

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

Petitioners

v.

FOUR BATONS WIRELESS, LLC,

Patent Owner

Case IPR2025-00493

U.S. Patent No. 7,502,348

**Declaration of Michael Kotzin, Ph.D. in Support
of Petition for *Inter Partes* Review
of U.S. Patent 7,502,348**

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I. INTRODUCTION

1. I have been retained by Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (“Samsung” or “Petitioners”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office (“PTO”).

2. I am aware that IMS Consulting & Expert Services, LLC is billing my time at a rate of \$545/hour for my services in this proceeding.

3. My compensation is in no way contingent on the nature of my findings, the presentation of my findings in testimony or this declaration, or the outcome of this or any other proceeding. I have no other interest in this proceeding.

4. I have been asked to consider whether certain references disclose and/or suggest the features recited in claims 1-8, 10, 11, and 13-21 of U.S. Patent No. 7,502,348 (“the ’348 patent”) (Ex. 1001) and whether one or more references, alone or in combination, renders those claims obvious to a person of ordinary skill in the art.¹ My opinions are set forth below.

¹ Where appropriate, I refer to exhibits I understand will be attached to the petition for *inter partes* review of the ’348 patent (the “Petition”).

II. BACKGROUND AND QUALIFICATIONS

5. I am an independent consultant. All of my opinions stated in this declaration are based on my own personal knowledge and professional judgment. In forming my opinions, I have relied on my knowledge and experience in electrical engineering, computer science, and wireless communication technology.

6. I am over 18 years of age and, if I am called upon to do so, I would be competent to testify as to the matters set forth herein. A copy of my current curriculum vitae, which details my education and professional and academic experience, is included as Ex. 1003 in this proceeding. The following provides an overview of some of my experience that is relevant to the matters set forth in this declaration.

7. I expect to testify regarding my background, qualifications, and experience relevant to the issues in this litigation. I have a Ph.D. in Electrical Engineering and Computer Science from Northwestern University. In fact, I hold the following four degrees from Northwestern University in Evanston, Illinois and the University of Illinois in Urbana, Illinois:

- Ph.D. in Electrical Engineering and Computer Science from Northwestern University, 1981;
- M.S. in Electrical Engineering from Northwestern University, 1977;
- B.S. in Electrical Engineering from the University of Illinois, 1975; and

- B.S. in Chemistry from the University of Illinois, 1975.

8. As noted above, in 1975, I received a Bachelor of Science in Electrical Engineering and a Bachelor of Science in Chemistry from the University of Illinois at Urbana. In 1977, I received a Masters of Science in Electrical Engineering from Northwestern University in Evanston, Illinois. My master's project was entitled "Digital Filter Implementation Using Cascaded Microprocessors." At the time, microprocessors were a nascent technology and there was great interest in using them to perform useful digital signal processing operations especially those useful for wireless communications such as digital filtering. Practical speeds of single microprocessors were very limited, and there was great interest utilizing multiple devices simultaneously to collaboratively perform processing functions. My project demonstrated a design and hardware prototype for digital filtering of a signal utilizing three Motorola MC6800 microprocessors simultaneously to take advantage of a nearly three-fold increase in processing speed.

9. Also as noted above, in 1981, I received a Ph.D. in Electrical Engineering and Computer Science from Northwestern University in Evanston, Illinois. My dissertation was entitled "Short Range Communication Using Diffusely Scattered Infrared Radiation." This research was related to the use of infrared light to provide communication within an enclosed area. While I focused on communicating speech, the method is also applicable for data communications, for

example, as a wireless local area network. The research included a study of scattered light propagation, as well as circuit and system techniques for providing speech supporting multiple simultaneous users. A time division multiple access (TDMA) system with four timeslots was prototyped, providing the capability for two full duplex speech channels.

10. My professional experience begins immediately after I earned my undergraduate degrees in 1975. At Motorola, I spent the first 15 years working in various research labs as a bench engineer. Almost all of my work during this time period focused on innovating and inventing new technology relating to or using radiocommunication systems, including cellular, public safety and private mobile systems.

11. Throughout this period, I was involved in what might be termed the transition of analog land mobile radio systems to digital technology. I was researching new systems including new radio access and modulation technologies. Several proposals were designed and prototyped for use with private land mobile radio. These proposals were contemporary with the initial investigations which were a precursor of the first digital cellular system standard occurring in Europe, namely GSM.

12. A key objective of my projects during this period was to provide new radio systems having an extremely high degree of spectrum efficiency. In other

words, it was desired to serve the largest population of mobile users using as little spectrum as possible. Since reuse of existing spectrum allocations was necessary, maintaining the existing channel spacing that had already been deployed was a critical design factor. Our proposed solutions to addressing these issues involved the use of digital speech coding, both constant envelope and linear modulation techniques and, again, TDMA. I was actively involved in the design and building of several of these prototype systems. Ultimately, this early work evolved into what became Motorola's successful proprietary dispatch and telephone system called iDEN, which was widely deployed by Nextel.

13. In 1989, I joined the Cellular Infrastructure and Networks Business of Motorola. In this capacity, I was responsible for ensuring the highest level of performance of Motorola's cellular infrastructure deployments. The first two years here were directed specifically to addressing unique technology issues facing the GSM product development communities. While I was in the infrastructure group, this team embraced a much broader systems view and thus addressed problems that would also be of significance to the group developing the mobile devices as well. Activities undertaken were often relevant to both the infrastructure and mobile development camps. For example, my participation in the channel equalizer activities provided results which were utilized in both base and mobile stations equipment.

14. Following the GSM activity, I became involved in numerous other digital cellular systems throughout the remainder of my career at Motorola. These include USDC (IS-54 and IS-136), CDMA (IS-95), W-CDMA (also known as 3G or UMTS) as well as LTE (Long Term Evolution also known as eUTRA [evolved UMTS Terrestrial Radio Access] and often characterized as 4G). From time to time either I, or engineers reporting to me, participated in various standards activities, both domestic and international.

15. This work transitioned in the early 1990s to digital cellular applied research and development on cellular infrastructure and mobile devices. As a senior technologist and leader, first in the cellular infrastructure division and subsequently the mobile device division at Motorola, I was a significant participant and contributor to the development of new and evolving digital systems. Some of these evolutions included the adoption of functional improvements, continuing quality improvements, system generation advancement, etc.

16. As a senior level technologist, I was personally working on technology to advance, evolve, and improve the various digital cellular systems deployed throughout the world. I was also directing several worldwide research organizations working on digital cellular technology to create novel and enhanced cellular communications products and techniques. In 1997, I became the Vice President of

Technical Staff and Director of Research and Advanced Technology in Motorola's Cellular Infrastructure and Networks division.

17. In 1998, I transferred organizations at Motorola to become Vice President of the Technical Staff, Office of the Chief Technology Officer, in the mobile devices business. In this role, I provided leadership and strategic directions for the adoption and creation of new technology for handheld devices. In this position, in addition to providing ongoing technology proposals for advancing and improving digital cellular performance and functionality, I formulated strategy for the creation and adoption of new technologies relevant to mobile devices and wireless systems generally. I directly supervised and worked with engineers in the United States and Europe in developing technology focused on radio layer and signaling protocols. As part of this work, we developed and provided technical contributions to industry standards organizations.

18. In 2006, I accepted a position at Motorola as Vice President of the Technical Staff, Corporate Law Department, Patent Operations. In this role, my responsibilities included working with technology teams throughout Motorola to create, manage and maintain strategically important technology, patent portfolios and patent review committees. This included responsibility for decision making on patent filings, annuities, acquisitions and divestitures; formulating technology patent portfolio strategy; and continuing to oversee the protection of intellectual property

across all Motorola's business entities. In this role, I created technology portfolio strategy across businesses including quantitative goals for new and retained intellectual property assets. I also managed processes and corporate-wide teams related to creating and maintaining patent portfolios. I served in this position until I left Motorola in 2009.

19. As part of my activities over the years at Motorola, I served as a chairman or member of several patent review committees. Patent committees are groups of the most senior technologists from within an organization or technology area. These committees are charged with the responsibility to evaluate patentable ideas submitted from all engineers and make recommendations about whether the idea warrants the large investment for it to be pursued to obtain a patent.

20. While at many times during my Motorola career I was responsible for supervising other engineers, my key responsibilities were always more technology-related than managerial. My primary responsibilities were always to be actively engaged in technological innovation and, as possible, to provide technical leadership for those individuals I supervised.

21. I received several awards and recognitions within Motorola. I was designated an Associate of the Science Advisory Board in 1982. In 1990, I was recognized as a Dan Noble Fellow, which is the highest recognition given by Motorola to a technologist. I received the Distinguished Innovator Award, Master

Innovator Award, a Special Intellectual Property Award for Defensive Contributions, and several “Patent of the Year” awards. “Patent of the Year” awards are presented to Motorola inventors whose patents are demonstrated to have had significant business impact, such as resulting in significant patent licensing revenue or a major business impacting product improvement.

22. At various times during my Motorola employment, I was also an active TIA and 3GPP standards organization participant representing Motorola. I received several standards impact awards.

23. I created MDK Consulting, Inc. in 2009 when I left Motorola. As President of MDK Consulting, Inc., I serve as a consultant and expert regarding intellectual property analysis, portfolio management and technology strategy relating to aspects of wireless communications technology including systems and products. In addition to my consulting activities, I have served as an expert for a variety of patent-related litigations and arbitrations relating to various aspects of wireless communications technology.

24. I have been a member of the Institute of Electrical and Electronics Engineers (IEEE) for 43 years. In 1995, I received the IEEE Vehicular Technology Society's “Avant Garde” recognition “for pioneering leadership and continuing contributions in promoting new technology in the field of vehicular communications and electronics.” In 2005, I was designated a Fellow of the IEEE “for contributions

to cellular mobile radio communications.” I am also a member of the Eta Kappa Nu and Tau Beta Pi engineering honors societies. In addition to my industry experience, I have taught electrical engineering courses at Northwestern University as an Adjunct Professor in various wireless technologies.

25. I am a listed inventor on approximately 134 issued U.S. patents and over 500 issued patents worldwide in areas including signal processing, data compression, communications, and wireless systems. I have also authored published articles and presented at several public conferences.

26. Additional detailed information regarding my background, experience, and professional qualifications may be found in the attached Curriculum Vitae. My Curriculum Vitae (Ex. 1003) lists my publication record in archival journals, international conferences, and workshops and further includes a list of granted patents.

27. My technical background has addressed private/public wireless systems, base/mobile hardware and software, algorithms, networking and protocols, signal processing, software/hardware design methodologies, antennas and cybersecurity. Based on my experience and education, I consider myself to be an expert at least in the fields of telecommunications, cellular networking, infrastructure, and mobile devices, including network selection architecture for mobile devices. As of the earliest priority date of the ‘348 patent, I was at least a

person of ordinary skill in the art, and I had personal knowledge of the technologies utilized therein.

