC PDP-11, PDP-15, Zilog Z-80 & Z-8000, and Motorola 68xxx processors.
Fortran IV and Fortran 77.
Cobol.
Pascal.
Basic and Visual Basic
C and C++
X Windows, Motif and SmallTalk Toolkits
Microsoft Office FrontPage
Java and JavaScript

Publications

Mark Lanning and David Sanders, "In Sync" Wireless Review. January 15, 2000.

Technical Expert Experience for Cases Filed Since 2018.01.01

Barkan Wireless IP Holdings, L.P. v. Samsung and Verizon. C.A. No. 2:18-cv-28-JRG. Before the United States District Court for the Eastern District of Texas, Marshall Division. On behalf of Samsung and Verizon.

Genband U.S. LLC and Sonus Networks, Inc. v. Metaswitch Networks Ltd and Countersuit. Cause No. DC-17-03697. Before the District Court of Dallas County, Texas, 134th Judicial District. Case regarding Internet and switching devices. On behalf of Genband.

Maxell, Ltd. v. Huawei Technologies Co. Ltd. et al. C.A. No. 5:16-cv-00178–RWS (Filed Nov. 2016). Before the United States District Court for the Eastern District of Texas, Texarkana Division. On behalf of Huawei. Inter Partes Review of U.S. Pat. Nos. 6,973,334, 6,983,140, and 7,324,487.

Zest Labs Inc et al v. Wal-Mart Inc. C.A. No. 4:18–cv–00500–JM (Filed Aug. 2018). Before the United States District Court for the Eastern District of Arkansas, Little Rock Division. Provided deposition and trial testimony. On behalf of Zest.

Zomm, LLC v. Apple Inc. C.A. No. 4:18-cv-04969–HSG (Filed Apr. 2018). Before the United States District Court for the Northern District of California, Oakland Division. On behalf of Apple. Inter Partes Review of U.S. Pat. No. 8,351,895. Provided multiple deposition testimony.

Sol IP, LLC, v. AT&T Mobility LLC. C.A. No. 2:18-cv-526-RWS-RSP (Filed 2018). Before the United States District Court for the Eastern District of Texas, Marshall Division. On behalf of AT&T.

Packet Intelligence LLC v Nokia Solutions and Networks U.S. LLC. C.A. No. 2:18-cv-00382-JRG (Filed Aug. 2018). Before the United States District Court for the Eastern District of Texas, Marshall Division. On behalf of Nokia.

Carucel Investments L.P. v. General Motors Company, et. al. C.A. No. 3:18–cv–03332 (Filed Dec. 2018). Before the United States District Court for the Northern District of Texas, Dallas Division. On behalf of Carucel. Provided multiple deposition testimony.

Rembrandt Wireless Technologies, L.P. v Apple Inc. C.A. 2:19-cv-00025-JRG (Filed Jan. 2019). Before the United States District Court for the Eastern District of Texas, Marshall Division. On behalf of Apple. Inter Partes Review of U.S. Pat. Nos. 8,023,580 and 8,457,228.

Optis Wireless Technology, LLC, Unwired Planet, LLC, and Panoptis Patent Management, LLC v Apple Inc. C.A. No. 2:19-cv-66. (Filed Feb. 2019). Before the United States District Court for the Eastern District of Texas, Marshall Division. Provided deposition and trial testimony. On behalf of Apple.

Cellular Evolution LLC v. T-Mobile US, Inc. et al., C.A. 2:19-cv-232-JRG (Filed Jun. 2019). Before the United States District Court for the Eastern District of Texas, Marshall Division. On behalf of T-Mobile.

DataQuill Limited v. TCL Communication Technology Holdings Limited et al., C.A. 2:19-cv-03394-AB-PLA (Filed Apr. 2019). Before the United States District Court for the Central District of California, Los Angeles Division. On behalf of TCL.

Huawei Technologies Co. Ltd. v Verizon Communications, Inc., et. al., C.A. 2:20-cv-00030 (Filed Feb. 2020). Before the United States District Court for the Eastern District of Texas, Marshall Division. On behalf of Verizon. Provided deposition and trial testimony.

Syncloud Technologies, LLC v Adobe, Inc. CA 6:19-cv-00527-ADA (Filed Sep. 2019). Before the United States District Court for the Western District of Texas, Waco Division. On behalf of Adobe.

Castlemorton Wireless, LLC v. Verizon Communications Inc. et. CA 6:20-cv-00035-ADA (Filed Jan. 2020). Before the United States District Court for the Western District of Texas, Waco Division. On behalf of Verizon and Charter Communications.

Confidential Arbitration case on behalf of Nokia regarding cellular devices.

IPCom v. Verizon (Nokia). CA 2:20-cv-323 (Filed 2020.10.01.). Before the United States District Court for the Eastern District of Texas, Marshall Division. Also included petitioner IPRs. On behalf of Verizon and Nokia. Provided IPR deposition testimony.