28. Through these and other experiences, I am very familiar with the technologies at issue in this matter.

III. MATERIALS REVIEWED

29. The opinions contained in this declaration are based on the documents I reviewed, my professional judgment, as well as my education, experience, and knowledge regarding electrical engineering, computer science, and wireless communication technology.

30. In forming my opinions expressed in this declaration, I reviewed the following materials:

- the '348 patent (Ex. 1001);
- the file history of the '348 patent ("*'348 File History*") (Ex. 1004);
- U.S. Patent Application Publication 2004/0165563 ("*Hsu*") (Ex. 1005);
- U.S. Patent Application Publication 2004/0198302 ("*Hutchison*") (Ex. 1006);
- U.S. Patent Application Publication 2003/0193910 ("*Shoaib*") (Ex. 1007);
- U.S. Patent No. 5,457,810 ("*Ivanov*") (Ex. 1008);
- U.S. Patent Application Publication 2004/0137902 ("*Chaskar*") (Ex. 1009);

1009);

- U.S. Patent Application Publication 2004/0264414 (“*Dorenbosch*”) (Ex. 1010);
- Waharte *et al.*, “Selective Active Scanning for Fast Handoff in WLAN Using Sensor Networks” (Jan. 2004) (“*Waharte*”) (Ex. 1011);
- Li *et al.*, “A Reliable Active Scanning Scheme for the IEEE 802.11 MAC Layer Handoff” (Aug. 2003) (“*Li*”) (Ex. 1012);
- U.S. Patent Application Publication 2004/0005894 (“*Trossen*”) (Ex. 1013);
- U.S. Patent Application Publication 2003/0104814 (“*Gwon*”) (Ex. 1014);
- Mishra *et al.*, “An Empirical Analysis of the IEEE 802.11 MAC Layer Handoff Process” (Jan. 2003) (“*Mishra*”) (Ex. 1015);
- U.S. Patent No. 6,487,596 (“*Douglis*”) (Ex. 1016);
- U.S. Patent Application Publication 2002/0160812 (“*Moshiri-Tafreshi*”) (Ex. 1017);
- U.S. Patent Application Publication 2006/0178147 (“*Jagadeesan*”) (Ex. 1018);
- B. Jabbari and W. Fuhrmann, “Teletraffic Modeling and Analysis of Flexible Hierarchical Cellular Networks with Speed-Sensitive Handoff

Strategy,” IEEE Journal on Selected Areas in Communications, 15(8), 1539-1548 (1997) (“*Jabbari*”) (Ex. 1019); and any other materials I refer to in this declaration in support of my opinions.

31. All of the opinions contained in this declaration are based on the documents I reviewed and my knowledge and professional judgment. My opinions have also been guided by my appreciation of how a person of ordinary skill in the art would have understood the claims and the specification of the ’348 patent at the time of the alleged invention, which I have been asked to consider as early as April 1, 2005. My opinions reflect how one of ordinary skill in the art would have understood the ’348 patent, the prior art to the patent, and the state of the art at the time of the alleged invention.

32. It is my opinion that certain references disclose and/or suggest all the features recited in claims 1-8, 10, 11, and 13-21 (“Challenged Claims”) of the ’348 patent, as I discuss in detail below.

IV. LEVEL OF ORDINARY SKILL IN THE ART

33. I have been informed and understand that, in the context of an invalidity analysis, a person having ordinary skill in the art is a hypothetical person who looks to prior art at the time of the invention. I further understand that the factors that may be considered in determining the level of ordinary skill include: (1) the problems encountered in the art; (2) the prior art solutions to the problems encountered in the

art; (3) the rapidity of innovation; (4) the sophistication of the technology; and (5) the education level of individuals actively working in the field. I understand that these factors need not all be considered for the analysis and that one or more of these factors may control.

34. I was asked to provide my opinion on the level of one of ordinary skill in the art with respect to the alleged invention of the '348 patent as of April 1, 2005. Based on my consideration of the factors above, I believe a person of ordinary skill in the art would have had a Bachelor's Degree (or equivalent) in electrical engineering, computer science, or a similar field and two years of experience in the design of wireless communication technology. A greater amount of professional education could compensate for fewer years of work experience, and vice versa.

35. As of April 1, 2005, I met, and in fact exceeded, the qualifications of a person of 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.

V. RELEVANT LEGAL STANDARDS

36. 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.

37. For the purposes of this declaration, I have been informed about certain aspects of the law that are relevant to forming my opinions. My understanding of the law is as follows:

38. Petitioners' counsel has informed me that for a claimed limitation to be inherently present, the prior art need not expressly disclose the limitation, so long as the claimed limitation necessarily flows from a disclosure in the prior art.

39. Petitioners' counsel has informed me that a patent claim can be considered to have been obvious to a person having ordinary skill in the art at the time the application was filed. Petitioners' counsel has informed me this means that, even if all of the requirements of a claim are not found in a single prior art reference, the claim is not patentable if the differences between the subject matter in the prior art and the subject matter in the claim would have been obvious to a person having ordinary skill in the art at the time of the invention.

40. Petitioners' counsel has informed me that a determination of whether a claim would have been obvious should be based upon several factors, including, among others:

- the level of ordinary skill in the art at the time the application was filed;
- the scope and content of the prior art;
- what differences, if any, existed between the claimed invention and the prior art; and

- any “secondary indicia” of non-obviousness, if they are of record.

41. Petitioners’ counsel has informed me that a single reference can render a patent claim obvious if any differences between that reference and the claims would have been obvious to a person having ordinary skill in the art. Alternatively, I understand that the teachings of two or more references may be combined in the same way as disclosed in the claims, if such a combination would have been obvious to one having ordinary skill in the art. In determining whether a combination based on either a single reference or multiple references would have been obvious, I understand the following are examples of approaches and rationales that may be considered:

- whether the teachings of the prior art references disclose known concepts combined in familiar ways, and when combined, would yield predictable results;
- whether a person of ordinary skill in the art could implement a predictable variation, and would see the benefit of doing so;
- whether the claimed elements represent one of a limited number of known design choices, and would have a reasonable expectation of success by those skilled in the art;
- whether a person of ordinary skill would have recognized a reason to combine known elements in the manner described in the claim;

- whether there is some teaching or suggestion in the prior art to make the modification or combination of elements claimed in the patent; and
- whether the innovation applies a known technique that had been used to improve a similar device or method in a similar way.

42. I understand that “secondary indicia” of non-obviousness may include certain objective factors, 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. I understand these factors are generally referred to as “secondary considerations” or “objective indicia” of non-obviousness. I understand, however, that for such objective evidence to be relevant to the (non)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.

43. Petitioners’ counsel has informed me that one of ordinary skill in the art has ordinary creativity and is not an automaton. Petitioners’ counsel has also informed me that in considering obviousness, obviousness may not be determined

using the benefit of hindsight, including hindsight derived from the patent being considered.

VI. OVERVIEW OF THE '348 PATENT

44. The '348 patent is generally directed to method of handing over a mobile device between neighboring networks:

The present application relates to wireless networking and, in some preferred embodiments, to methods of improving handoff of a mobile device between neighboring networks and/or the like.

'348 patent at 1:7-9. Specifically, the '348 patent describes an approach referred to as "Silent Proactive Handoff" in which a mobile device that is using one network to transport its application traffic will use silent periods to connect to other networks temporarily to perform actions needed to handoff to the target network:

According to the preferred embodiments of the invention, a new approach is used to significantly reduce the handoff delays, which approach is referred to herein as Silent Proactive Handoff (SPH). In some preferred embodiments, a silent proactive handoff operates as follows: when a mobile is using one network (referred to as the old network or the current network) to transport its application traffic and this network can satisfy the mobile device's requirements, the mobile device uses its silent periods to connect to one or more target neighboring network(s) temporarily (i.e., only during these silent periods) and uses this

temporary connectivity to perform actions needed for handoff into the target network.

Id. at 7:47-58.

45. The '348 patent the various circumstances that may comprise such a “silent period” that is used to perform the silent proactive handoff:

In the preferred embodiments, a silent period is a time period during which the mobile has no traffic to send or receive over the current access network. In some embodiments, a silent period can be defined as a time period during which the mobile has substantially no traffic to send or receive. In preferred embodiments, during a silent period, a mobile device would not be expecting incoming traffic at the IP and higher protocol layers. Moreover, in preferred embodiments, the mobile device will not control if and/or when there may be incoming traffic, but the mobile device will predict or estimate silent periods. Thus, in preferred embodiments, a silent period is a time period during which the mobile device does not need to send or receive IP or higher layer traffic (e.g., not just application layer traffic). In some instances, the mobile device may send traffic at protocol layers below the IP layer during a silent period. In addition, in some examples, a silent period can include time periods during which the mobile device may send or receive only certain IP layer or higher layer traffic (such as, e.g., application layer traffic) which, when temporarily interrupted (e.g., delayed or

discarded), will substantially not cause undesirable or unexpected effects to the user of a mobile device.

Id. at 7:59-8:13.

46. The '348 patent also explains that a “handoff actions” may include one of a number of types of actions, including discovering neighboring network information, obtaining a local IP address from a target network, and/or performing authentication with the target network:

Once connected to a target network, the mobile can perform a range of actions during the silent period that need to be done during an actual handoff. In some embodiments, these actions can include some or all of the following:

Neighboring network information discovery: This may be done to discover the information needed by the mobile to handoff into the neighboring network. To do so, the mobile device can listen to advertisements at layer-2, the IP-layer and/or the application layer from the target network to obtain information regarding the target network. This information may include, e.g., the addresses of the access IP routers, addresses of the IP address allocation servers (e.g., Dynamic Host Configuration Protocol (DHCP) servers), addresses of the authentication routers, and other parameter values needed to perform authentication with the target network.

Obtain local IP address from the target network: This may be done to obtain a local IP address from the target network that the mobile can use to receive from IP packets from the target network.

Perform authentication with the target network: This may be done to perform layer-2, layer-3, and/or application-layer authentication with the target network if the target network requires such authentication(s).

In this disclosure, among other actions, the foregoing actions and the action to establish a connection to a target network as are referred to as types of Handoff Actions.

Id. at 8:47-9:5.

VII. OVERVIEW OF THE PRIOR ART REFERENCES

A. Analogous Art

47. I have analyzed the prior art references used in the grounds below, and it is my opinion that they are analogous to the '348 patent because they are within the same field of endeavor and reasonably pertinent to at least one problem with which the inventors of the '348 patent were involved.

48. In particular, *Hsu* (like the '348 patent) is directed to techniques for detecting and selecting potential networks to which a mobile station (or device) may connect and handing over the mobile station (or device) from one network to another. *See, e.g., Hsu*, Abstract, [0005], [0060]-[0064]. *Hsu* is also reasonably

pertinent to a problem with which the inventors of the '348 patent were involved, namely “improving handoff of a mobile device between neighboring networks.” '348 patent at 1:7-9. Indeed, *Hsu* aims to improve handoffs between systems, specifically with respect to the detection and selection of the systems for mobile station handoff. *See Hsu*, Abstract, [0008]; *see also id.* at [0059]-[0060] (describing a mobile station configured to perform system detection and selection in a number of scenarios).

49. *Hutchison* (like the '348 patent) relates to terminals in wireless communication systems and techniques performed in consideration of (or in conjunction with) pertinent events, including hand-offs. *See, e.g., Hutchison*, [0003], [0013]. *Hutchison* is also reasonably pertinent to a problem with which the inventors of the '348 patent were involved, namely “reduc[ing] unnecessary battery consumption, unnecessary use of processing power,” and other problems purportedly addressed by the techniques described with respect to the '348 patent’s “silent proactive handoff.” '348 patent at 13:5-13. Indeed, *Hutchison* also provides solutions that conserve battery power. *See, e.g., Hutchison*, [0010], [0012], [0039].

50. *Shoaib* (like the '348 patent) relates to the field of wireless networks and is directed to a method of performing a handover from one network to another. *See, e.g., Shoaib*, [0002], [0014], [0015]. *Shoaib* is also reasonably pertinent to a problem with which the inventors of the '348 patent were involved, namely

“improving handoff of a mobile device between neighboring networks.” ’348 patent at 1:7-9. Indeed, *Shoaib* is similarly aimed at addressing a need for technology “that can provide seamless handover to other networks in next generation wireless networks.” *Shoaib*, [0013].

51. *Ivanov* (like the ’348 patent) is directed to a handover decision process for a mobile station potentially moving from one cell (or network) to a neighboring cell (or network). *See, e.g., Ivanov*, Abstract, 2:51-3:9. *Ivanov* is also reasonably pertinent to a problem with which the inventors of the ’348 patent were involved, namely “improving handoff of a mobile device between neighboring networks.” ’348 patent at 1:7-9. Indeed, *Ivanov* relates to improving the handover decision process by “reduc[ing] the plurality of hand overs for rapidly moving mobile stations.” *Ivanov*, 2:48-50.

B. *Hsu*

52. *Hsu* is directed to a method and apparatus for detection and selection of WLAN service by a mobile in a cellular communication system:

Method and apparatus for detection and selection of Wireless Local Area Network (WLAN) service. A remote station, which may be in conjunction with a wireless computing device, may scan for a cellular paging indicator and a WLAN beacon using one or two tuners. When WLAN coverage is available, a packet data session may be transferred thereto.

Hsu, Abstract; *see also id.* at [0005] (“The present invention relates generally to communication systems, and more specifically to detection of a Wireless Local Access Network (WLAN) by a mobile station in a cellular communication system.”).

53. *Hsu* explains that “users desire access to local WLANs to enhance reception and data rates of communications through a wireless device.” *Id.* at [0007]. *Hsu* recognizes, however, that mobile stations may expend considerable power scanning for WLAN coverage periodically, particularly when the mobile station has little information regarding the location and accessibility of a WLAN:

Wireless Local Access Networks (WLANs) provide wireless access to a communication network within a local geographical area, such as a building or in a cybercafe. WLANs are currently considered by many cellular carriers to alleviate loading of a cellular system, so as to increase capacity. Additionally, users desire access to local WLANs to enhance reception and data rates of communications through a wireless device. A problem exists in detecting and selecting WLAN systems. The purpose of system detection is to detect the availability of a wireless access medium (e.g., cdma2000, WLAN, etc.). The purpose of system selection is to select an access medium for transporting application contents. System selection may be based on the availability of access media, preference policy, application status, user intervention, etc., or a combination thereof.

Typically, a cellular system transmits a paging indicator periodically to page a mobile station when there is a pending communication. Similarly, a WLAN may be advertised by a beacon transmitted by the WLAN. Both the paging indicator and the beacon require the mobile station to scan for the transmitted signal. As the mobile station often has little information as to the location and accessibility of a WLAN, the mobile station may scan for the WLAN periodically expending considerable power. There is a need therefore for an efficient, accurate method of system detection and selection.

Id. at [0007]-[0008]. Accordingly, *Hsu* explains that there is a need for an improved method of system detection and selection. *Id.*

54. *Hsu* describes techniques for detecting and selecting a WLAN with respect to a one-tuner embodiment, in which a mobile device may only tune to one system (WLAN or cellular) at a given time, and a two-tuner embodiment, in which a mobile station can tune to a cellular frequency and the WLAN frequency simultaneously. *See generally id.* ¶¶[0058]-[0075] (describing the one-tuner embodiment); *id.* ¶¶[0076]-[0090] (describing the two-tuner embodiment). With respect to each embodiment, and addressing the need for an “efficient” detection system discussed above, *Hsu* discloses that a mobile station may not scan for WLAN when the mobile station has an active packet data session with the cellular network:

The MS may choose not to scan for WLAN while active data session in the cellular network. In this case, while the MS is active in the cellular network, the MS does not switch to WLAN even though it could access to WLAN. Although the MS might not be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption. After the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.

Id. at [0062]; *see also id.* at [0082] (“The MS 300 may decide to scan for WLAN coverage based on one or more factors, e.g., ... application status (e.g., on-going packet data session).”). Rather, *Hsu* explains that the mobile station waits until the mobile station becomes idle in the cellular network to tune away from the cellular network to scan for WLAN coverage. *Id.* at [0062].

55. *Hsu* further discloses that, after detecting WLAN coverage, the mobile station proceeds to handover its packet data session to the WLAN by performing WLAN access authentication and Mobile IP registration:

The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon. Then, the MS may have the following behaviors. (1) If the MS detects WLAN coverage, the MS tunes back to the cellular network to notify the WLAN search result. The cellular network then sends a signaling message to instruct the MS to handoff to WLAN. The MS tunes to WLAN and performs access authentication and optionally

Mobile IP registration to handover its packet data session to WLAN. If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064]; *see also id.* at [0065], [0074], [0085]. *Hsu* also teaches that, after detecting WLAN coverage, the mobile station may determine whether to proceed to handover its packet data session from the cellular network to the WLAN based on certain criteria, including whether the MS is idle in cellular network:

After the MS 300 detects WLAN coverage, receives the WLAN beacon, the MS 300 uses certain criteria to handover a packet data session from the cellular network to the WLAN. The criteria may include whether the MS is idle in cellular network (i.e., no dedicated channel) or whether the WLAN signal strength is stable, etc. The MS 300 may wait for a pending packet data session to go dormant in the cellular network. The MS 300~~d~~ then performs packet data session handover (i.e., sending Mobile IP registration via WLAN). This may be useful to minimize service interruption. Similarly, the MS 300 may perform packet data session handover when the WLAN signal strength is above an acceptable threshold for a specified period of time. In this way, the MS 300 ensures that access to the WLAN is sustainable. The measure may be any measure of channel quality and/or signal strength. The threshold may be predetermined or may dynamically be adjusted based on the actual performance of the

communication. This may be useful to avoiding any ping-pong effect whereby the MS 300 switches between WLAN access and cellular network access due to changing conditions or signal strength that is at the margin of tolerance for operation. Still further, upon detection of the WLAN, the MS 300 may notify the user and wait for the user to manually select WLAN.

Id. at [0085]; *see also id.* at [0096] (“Upon detecting a strong WLAN signal, the laptop 600 waits for a given time period (e.g., several seconds) to detect any activity of data transfer. If no activity is detected, the laptop 600 performs WLAN access authentication, followed by Mobile IP registration via the WLAN, and finally release of the cellular packet data service option, as described above.”).

C. *Hutchison*

56. *Hutchison* is directed to techniques for performing timer-based sleep to extend battery life for a terminal in a wireless communication system:

Techniques for performing timer-based sleep to extend sleep time and thus battery life for a terminal in a wireless communication system. The likelihood of data traffic may be related to recent usage. If recent usage indicates that data traffic is unlikely, then the terminal can continue to maintain the link but monitor the signals from the system at a reduced rate. In one method, the probability of data traffic for the terminal is initially estimated (e.g., based on time since last activity and a particular usage model). A timer value is then determined based on the

estimated probability of data traffic. The timer value may be modified based on an event, which may relate to link maintenance, hand-off, and so on. Sleep is then performed for the duration corresponding to the unmodified or modified timer value and may extend past one or more designated paging slots.

See Hutchison, Abstract; *see also id.* at [0023]. *Hutchison* discloses a process 500 for performing timer-based sleep by a terminal that includes estimating the probability of data traffic for the terminal. *See id.* at [0057]-[0058]. *Hutchison's* process 500 is depicted in Figure 5, which I have reproduced below:

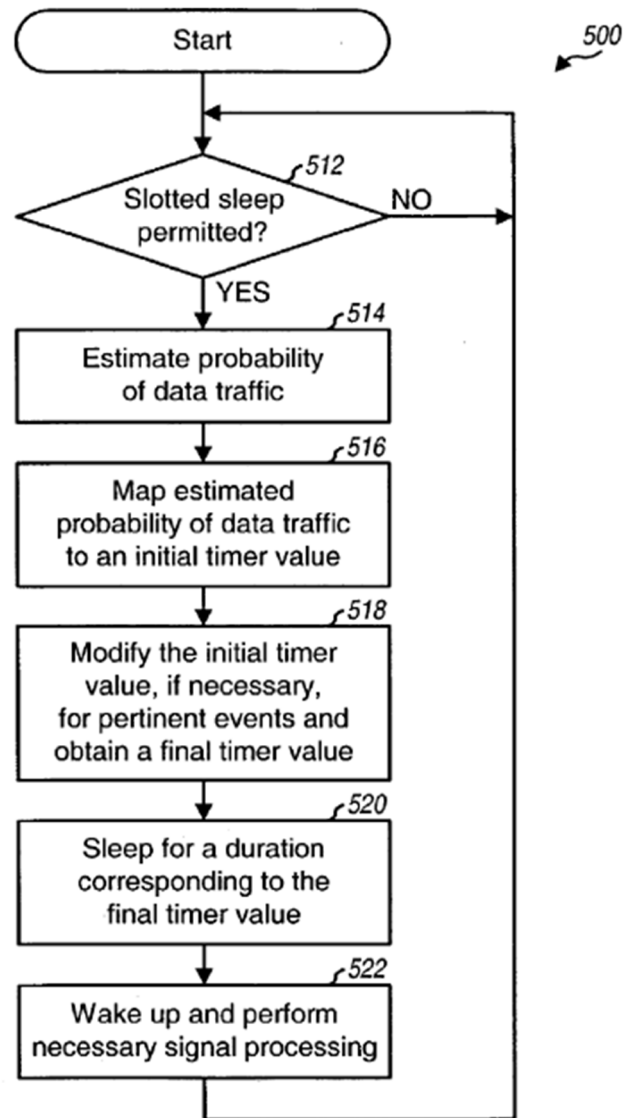


FIG. 5

Hutchison, Ex. 1006, Fig. 5

57. With respect to process 500, *Hutchison* explains that the probability of data traffic may be estimated based on the time since last activity using a particular function:

FIG. 5 shows a flow diagram of an embodiment of a process 500 for performing timer-based sleep by a terminal. Initially, a determination is made whether or not slotted sleep is permitted for the terminal (step 512). This determination may be made based on session information for the terminal. For the HDR system, slotted sleep may be permitted, for example, while the terminal is in the Idle state whereby a session is opened but a connection is not opened. If slotted sleep is not permitted, then the process returns to step 512.