IPCom v. AT&T (Ericsson). CA 2:20-cv-323 (Filed 2020.10.01.). Before the United States District Court for the Eastern District of Texas, Marshall Division. Also included petitioner IPRs. On behalf of AT&T and Ericsson. Provided IPR deposition testimony.

Philips v. Thales et al. ITC Investigation No. 337-TA-1240. Before the ITC. Also, declarations for Patent Owner IPRs. On behalf of Philips. Provided deposition and hearing testimony.

Sisvel S.p.A. v. TCL Communication Technology Holdings Limited et al., CA 1:20-cv-00654-MN. Before the United States District Court for Delaware. On behalf of TCL. Provided IPR deposition testimony.

Godo Kaisha IP Bridge 1 v Ericsson Inc. CA 2:21-cv-213-JRG. Before the United States District Court, Eastern District of Texas. On behalf of Ericsson.

Aegis 11 S.A. v Hisense Co. Ltd. CA 1:20-cv-03891-MHC. Before the United States District Court, Northern District of Georgia. On behalf of Hisense.

CommWorks Solutions, LLC v Comcast Cable Communications, d/b/a Xfinity, et al. CA 6:21-cv-00366. Before the Western District of Texas, Waco Division. On behalf of Comcast.

Collision Communications, Inc. v Ericsson. CA 2:21-cv-00327. Before the United States District Court, Eastern District of Texas. On behalf of Ericsson.

TQ Delta, LLC v. Nokia. CA 2:21-cv-309-JRG. Before the United States District Court, Eastern District of Texas. On behalf of Nokia and CommScope.

Maxell v Lenovo and Motorola Mobility. ITC Investigation No. 337-TA-1312/1324. On behalf of Lenovo and Motorola Mobility.

Smart Mobile Technologies LLC v. Apple Inc. CA 6:21-cv-00603-ADA. Before the United States District Court, Western District of Texas. On behalf of Apple.

Telecom Network Solutions, LLC v. AT&T Inc., et al. CA 2:21-cv-00415-JRG (Lead Case). With member cases CA 2:21-cv-00416-JRG and CA 2:21-cv-00418-JRG. Before the United States District Court, Eastern District of Texas. On behalf of T-Mobile.

VoIP-Pal.com v Verizon Wireless Services, LLC, et al. CA 16-cv-00271. Before the United States District Court in Nevada. On behalf of AT&T.

LG Electronics v TCL Electronics. CA 2:22-cv-00122-JRG. Before the United States District Court, Eastern District of Texas. Included IPR2023-00869 for U.S. 10,499,431 and IPR2023-00866 for U.S. 9,788,346. On behalf of TCL Electronics.

Howlink Global LLC v AT&T et al. and Verizon Communications, Inc. et al. CA 2:22-cv-00040. Before the United States District Court, Eastern District of Texas. On behalf of AT&T and Verizon (Ericsson and Nokia).

Ex-Parte Reexamination of U.S. Patent No. 9,137,830. On behalf of United Patents, Inc.

Silent Communication, LLC v Adobe Inc. CA 6:22-cv-00527. Before the United States District Court, Western District of Texas. On behalf of Adobe.

Mitsubishi Electric Corporation and Sisvel International S.A. v TCL Communication Technology Holdings Limited, et al. Case No. 8:22-CV-01073-GW-DFM. Before the United States District Court, Central District of California. Included IPR2023-00957 for U.S. 9,635,656 and IPR2023-00997 for U.S. 10,200,976 and IPR of U.S. 8,971,279. On behalf of TCL.

Ex-Parte Reexamination of U.S. Patent No. 7,924,802. On behalf of United Patents, Inc.
Case active as of 05/31/2024.

Dali Wireless, Inc. v. Cellco Partnership D/B/A Verizon Wireless et al., Case No. 6:22-cv-00104-ADA. Before the United States District Court, Western District of Texas.

Dali Wireless, Inc. v. AT&T Corp. et al. Case No. 2:22-CV-12-RWS-RSP. Before the United States District Court, Eastern District of Texas.

Dali Wireless, Inc. v. T-Mobile US, Inc., et al., Case No. 2:22-cv-414. Before the United States District Court, Eastern District of Texas.

All three above cases are on behalf of Ericsson.

Genghiscomm Holdings, LLC v. TCL Communication Inc., Case No. 2:23-cv-08949. Before the United States District Court, Central District of California. On behalf of TCL.

Zest Labs Inc et al v. Wal-Mart Inc. C.A. No. 4:18-cv-00500-JM (Filed Aug. 2018). Before the United States District Court for the Eastern District of Arkansas, Little Rock Division. This listing is for the second trial. On behalf of Zest. Case still active as of 01/20/2025.

Cerence Operating Company v. Samsung Electronics Co. Ltd. And Samsung Electronics America, Inc., Case No. 2:23-cv-00482. Before the United States District Court, Eastern District of Texas, Marshall Division. Includes IPRs for the 7,395,078 and 8,081,993 patents. On behalf of Samsung.
Case still active as of 01/20/2025.