Otherwise, if slotted sleep is permitted, then the probability of data traffic for the terminal is estimated (step 514). As described above, the probability of data traffic may be estimated based on (1) the time since last activity and (2) a particular function defining probability of data traffic versus time since last activity. The time since last activity may be set equal to the time since the terminal enters the Idle state.

Id. at [0057]-[0058]; *see also id.* at [0023] (“In one method, the probability of data traffic for the terminal is initially estimated (e.g., based on time since last activity and a particular usage model).”); *id.* at FIG. 4, [0041], [0044]-[0045], [0049] (discussed further herein and describing a function that may be used to determine an initial timer value). *Hutchison* discloses that the estimated probability is then mapped to an initial timer value:

The estimated probability of data traffic is then mapped to an initial timer value (step 516). As noted above, a set of probability threshold values may be used and mapped to a set of timer values. The initial timer value would then be the timer value associated with the probability threshold value to which the estimated probability of data traffic is mapped.

Id. at [0059].

58. *Hutchison* discloses that, once the estimated probability is mapped to an initial timer value, the initial timer value may be modified to account for one or more pertinent events (such as events required for link maintenance) and that the final timer value is indicative of a duration of a next sleep by the terminal:

The initial timer value may be modified due to one or a combination of pertinent events (e.g., required for link maintenance), as described above (step 518). The result of step 518 is a final timer value indicative of the duration of the next sleep by the terminal. This final timer value may be equal to zero (to indicate no sleep), the time until the next paging slot (to indicate a “normal” sleep), or multiple paging slot cycles (to indicate an extended sleep, i.e., a sleep through of one or more designated paging slots). The final value is loaded into the timer that is used to keep track of the duration of time to sleep.

Id. at [0060]. For example, *Hutchison* explains that such pertinent events may include events related to a hand-off:

Link maintenance events may include (1) synchronization with system time, (2) registration and/or authentication with the system, (3) monitoring messages from the system for updated system overhead information, (4) hand-off from one access point to another access point, (5) hand-off from one system to another system, (6) hand-off from one subnet (or access point) to another subnet, and (6) possibly others. The rate at which timing synchronization needs to be performed may be dependent on the stability of the terminal's time hypothesis. If the sleep is too long, then the terminal's internal clock may drift too much. In that case, the terminal's timing may be sufficiently skewed such that it cannot efficiently perform the required signal processing when it wakes up from a sleep. Operation in a second system or mode (e.g., IS-2000) may improve the time hypothesis. The rates at which registration, system overhead information updating, and hand-off need to be performed may be dependent on various factors such as network topology.

Id. at [0052]. *Hutchison* explains that the final timer value is selected such that a link can be maintained and acceptable data traffic monitoring can be achieved:

In general, the final timer value may be determined by the initial timer value and any modifications required by pertinent events for the terminal. It is desirable to not sleep during data traffic, since data would be lost if such were to occur. It is also desirable to not sleep when link maintenance is required, since the link may be lost in that case. Thus, the final timer value is selected so

that the link can be maintained and acceptable data traffic monitoring can be achieved. That is, the sleep time is selected such that undesirable sleep through of data traffic and/or required link maintenance events is limited to within an acceptable level.

Id. at [0056].

59. Once the timer value is modified, *Hutchison* discloses that the terminal performs a sleep for a time corresponding to the final value:

The terminal then performs a sleep for the duration of time corresponding to the final value loaded into the timer (step 520). Upon expiration of the timer, the terminal wakes up and performs the necessary signal processing (522). For example, the terminal can process the signals from the system, update its system overhead information, synchronize its timing, and so on. Thereafter, the process returns to step 512. Process 500 may be terminated by an occurrence of any one of a number of specified events (e.g., a request to open the connection).

Id. at [0061].

60. *Hutchison* discloses that, for an HDR system, the timer may be enabled if a terminal has an opened session but a closed connection (*i.e.*, the timer may be enabled if the terminal is in the Idle state):

In an embodiment, the timer is enabled for use based on session information for the terminal. For the HDR system, the timer may be enabled if the terminal has an opened session but a closed

connection (i.e., the timer may be enabled if the terminal is in the Idle state). If enabled, the timer is loaded with a particular value prior to entering sleep. The duration of the sleep is then determined by the value loaded into the timer.

Id. at [0043]; *see also id.* at [0039] (“Techniques are provided herein for performing timer-based sleep to extend sleep time and thus battery life for terminals in wireless communication systems, such as the HDR system.”). If enabled, *Hutchison* explains that the duration of a sleep may be determined by the particular value loaded into the timer. *Id.*

D. *Shoaib*

61. *Shoaib* discloses a method of performing a handover from one network to another that includes evaluating various criteria and initiating a trigger that causes the handover:

One aspect of the present invention regards a method of handing over from a first network to a second network that includes operating a mobile terminal via a first network, evaluating at least one criteria of either the first network or a second network and initiating a trigger that causes a handover from the first network to the second network so that the mobile terminal operates via the second network.

Shoaib, [0014]. *Shoaib* also discloses an application layer triggering mechanism that determines the triggers required given a set of circumstances:

A second aspect of the present invention regards a network selection system that includes a mobile terminal in communication with a first network, a second network in communication with the first network and an application layer triggering mechanism that determines which one of a plurality of triggers is required in a certain set of circumstances to provide a particular application.

Id. at [0015]. For example, *Shoaib* discloses a triggering mechanism that determines the type of trigger that is required in particular circumstances:

An algorithm for an application layer triggering mechanism is shown and described in FIG. 2. As will be described below, the application layer triggering mechanism 200 determines which type of trigger is required in a certain set of circumstances and to provide the required trigger to applications.

Id. at [0034].

62. *Shoaib* explains that there are four types of triggers that may be provided, including a handover trigger signal that initiates a handover process with a target network:

There are four types of triggers contemplated: 1) a pre-authentication trigger signal 202 (PT) that triggers pre-authentication initiation of the mobile terminal with the handover target network(s), 2) a service adaptability trigger signal 204 (ST) that signals an application that it can perform any necessary

adaptation in anticipation of an impending handover, 3) a pre-caching trigger signal 206 (CT) that sends a trigger signal to a cache management system in order to pre-cache content at the cache server nearest to the target base station and 4) a handover trigger signal 208 (HT) that initiates the handover process with the target network.

Id. at [0035]. *Shoaib* discloses evaluating various criteria to determine whether to initiate one or more of the trigger signals (with or without user input):

A certain set of criteria need to be met in order to signal one or more of the above-mentioned trigger signals. This set of criteria corresponds to the many different aspects that need to be considered before making a triggering decision. The triggering mechanism 200 evaluates these criteria in parallel. The results of this evaluation are combined to determine a composite triggering criteria. If the composite triggering criteria are satisfied, then the triggering mechanism 200 checks the remote (target) network signal criteria and if that is also satisfied it may initiate one or more trigger signals with or without user input depending on the situation or pre-defined settings.

Id. at [0036].

63. Among the various criteria that may be considered, *Shoaib* describes considering a “local signal criteria” that looks at a signal strength of a current point of attachment and determines whether the signal strength is satisfactory:

Local signal criteria 240 look at signal strength of the current point of attachment. Some possible signal strength states are: 1) SL000—No signal; 2) SL100—Extremely bad signal; 3) SL200—Poor signal; 4) SL300—Acceptable signal; 5) SL400—Good signal and 6) SL500—Excellent signal. Local signal criteria 240 is evaluated at step 252 and is satisfied when the signal strength with the current point of attachment becomes poor or worst (states <SL300).

The local signal criteria 240 is a qualitative criteria, which is derived from a quantitative criteria that is specific to access technology. For example, a good signal strength is specified by the vender and the operator depending on the wireless system (e.g., 6.1 dB). Note that should the local signal criteria 240 not be met, then the application state information will be saved per step 254.

Id. at [0072]-[0073]. *Shoaib* also explains that the local signal criteria is “satisfied” when the signal strength becomes poor or worse. *Id.* at [0072].

64. *Shoaib* explains that the various criteria identified, including local signal criteria 240, may be continuously evaluated and used to separately trigger one of more operations, including pre-authentication and/or handover:

All the criteria 212, 222, 218, 220, 236, 238, 240 and 242 are continuously evaluated and results in the evaluation being sent to the composite trigger selector 272, which determines what

type(s) of trigger(s) may be required. Only if the composite trigger selector 272 determines the need for one or more triggers, then a remote signal criteria 260 is applied. This helps in saving battery resources on the mobile device because the mobile device does not have to scan for target networks at all times.

(*id.* at [0080]),

Once the triggering is entered either manually or automatically, the triggering is initiated per step 270 so that either the pre-authentication trigger 202, the service adaptability trigger 204, the pre-caching trigger 206 or the handover trigger 208 is initiated.

(*id.* at [0090]).

E. *Ivanov*

65. *Ivanov* discloses a mobile speed-sensitive handover method for mixed cell structures:

In a speed-dependent hand over method for hierarchic cell structures, a finding is made to whether mobile stations have traversed a radio coverage domain of a micro cell within a time interval. When the mobile stations are still in the radio coverage domain with respect to the micro cell after the time interval, then a hand over for the appertaining mobile stations into the micro cell is requested.

Ivanov, Abstract. *Ivanov* explains that an object of the invention is reduce the number of handovers performed in such scenarios:

It is an object of the present invention to reduce the plurality of hand overs for rapidly moving mobile stations in such a mixed cell structure.

Id. at 2:48-50.

66. To achieve this objective, *Ivanov* discloses considering the speed of a mobile station when determining whether to handover a mobile device from one network (specifically, “a macro cell”) to another network (specifically, “a micro cell”):

In a mobile radio network of the type initially set forth, this object is inventively achieved by a hand over from the radio coverage domain of a macro cell into one or more further micro cells that takes the speed of a mobile radio subscriber into consideration and is implemented in addition to the static hand over decisions, being carried out such that a determination is made in the hand over decision process for a mobile station allocated to the base station of the macro cell, by comparison of the measured data about level, quality, distance and the like and/or of the quantities derived from the measured data that are calculated by the mobile station and/or by the base station to thresholds, as to whether it is located in the radio coverage domain of the micro cell contained in the macro cell or

approaches this and, given a positive result, a means for time acquisition (timer) having an arbitrary but fixed time interval is started during which a determination is continuously made on the basis of the measured data arriving in the hand over decision process as to whether the mobile station is still located in the radio coverage domain of the micro cell; and such that, after expiration of the time interval, a hand over for the appertaining mobile station into the micro cell is requested in that case wherein it is still located in the radio coverage domain of the micro cell and no hand over is requested for that case wherein the mobile station is no longer located in the radio coverage domain of the micro cell.

Id. at 2:51-3:9. For example, *Ivanov* discloses a method that utilizes a timer (or time interval), whereby if a mobile station is still located in the domain of a micro cell after the time interval, a handover for the mobile station into the micro cell is requested:

In this speed-sensitive hand over method for hierarchic cell structures, a check is carried out to see whether the mobile stations have traversed the radio coverage domain of a micro cell within a time interval. When the mobile stations are still located in the radio coverage domain with respect to the micro cell after the time interval, i.e. after the expiration of a timer, then a hand over for the appertaining mobile stations into the micro cell is requested.

Id. at 3:10-17.

67. *Ivanov* describes, as an example, the implementation of the speed-sensitive handover method with respect to a micro cell having a size of 500 meters:

A numerical example shall also be recited below in order to make the relationship between the hand over decision and the vehicle speed clear. A hierarchic cell structure is thereby considered, composed of a macro cell and of a micro cell having a size of 500 m. A mobile station having an average speed of 10 km/h requires approximately 180 s for traversing the micro cell. When the mobile station has an average speed of 30 km/h, then it requires approximately 60 s and a mobile station having a speed of approximately 60 km/h traverses the micro cell in 30 seconds.

Id. at 7:11-20. Given the size of the micro cell, *Ivanov* explains that a mobile station having an average speed of 10 km/h would require approximately 180 seconds to traverse the cell, a mobile station having an average speed of 30 km/h would require approximately 60 seconds to traverse the cell, and a mobile station having an average speed of 60 km/h would require approximately 30 seconds to traverse the micro cell.

Id. at 7:15-20 (reproduced above). Assuming such a micro cell has a time interval of 60 seconds, *Ivanov* explains that mobile stations that travel into the cell at speeds less than 30 km/h will request a handover into the cell (because the mobile stations will be within the cell for more than 60 seconds), whereas mobile stations that travel

into the cell at speeds greater than 30 km/h will not request a handover into the cell (because the mobile stations will not be within the cell for at least 60 seconds):

Assuming a time interval of 60 seconds associated with the timer administered for this micro cell, mobile stations, allocated to the macro cell, that travel into the micro cell at a speed less than 30 km/h will request a hand over into this micro cell. Correspondingly, mobile stations, traversing the micro cell at a speed greater than 30 km/h will remain served by the macro cell, i.e., these mobile stations will not request a hand over into this micro cell.

Id. at 7:21-29.

VIII. CLAIM CONSTRUCTION

68. I have given all the claim terms of the challenged claims their plain and ordinary meaning, as would have been understood by a person of ordinary skill in the art, at the time of the alleged invention, which I understand is no earlier than April 1, 2005 (the filing date of U.S. Patent Application 11/096,721, which issued as the '348 patent), having taken into consideration the language of the claims, the specification, and the prosecution history of record. I reserve the right to respond to any construction questions that may be raised in the matter.

IX. DETAILED EXPLANATION OF GROUNDS

A. Grounds Challenging Claims 1-8, 10, 11, and 13-21 of the '348 Patent

69. In the sections below, I explain in detail how claims 1-8, 10, 11, and 13-21 of the '348 patent are not patentable over the prior art. Below I summarize how each of *Hsu*, *Hutchison*, *Shoaib*, and *Ivanov* render the claims unpatentable.

70. **Ground 1** challenges claims 1-8 and 13-15 of the '348 patent as obvious over *Hsu*.

71. **Ground 2** challenges claims 10, 11, 20, and 21 of the '348 patent as obvious over *Hsu* in view of *Hutchison*.

72. **Ground 3** challenges claims 16 and 17 of the '348 patent as obvious over *Hsu* in view of *Shoaib*.

73. **Ground 4** challenges claims 18 and 19 of the '348 patent as obvious over *Hsu* in view of *Ivanov*.²

² To the extent my declaration refers to prior art references other than those recited in the above-listed Grounds 1-4, I am using such references as evidence supporting what I believe would have been known to a person of ordinary skill in the art at the time of the alleged invention, for example, about the state of the art and/or the benefits and advantages of certain design choices.

B. Ground 1: *Hsu* Renders Obvious Claims 1-8 and 13-15

74. I have reviewed *Hsu*, and as described below, it is my opinion that *Hsu* discloses or suggests all of the features of claims 1-8 and 13-15 of the '348 patent.

1. Claim 1

a. “A method for performing silent proactive handoff of a mobile device to a target network while the mobile device is using a current network, comprising:”

75. I understand that “[a] method for performing silent proactive handoff of a mobile device to a target network while the mobile device is using a current network, comprising:” is the preamble of claim 1 of the '348 patent. I have been asked to assume that the preamble is a claim limitation. Under this assumption, in my opinion, *Hsu* discloses or suggests this feature. For example, *Hsu* discloses a method and apparatus for detection and selection of WLAN service by a mobile station in a cellular communication system:

The present invention relates generally to communication systems, and more specifically to detection of a Wireless Local Access Network (WLAN) by a mobile station in a cellular communication system.

Hsu, [0005].

76. *Hsu* discloses an embodiment in which the mobile station comprises a device that has one tuner for communication:

In such a device, the single tuner is used for communication with both the cellular system and the WLAN system. The MS detects WLAN coverage and performs system selection between WLAN and cellular system, wherein the MS may only tune to one system (WLAN or cellular) at a given time.

Hsu, [0059]. I will hereafter refer to that embodiment herein as the “one-tuner embodiment.” *See generally id.* at [0058]-[0075] (describing the “one-tuner embodiment”). With respect to such an embodiment, *Hsu* explains that the mobile station performs system detection and selection in a number of scenarios, including when the mobile station has an active packet data session with a cellular network and desires to scan for WLAN coverage:

The MS performs system detection and selection in the following scenarios: (1) the MS is idle (not active in communication) with respect to the cellular network, having no dedicated channel, and desires to scan for WLAN; **(2) the MS has an active packet data session with the cellular network, having a dedicated channel, and desires to scan for WLAN;** (3) the MS is tuned to the WLAN, and desires to receive cellular pages; and (4) the MS is tuned to the WLAN but with low signal strength.

Id. at [0060].

77. With respect to scenario (2) (*i.e.*, when the mobile station has an active packet data session with the cellular network, having a dedicated channel, and desires to scan for WLAN coverage), *Hsu* discloses that the mobile station does not switch from the cellular network to a WLAN while the mobile station is active in the cellular network:

In scenario (2) described above, the MS has an active packet data session in the cellular network (*i.e.*, with dedicated channel). The MS may choose not to scan for WLAN while active data session in the cellular network. **In this case, while the MS is active in the cellular network, the MS does not switch to WLAN even though it could access to WLAN.** Although the MS might not be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption. **After the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.**

Id. at [0062]. Rather, *Hsu* explains that the mobile station waits until the mobile station becomes idle in the cellular network to tune away from the cellular network to scan for WLAN coverage. *Id.*

78. If the mobile station detects WLAN coverage, *Hsu* explains that the mobile station may then proceed to handover its packet data session to the WLAN:

The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon. Then, the MS may have the

following behaviors. (1) **If the MS detects WLAN coverage,** the MS tunes back to the cellular network to notify the WLAN search result. The cellular network then sends a signaling message to instruct the MS to handoff to WLAN. **The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.** If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064]; *see also id.* at [0065], [0067], [0074], [0085]. An example implementation of the foregoing process discussed further herein is illustrated in *Hsu's* Figure 10B, which I have reproduced below:

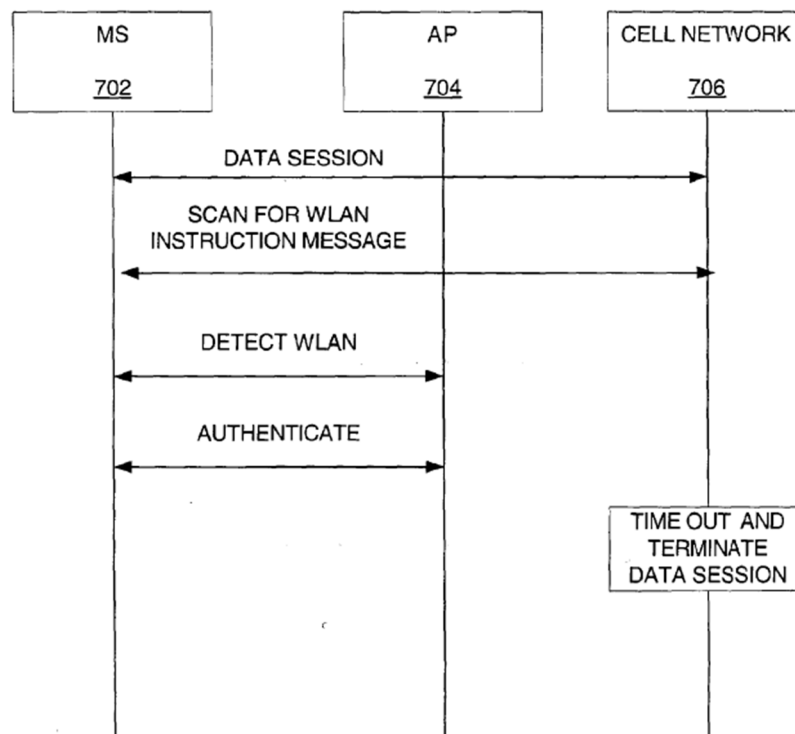


FIG. 10B

Hsu, Ex. 1005, Fig. 10B

With respect to Figure 10B, *Hsu* explains that upon detecting WLAN coverage, the mobile station tunes to the cellular network to notify the cellular network of the scan result and then proceeds to initiate authentication to handover a packet data session to the WLAN (without receiving an instruction from the cellular network):

FIG. 10B illustrates another example of scenario (2), wherein the MS 702 currently has a packet data session with the cell network 706. The MS 702 scans for a WLAN instruction message from the cell network 706. Using the WLAN instruction message, which provisions the MS, the MS scans for WLAN coverage. **Upon detection of the WLAN, the MS 702 notifies the cell network of the result. As illustrated, the MS 702 detects a WLAN (AP 704), and in response initiates authentication with the AP 704.** The cellular network 706 then starts a timer, and when a time out period is expired, the cellular network 706 removes the data session.

Id. at [0074].

79. For reasons I discuss below in Section IX.B.1.c, a person of ordinary skill in the art would have understood that a period in *Hsu* “[a]fter the MS becomes idle in the cellular network” comprises “at least one silent period of an application.” And, for the reasons I discuss below in Section IX.B.1.d, a person of ordinary skill in the art would have understood *Hsu* to disclose a “proactive” handoff technique at

least because *Hsu* discloses performing handoff actions based on factors aside from the connection with the cellular network degrading, and thus requiring handoff.