Pegasus Wireless Innovation LLC v. Verizon Wireless et al., Case No. 2:23-cv-00640-JRG (Lead Case). Before the United States District Court, Eastern District of Texas, Marshall Division. Includes IPRs for the 10,181,931 and 11,405,942 patents. On behalf of Verizon. Case still active as of 01/20/2025.

Pegasus Wireless Innovation LLC v. AT&T Corp. et al., Case No. 2:23-cv-00638-JRG. Before the United States District Court, Eastern District of Texas, Marshall Division. On behalf of AT&T. Case still active as of 01/20/2025.

Vasu Holdings, LLC v. Samsung Electronics Co., Ltd. et al., Case No. 2:24-cv-00034-JRG-RSP. Before the United States District Court, Eastern District of Texas, Marshall Division. Includes IPRs for the 8,886,181, 10,206,154, 10,368,281 and the 10,419,996 patents. On behalf of Samsung. Case still active as of 01/20/2025.

Marble VOIP Partners LLC v. Microsoft Corporation. Case No. W-22-cv-00076-ADA. Before the United States District Court, Western District of Texas, Waco Division. On behalf of Microsoft. Case still active as of 01/20/2025.

Pegasus Wireless Innovation LLC v. Verizon Wireless et al. (i.e., Google), Case No. 2:23-cv-00640-JRG (Lead Case). Before the United States District Court, Eastern District of Texas, Marshall Division. Includes IPR for the 10,594,460 patent. On behalf of Google. Case still active as of 01/20/2025.

Headwater Research LLC v. Verizon Communications, Inc. et al. Case No. 2:23-cv-00352-JRG-RSP. Before the United States District Court, Eastern District of Texas, Marshall Division. On behalf of Verizon. Case still active as of 01/20/2025.

Headwater Research LLC v. T-Mobile USA Inc., et al. Case No. 2:23-cv-00379-JRG-RSP (Lead case). Before the United States District Court, Eastern District of Texas, Marshall Division. On behalf of T-Mobile. Case still active as of 01/20/2025.

APPENDIX B (LIST OF MATERIALS CONSIDERED)

Exhibit No.	DESCRIPTION
1001	U.S. Patent No. 10,206,154 (“154”)
1002	File History of U.S. Application No. 14/510,766 (“154FH”)
1004	U.S. Patent App. Pub. 2005/0282541 (“Iizuka”)
1005	U.S. Patent App. Pub. 2002/0126654 (“Preston”)
1008	U.S. Provisional App. No. 60/534,466 (“466-Prov”)
1009	U.S. Provisional App. No. 60/643,829 (“829-Prov”)
1010	U.S. Patent App. No. 11/031,498 (“498-CIP”)
1011	U.S. Patent Pub. 2005/0136927 (“Enzmann”)
1012	U.S. Patent Pub. 2007/0146475 (“Inoue”)
1013	U.S. Patent Pub. No. 2003/0134638 (“Sundar”)
1015	U.S. Patent Pub. No. 2004/0009761 (“Money”)
1016	Jim Zyren, Intersil Corporation, “IEEE 802.11g Explained” (2001), available at https://www.3g4g.co.uk/Other/WiLan/802_11g/WP_IEEE802gExpla_12_06.pdf
1017	Guide to IEEE 802.11 Wireless LAN Standards, EE Times (May 23, 2003), available at https://www.eetimes.com/guide-to-ieee-802-11-wireless-lan-standards/
1018	File History of U.S. Application No. 13/240,776 (“181FH”)
1019	Plaintiff Vasu Holdings, LLC’s Objections and Responses to Defendants Samsung Electronics Co., Ltd, and Samsung Electronics America, Inc.’s First Set of Interrogatories (Nos. 1-25)
1020	Plaintiff Vasu Holdings, LLC’s Supplemental Objections and Responses to Defendants Samsung Electronics Co., Ltd, and Samsung Electronics America, Inc.’s Interrogatories (Nos. 1-5, 8, 9, 13-15, 19-22, 25)

Exhibit No.	DESCRIPTION
1021	Plaintiff Vasu Holdings, LLC’s Objections and Responses to Defendants Samsung Electronics Co., Ltd, and Samsung Electronics America, Inc.’s Second Set of Interrogatories (No. 26)
1022	U.S. Patent No. 7,664,501 (“Dutta”)
1023	Dictionary of Computer Science, Engineering, and Technology
1024	Microsoft Computer Dictionary, Fifth Edition
1025	WiFi Alliance, WiFi Overview
1026	U.S. Patent Pub. No. 2005/0190747 (“Sindhvani”)
1027	U.S. Patent No. 6,300,887 (“Le”)
1028	U.S. Patent No. 7,751,316 (“Yarlagadda”)
1029	U.S. Patent No. 7,359,979(“Gentle”)

* I also considered any additional materials referenced in my declaration.