80. Additionally, for the reasons I discuss below in Section IX.B.1.b, a person of ordinary skill in the art would have understood that *Hsu*'s mobile station tunes away from the cellular network to scan for WLAN coverage (when the mobile station is idle in the cellular network) and performs access authentication and Mobile IP registration if WLAN coverage is detected *while* the mobile station has a packet data session with the cellular network that the mobile station would use to transport data were the mobile station no longer idle in the cellular network.

81. Accordingly, *Hsu* discloses or suggests a mobile station proactively scanning for WLAN coverage when the mobile station is idle in the cellular network and, if WLAN coverage is detected, performing access authentication and Mobile IP registration to handover a packet data session to a WLAN ("performing silent proactive handoff of a mobile device to a target network") while the mobile station has a packet data session with the cellular network ("while the mobile device is using a current network").

b. "while the mobile device is using the current network to transport application traffic and the current network satisfies the mobile device's requirements,"

82. In my opinion, *Hsu* discloses or suggests these features. For example, *Hsu* explains that the mobile station performs system detection and selection when

the mobile station has an active packet data session with a cellular network and desires to scan for WLAN coverage:

The MS performs system detection and selection in the following scenarios: (1) the MS is idle (not active in communication) with respect to the cellular network, having no dedicated channel, and desires to scan for WLAN; **(2) the MS has an active packet data session with the cellular network, having a dedicated channel, and desires to scan for WLAN;** (3) the MS is tuned to the WLAN, and desires to receive cellular pages; and (4) the MS is tuned to the WLAN but with low signal strength.

Id. at [0060].

83. In my opinion, a person of ordinary skill in the art would have readily recognized that, when *Hsu*'s mobile station has a packet data session with the cellular network that is "active," *Hsu*'s mobile station is currently using the cellular network to communicate (or send and receive data). For example, in contrast, *Hsu* explains that the same mobile station may also perform system detection and selection in an alternative scenario ("scenario (1)") where the mobile station is "not active in communication" with the cellular network:

The MS performs system detection and selection in the following scenarios: **(1) the MS is idle (not active in communication) with respect to the cellular network, having no dedicated channel, and desires to scan for WLAN;** (2) the MS has an

active packet data session with the cellular network, having a dedicated channel, and desires to scan for WLAN; (3) the MS is tuned to the WLAN, and desires to receive cellular pages; and (4) the MS is tuned to the WLAN but with low signal strength.

Id.

84. *Hsu* also explicitly indicates that the term “active” refers to when data is being sent or received:

Interface A: The user 52 may manually load new system selection criteria or modify existing system selection criteria in the preference database 56. System selection criteria are rules that the selector 58 will use for decision making. For example, **if an application is active (i.e., sending/receiving data)** and the WLAN access medium is available, then the system should select the WLAN access medium to transport data traffic. The user may input system selection criteria via a user-graphic interface (e.g., window-based programs).

Id. at [0029].

85. Additionally, in my opinion, a person of ordinary skill in the art would have understood that unless and until the mobile station’s packet data session is handed over to another network, any data sent or received by *Hsu*’s mobile station would be sent or received via the cellular network. For example, *Hsu* explains that only after a packet data session is handed over to the WLAN may the mobile station

send or receive data via the WLAN. *See id.* at [0086] (“After the MS 300 performs the handover of the packet data session to the WLAN, the MS 300 may receive data via the WLAN as well as incoming circuit-switched voice calls via the cellular network.”); *see also id.* at [0095] (“The laptop 600 may then maintain the packet data session via the cellular network until handover of the packet data session to the WLAN is completed.”).

86. In the “one-tuner embodiment” relied upon herein, *Hsu* also explains that the mobile station comprises a device that has one tuner for communication and, as such, may only tune to either a cellular network or a WLAN at a given time:

In such a device, the single tuner is used for communication with both the cellular system and the WLAN system. The MS detects WLAN coverage and performs system selection between WLAN and cellular system, wherein the MS may only tune to one system (WLAN or cellular) at a given time.

Hsu, [0059]. In my opinion, because *Hsu* discloses that the mobile station may only tune to either the cellular network or the WLAN at a given time, and because *Hsu* explains that the packet data session is maintained with the cellular network until the packet session is handed over to the WLAN (*e.g.*, by performing access authentication and Mobile IP registration) as I discuss further below, a person of ordinary skill in the art would readily recognize that *Hsu*’s mobile station uses the

cellular network to transport any data (including application traffic) until the packet data session is handed over to the WLAN.

87. Indeed, *Hsu* explains that a packet data session with the cellular network is maintained—even when not “active”—until the packet data session is handed over to the WLAN. For example, in scenario (2), after waiting until the mobile station becomes idle (or is no longer active) in the cellular network to tune away from the cellular network to scan for WLAN coverage, *Hsu* describes the mobile station handing over its packet data session to the WLAN:

If the MS detects WLAN coverage, the MS tunes back to the cellular network to notify the WLAN search result. The cellular network then sends a signaling message to instruct the MS to handoff to WLAN. **The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.** If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064]; *see also id.* at [0065]. Also with respect to scenario (2), *Hsu* describes the mobile station restoring the “active state” of the packet data session if the mobile station does not detect WLAN coverage:

(3) If the MS fails to detect WLAN coverage, the MS re-tunes to the cellular network and sends a signaling reply message to

inform the cellular network about the WLAN search result, and
**the network restores the active state of the MS's packet data
session.**

Id. at [0066]; *see also id.* at [0067] (“If the MS fails to detect WLAN coverage or fails WLAN access authentication, the MS re-tunes to cellular network and sends a signaling message to request the cellular network to restore the active state of the MS’s packet data session.”). Accordingly, *Hsu* explains that, when the mobile station becomes idle within the cellular network (*e.g.*, when the packet data session is not “active”) and the mobile station tunes away from the cellular network to scan for WLAN coverage and then perform access authentication and Mobile IP registration if WLAN coverage is detected, the mobile station still has a packet data session with the cellular network until access authentication (and Mobile IP registration) are successful and the packet data session is handed over to the WLAN.

88. For these reasons, in my opinion, a person of ordinary skill in the art would have understood that, in *Hsu*’s scenario (2), the mobile station tunes away from the cellular network to scan for WLAN coverage (when the mobile station is idle in the cellular network) and performs access authentication and Mobile IP registration if WLAN coverage is detected **while** the mobile station has a packet data session with the cellular network that the mobile station would use to transport data (including application traffic).

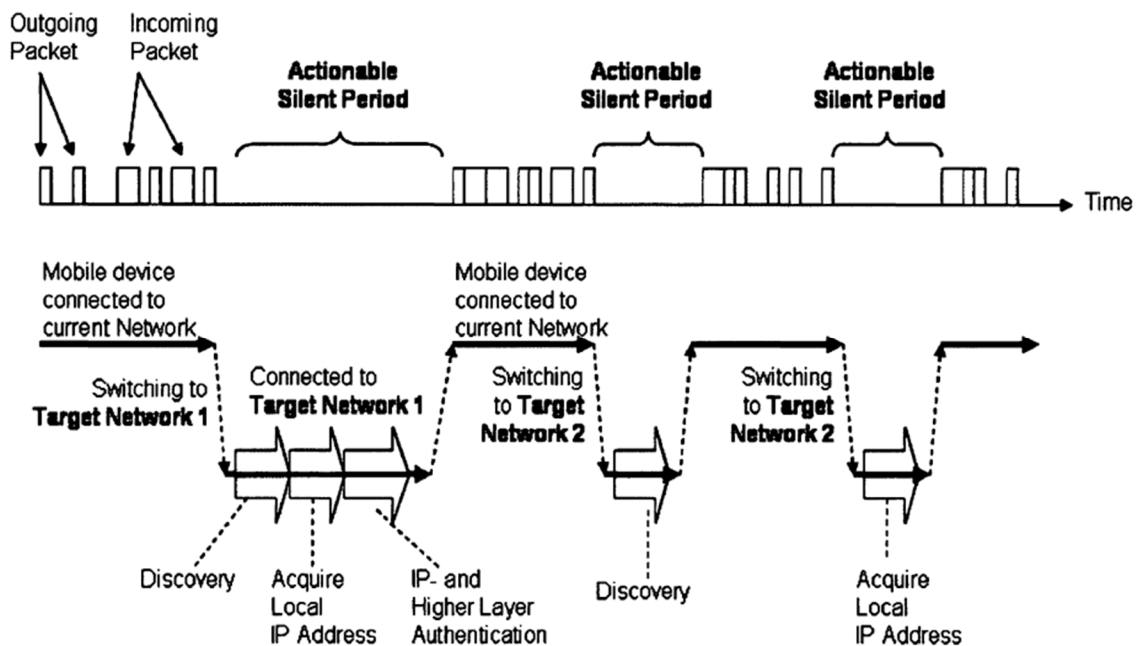
89. I have been asked to assume that Patent Owner may argue that claim 1 requires that a mobile device transport application traffic using the current network contemporaneously with the mobile device using a silent period to temporarily connect to a target network to proactively perform at least one handoff action. In my opinion, such an argument is incorrect because a person of ordinary skill in the art would have understood that a mobile device cannot use a silent period *of an application* to temporarily connect to a target network and simultaneously be transporting application traffic.

90. Nevertheless, in my opinion, a person of ordinary skill in the art would have recognized that *Hsu*'s mobile station waiting until the mobile station becomes idle (or is no longer active) in the cellular network to tune away from the cellular network to scan for WLAN coverage closely resembles the '348 patent's disclosure regarding the use of a silent period to perform one or more handoff actions. For example, the '348 patent discloses that the mobile device switch back and forth between the current and target networks during silent periods (as opposed to maintaining simultaneous connections with both networks):

Since the above process of switching to the target network and then switching back to the current or old network can be advantageously done during the otherwise silent periods of the mobile device, the switching can be effectively transparent to the

applications on the mobile device and, hence, will avoid interruptions to such applications.

'348 patent, 12:11-16; *see also id.* at claim 16 (discussed further herein). Figure 3 of the '348 patent (reproduced below) also illustrates the use of silent periods to perform handoff actions ('348 patent, 12:17-20):



'348 Patent, Ex. 1001, Fig. 3

Indeed, similar to *Hsu*'s mobile station waiting until the mobile station becomes idle in the cellular network to tune away from the cellular network (and to the WLAN network) to perform one or more actions, Figure 3 of the '348 patent illustrates a similar arrangement in which a mobile device switches from a current network to a target network during silent periods to perform handoff actions (as opposed to

maintaining simultaneous connections with both the current network and target network).

91. Ultimately, for the foregoing reasons, a person of ordinary skill in the art would have understood *Hsu* to disclose or suggest a mobile station tuning away from the cellular network to scan for WLAN coverage (when the mobile station is idle in the cellular network) and performing access authentication and Mobile IP registration if WLAN coverage is detected while the mobile station has a packet data session with the cellular network that the mobile station would use to transport data (including application traffic) were the mobile station no longer idle in the cellular network (“while the mobile device is using the current network to transport application traffic”).

92. *Hsu* also discloses that the mobile station may not scan for WLAN when the mobile station is active in the cellular network (*i.e.*, has an **active** packet data session) or perform handover of a packet data session unless the mobile station is idle in cellular network:

In scenario (2) described above, the MS has an active packet data session in the cellular network (*i.e.*, with dedicated channel). The MS may choose not to scan for WLAN while active data session in the cellular network. **In this case, while the MS is active in the cellular network, the MS does not switch to WLAN even though it could access to WLAN.** Although the MS might not

be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption. **After the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.**

Id. at [0062]; *see also id.* at [0082], [0085]. Rather, *Hsu* explains that the mobile station waits until the mobile station becomes idle in the cellular network to tune away from the cellular network to scan for WLAN coverage or to perform handover a packet data session to ensure there is no service interruption or that any service interruption is minimized. *Id.* at [0062] (“Although the MS might not be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption.”); *id.* at [0085] (“The MS 300 may wait for a pending packet data session to go dormant in the cellular network. The MS 300*d* then performs packet data session handover (i.e., sending Mobile IP registration via WLAN). This may be useful to minimize service interruption.”); *see also id.* at [0096] (“Alternatively, the laptop may switch to the WLAN if the packet data session currently has no data pending transfer so as to minimize service interruption (e.g., downloading a file).”).

93. In my opinion, a person of ordinary skill in the art would have understood that a mobile station waiting for an active packet data session to become idle in the cellular network indicates that the cellular network satisfies the mobile station’s requirements. Indeed, a person of ordinary skill in the art would have

understood that the mobile station would not wait to scan for WLAN (or perform handover of a packet data session) if the current network did not satisfy the mobile station's requirements. Additionally, *Hsu* expressly discloses that the mobile station may not switch to a WLAN the mobile station can access when the mobile station is active in a cellular network "to avoid service interruption." *Id.* at [0062]. In my opinion, a person of ordinary skill in the art would have understood that a mobile station would not forgo switching away from a network to reduce the likelihood of service interruption if that service was already (or also) interrupted. *See id.* at [0063] (describing the cellular network instructing the mobile station to handover its packet data session to the WLAN if, for example, the cellular network is overloaded). Indeed, a person of ordinary skill in the art would have readily recognized that such a network would fail to satisfy the mobile device's requirements. Thus, in my opinion, a person of ordinary skill in the art would have readily recognized that, in scenario (2), the cellular network satisfies the mobile device's requirements.

94. Ultimately, for the foregoing reasons, a person of ordinary skill in the art would have understood *Hsu* to disclose or suggest a mobile station tuning away from the cellular network to scan for WLAN coverage (when the mobile station is idle in the cellular network) and performing access authentication and Mobile IP registration if WLAN coverage is detected while the mobile station has a packet data session with the cellular network that the mobile station would use to transport data

(including application traffic) were the mobile station no longer idle in the cellular network (“while the mobile device is using the current network to transport application traffic”).

95. Accordingly, *Hsu* discloses or suggests a mobile station tuning away from the cellular network to scan for WLAN coverage when the mobile station is idle in the cellular network and performing access authentication and Mobile IP registration if WLAN coverage is detected while the mobile station has a packet data session with the cellular network (“while the mobile device is using the current network to transport application traffic”) and that the cellular network satisfies the mobile station’s requirements.

c. “having the mobile device use at least one silent period of an application to temporarily connect to at least one target network”

96. In my opinion, *Hsu* discloses or suggests this feature. For example, *Hsu* discloses that the mobile station does not switch from the cellular network to a WLAN while the mobile station is active in the cellular network:

In scenario (2) described above, the MS has an active packet data session in the cellular network (i.e., with dedicated channel). The MS may choose not to scan for WLAN while active data session in the cellular network. **In this case, while the MS is active in the cellular network, the MS does not switch to WLAN even though it could access to WLAN.** Although the MS might not

be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption. **After the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.**

Id. at [0062]. Rather, *Hsu* explains that the mobile station waits until the mobile station becomes idle in the cellular network to tune away from the cellular network to scan for WLAN coverage. *Id.*

97. To scan for WLAN coverage when the mobile station becomes idle, *Hsu* describes the mobile station tuning to WLAN frequencies and, if WLAN coverage is detected, tuning back to the cellular network:

The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon. Then, the MS may have the following behaviors. (1) **If the MS detects WLAN coverage, the MS tunes back to the cellular network to notify the WLAN search result.** The cellular network then sends a signaling message to instruct the MS to handoff to WLAN. The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN. If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064]; *see also id.* at [0066] (also describing the mobile station tuning back to the cellular network if the mobile station fails to detect WLAN coverage).

98. In my opinion, a person of ordinary skill in the art would have understood a period of time when *Hsu*'s mobile station is "idle" with respect to the cellular network to comprise a "silent period of an application," as recited by independent claim 1 of the '348 patent. For example, the '348 patent explains what may constitute a "silent period":

In the preferred embodiments, a silent period is a time period during which the mobile has no traffic to send or receive over the current access network. In some embodiments, a silent period can be defined as a time period during which the mobile has substantially no traffic to send or receive. In preferred embodiments, during a silent period, a mobile device would not be expecting incoming traffic at the IP and higher protocol layers. Moreover, in preferred embodiments, the mobile device will not control if and/or when there may be incoming traffic, but the mobile device will predict or estimate silent periods. Thus, in preferred embodiments, a silent period is a time period during which the mobile device does not need to send or receive IP or higher layer traffic (e.g., not just application layer traffic). In some instances, the mobile device may send traffic at protocol layers below the IP layer during a silent period. In addition, in some examples, a silent period can include time periods during which the mobile device may send or receive only certain IP layer or higher layer traffic (such as, e.g., application layer traffic) which, when temporarily

interrupted (e.g., delayed or discarded), will substantially not cause undesirable or unexpected effects to the user of a mobile device.

'348 patent, 7:59-8:13. In my opinion, a person of ordinary skill in the art would have understood *Hsu* to disclose waiting to tune away from a cellular network to scan for WLAN coverage until a mobile station is idle in the cellular network, and that when the mobile station is "idle," the mobile station is "not active in communication" (*Hsu*, [0060]) and is thus not "sending/receiving data" (*id.* at [0029]), and that a period of time when the mobile station is not active in communication (or sending/receiving data) is a time period in which there is not traffic (or substantially no) traffic to send or receive.

99. *Hsu* indicates that a period of time when a mobile station is "idle" with respect to the cellular network is a period of time when the mobile station is "not active in communication":

The MS performs system detection and selection in the following scenarios: (1) **the MS is idle (not active in communication) with respect to the cellular network**, having no dedicated channel, and desires to scan for WLAN; (2) the MS has an active packet data session with the cellular network, having a dedicated channel, and desires to scan for WLAN; (3) the MS is tuned to the WLAN, and desires to receive cellular pages; and (4) the MS is tuned to the WLAN but with low signal strength.

Id. at [0060]; *see also id.* at [0029] (equating “active” with “sending/receiving data”). A person of ordinary skill in the art would have thus understood that a period of time when *Hsu*’s mobile station is “idle” with respect to the cellular network is a period of time when the packet data session is not “an **active** packet data session in the cellular network.” *Id.* at [0062]. For example, as I discussed above in Section IX.B.1.b, *Hsu* explains that a packet data session is maintained with the cellular network—even when not “active”—until the packet data session is handed over to the WLAN. *Id.* at [0064]-[0067].

100. Moreover, *Hsu* explains that the mobile station waits until the mobile station becomes idle in the cellular network to tune away from the cellular network to scan for WLAN coverage or to perform handover a packet data session to ensure there is no service interruption or that any service interruption is minimized. *Id.* at [0062] (“Although the MS might not be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption.”); *id.* at [0085] (“The MS 300 may wait for a pending packet data session to go dormant in the cellular network. The MS 300d then performs packet data session handover (i.e., sending Mobile IP registration via WLAN). This may be useful to minimize service interruption.”); *see also id.* at [0096] (“Alternatively, the laptop may switch to the WLAN if the packet data session currently has no data pending transfer so as to minimize service interruption (e.g., downloading a file).”). As such, a person of

ordinary skill in the art would readily recognize that the time period when the mobile station is idle in the cellular network is a time when there is not traffic that, when interrupted, would cause undesirable or unexpected effects to the user of the mobile station.

101. In my opinion, a person of ordinary skill in the art would also have understood the time period when *Hsu*'s mobile station is idle in the cellular network to comprise a time period when an application operating on the mobile station is idle in the cellular network. Indeed, for the reasons provided above, a person of ordinary skill in the art would understand *Hsu* to disclose that the mobile station has no data (including application data) to send or receive when the mobile station is idle in the cellular network. *See id.* at [0060] (explaining that, when the mobile station is idle, the mobile station is “not active in communication”); *id.* at [0029] (equating “active” with “sending/receiving data”).

102. Moreover, *Hsu* explains that a mobile station may decide whether to scan for WLAN coverage based on a number of factors, including “application status”:

The MS 300 may decide to scan for WLAN coverage based on one or more factors, e.g., user command(s), pre-configured preference(s), application status (e.g., on-going packet data session), WLAN availability advertisement as received from the cellular network, etc.

Hsu, [0082]; *see also id.* at [0035] (“The Selector 58 may enable or disable one or more Access Medium Detectors 60 based on user input, application status, and/or system selection criteria from the preference database 56.”). In doing so, *Hsu* provides that an example of an application status is whether there is an “on-going packet data session.” *Id.* Thus, in my opinion, a person of ordinary skill in the art would have understood *Hsu* to suggest that the state of a packet data session may indicate the status of at least one application.

103. In my opinion, a person of ordinary skill in the art would also have understood *Hsu*’s mobile station tuning away from the cellular network to scan for WLAN coverage to comprise the mobile station temporarily connecting to the WLAN. Indeed, in my opinion, a person of ordinary skill in the art would have understood *Hsu* to disclose that the connection to the WLAN frequency is temporary because *Hsu* describes tuning back to the cellular network if WLAN coverage is detected. *See Hsu*, [0064], [0074].

104. I have been asked to consider that Patent Owner may argue that “temporarily connect[ing] to at least one target network,” as recited by claim 1 of the ’348 patent requires a connection to the at least one target network only during the silent period. For example, the ’348 patent appears to equate “temporarily” with “only during these silent periods”:

According to the preferred embodiments of the invention, a new approach is used to significantly reduce the handoff delays, which approach is referred to herein as Silent Proactive Handoff (SPH). In some preferred embodiments, a silent proactive handoff operates as follows: when a mobile is using one network (referred to as the old network or the current network) to transport its application traffic and this network can satisfy the mobile device's requirements, the mobile device uses its silent periods to **connect to one or more target neighboring network(s) temporarily (i.e., only during these silent periods)** and uses this temporary connectivity to perform actions needed for handoff into the target network.

'348 patent at 7:55-57. In my opinion, and for the sake of argument, if the Board were to accept such an argument, *Hsu* nevertheless discloses connecting to the WLAN only during the silent period for reasons provided further herein. For example, as I discussed above in Section IX.B.1.b, *Hsu* explains that the mobile station waits until the mobile station becomes idle in the cellular network to tune away from the cellular network to scan for WLAN coverage or to perform handover a packet data session to ensure there is no service interruption or that any service interruption is minimized. As I discussed above in this section, *Hsu* also describes returning to the cellular network to notify the cellular network of the scan result. *Hsu*, [0064]. And as I also discuss further herein (*see, e.g.*, Section IX.B.5.a), after

detecting WLAN coverage, *Hsu* expressly contemplates that a mobile station may consider whether the mobile station is idle in the cellular network (and even waits until the mobile station is idle) before handing over a packet data session. *See id.* at [0085]. Accordingly, in my opinion, a person of ordinary skill in the art would have understood *Hsu* to disclose tuning away from the cellular network and connecting to the WLAN to scan for WLAN coverage or to perform handover a packet data session only when the mobile station is idle in the cellular network.

105. I have also been asked to consider that Patent Owner may argue that “temporarily connect[ing] to at least one target network,” as recited by claim 1 of the ’348 patent requires establishing the necessary connection or association with a target network such that a mobile device can receive IP-layer and/or high layer advertisement messages. For example, the ’348 patent provides:

In this disclosure, **the terminology “connected to a target network” refers to the establishment of the necessary connection or association with a target network to the extent that the mobile can receive IP-layer and/or high layer advertisement messages.** Once connected to a target network, the mobile can perform a range of actions during the silent period that need to be done during an actual handoff.

’348 patent at 8:41-47. I note, however, that this language appears nearly verbatim in dependent claim 4, which I have discussed further below. Thus, for the sake of

argument, if the Board were to accept such an argument and construe claim 1 to include these additional features recited by dependent claim 4, it is my opinion that *Hsu* discloses or suggests such features for the reasons I discuss below in Section IX.B.4.a.

106. Accordingly, *Hsu* discloses or suggests waiting until the mobile station becomes idle in the cellular network (“use at least one silent period of an application”) to tune to a WLAN to scan for WLAN coverage (“to temporarily connect to at least one target network”).

d. “to proactively perform at least one handoff action for potential later handoff to the target network.”

107. In my opinion, *Hsu* discloses or suggests these features. For example, *Hsu* discloses that the mobile station does not switch from the cellular network to a WLAN while the mobile station is active in the cellular network:

In scenario (2) described above, the MS has an active packet data session in the cellular network (i.e., with dedicated channel). The MS may choose not to scan for WLAN while active data session in the cellular network. **In this case, while the MS is active in the cellular network, the MS does not switch to WLAN even though it could access to WLAN.** Although the MS might not be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption. **After the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.**

Id. at [0062]. Rather, *Hsu* explains that the mobile station waits until the mobile station becomes idle in the cellular network to tune away from the cellular network to scan for WLAN coverage. *Id.* If the mobile station detects WLAN coverage, *Hsu* explains that the mobile station may then proceed to handover its packet data session to the WLAN:

The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon. Then, the MS may have the following behaviors. (1) If the MS detects WLAN coverage, the MS tunes back to the cellular network to notify the WLAN search result. The cellular network then sends a signaling message to instruct the MS to handoff to WLAN. The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN. If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064].

108. In my opinion, a person of ordinary skill in the art would have understood *Hsu* to disclose “proactively” scanning for WLAN coverage because *Hsu* discloses scanning for WLAN coverage based one or more factors aside from the status of the connection with the cellular network. Indeed, a person of ordinary skill in the art at the time of the alleged invention would have understood handoffs (or

handoff actions) performed “proactively” to comprise handoffs (or handoff actions) performed when not required due to the state of a current connection.

109. For example, *Chaskar*³ relates to controlling handover between networks and explains that initiating handoffs based on signal strength alone can cause an undesirable ping-pong effect. *See Chaskar*, [0002], [0006]. *Chaskar* explains that the performance of inter-technology handoff can be improved if certain actions are performed “proactively, i.e., while the mobile terminal still sees a strong WLAN signal”:

The performance of inter-technology handoff (or IP-layer handoff in general) can be improved if some of the handoff messaging can be done **proactively, i.e., while the mobile terminal still sees a strong WLAN signal**. These proactive steps could include, for example, acquiring the cellular network, performing Mobile IP Fast Handoff signaling as described in “Low Latency Handoffs in Mobile IPv4”, Internet draft, draft-ietf-mobileip-lowlatency-handoffs-v4-04.txt, June 2002, and “Fast Handovers for Mobile IPv6”, Internet draft, draft-ietf-mobileip-fast-mipv6-05.txt, September 2002, authenticating

³ To be clear, here, I am relying on *Chaskar* as evidence of a person of ordinary skill in the art’s knowledge and the state of the art. *Chaskar* is not part of unpatentability Ground 1.

with the cellular network, performing Candidate Access Router Discovery as described in “Issues in Candidate Access Router Discovery for Seamless IP layer Handoffs”, Internet draft, draft-ietf-seamoby-cardiscovery-issues-04.txt, October 2002, informing the target network about QoS (Quality of Service) and other requirements of current applications, etc. **Then, as soon as the WLAN signal strength diminishes, the mobile terminal can send a final trigger to the cellular network to complete the handoff process (i.e., actually commit the radio resources, arrange for packet rerouting, etc.).**

Id. at [0009]. *Chaskar* also explains that, after these actions are performed proactively, the remaining steps to complete the handoff process may be performed when the signal strength of the current network diminishes. *Id.* Notably, *Chaskar* also describes handoff schemes as being logically partitioned into a “proactive” phase and a “reactive” phase:

FIGS. 6 and 7 also show the logical partitioning of each of the handoff schemes into two phases: Phase 1, i.e. preparing a handover procedure, which is the **proactive phase and needs to be completed when WLAN signal is still strong**, and Phase 2, i.e. performing actual handover, **which is reactive, i.e., can be initiated after WLAN signal starts to fade noticeably.**

Id. at [0062]; *see also id.* at [0075] (explaining that, at the time, many handoff schemes “include[d] extensive proactive procedures”).

110. As another example, *Dorenbosch*⁴ discloses a method for providing a fast handover of wireless communication units between wireless networks through “proactive” registration. *See Dorenbosch*, [0001]. *Dorenbosch* explains that “proactive” registration refers to registration initiated “before it is required”:

In this manner, proactive registration or registering with the second network concurrently with or before a call is initiated provides for increased battery life because the communication units are not always linked to both the first and the second networks. In addition, **proactive registration** reduces the likelihood of dropping a call or communication or experiencing poor network service when a communications unit is handed over from a first network to a second network **by initiating registration with the second network before it is required.**

Id. at [0048]; *see also id.* at [0020] (providing that, for a handover to be accomplished, registration on the system that communication is being handed to is required). *Dorenbosch* also explains that whether a handover is required is based on the state of the connection to a current (or present) network:

⁴ To be clear, here, I am relying on *Dorenbosch* as evidence of a person of ordinary skill in the art’s knowledge and the state of the art. *Dorenbosch* is not part of unpatentability Ground 1

The specifics of deciding whether a handover is required are beyond the scope of this disclosure but would include determining that ongoing service with the present network is not feasible, not practical, or no longer appropriate for some reasons.

Id. at [0034].

111. *Hsu* describes the mobile station tuning away from a cellular network to scan for WLAN coverage when a mobile station becomes idle in the cellular network:

In scenario (2) described above, the MS has an active packet data session in the cellular network (i.e., with dedicated channel). The MS may choose not to scan for WLAN while active data session in the cellular network. **In this case, while the MS is active in the cellular network, the MS does not switch to WLAN even though it could access to WLAN.** Although the MS might not be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption. **After the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.**

Id. at [0062]. Alternatively, *Hsu* describes the mobile station tuning away from a cellular network to scan for WLAN coverage when instructed by a network, for example, when the network is overloaded or when the mobile station has low power strength:

Alternatively, the cellular network may direct the MS to scan for WLAN coverage. In this case, the cellular network instructs the MS to scan for WLAN coverage. If there is WLAN coverage, the network may direct the MS to handover its packet data session to WLAN. **This procedure might be useful when the network is overloaded or when the MS has low power strength.** The procedure is described hereinbelow and is similar to the candidate frequency search procedure in a system supporting cdma2000.

Id. at [0063].

112. *Hsu* also describes that the determination to scan for WLAN coverage may be reached separately and independently of the determination to handover a packet data session. For example, *Hsu* explains that the mobile station may decide to scan for WLAN coverage based on a number of factors:

In scenario (1) described above, **if the MS is idle in the cellular network (i.e., no dedicated channel), the MS may decide to scan for WLAN coverage based on one or more factors, e.g., user command, pre-configured preference, WLAN availability advertisement as received from the cellular network, etc.**

Id. at [0061]; *see also id.* at [0082].

113. *Hsu* also explains that the determination to handover a packet data session may be based on a signaling message received from the cellular network:

The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon. Then, the MS may have the following behaviors. (1) If the MS detects WLAN coverage, the MS tunes back to the cellular network to notify the WLAN search result. **The cellular network then sends a signaling message to instruct the MS to handoff to WLAN.** The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN. If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064]. Alternatively (or additionally), *Hsu* provides that the determination to handover a packet data session may be made by the mobile station based on a number of factors:

After the MS 300 detects WLAN coverage, receives the WLAN beacon, the MS 300 uses certain criteria to handover a packet data session from the cellular network to the WLAN. The criteria may include whether the MS is idle in cellular network (i.e., no dedicated channel) or whether the WLAN signal strength is stable, etc. The MS 300 may wait for a pending packet data session to go dormant in the cellular network. The MS 300_d then performs packet data session handover (i.e., sending Mobile IP registration via WLAN). This may be useful to minimize service interruption. Similarly, the MS 300 may perform packet data session handover when the

WLAN signal strength is above an acceptable threshold for a specified period of time. In this way, the MS 300 ensures that access to the WLAN is sustainable. The measure may be any measure of channel quality and/or signal strength. The threshold may be predetermined or may dynamically be adjusted based on the actual performance of the communication. This may be useful to avoiding any ping-pong effect whereby the MS 300 switches between WLAN access and cellular network access due to changing conditions or signal strength that is at the margin of tolerance for operation. Still further, upon detection of the WLAN, the MS 300 may notify the user and wait for the user to manually select WLAN.

Id. at [0085]; *see also* Section IX.B.7.b (discussing *Hsu*'s one-tuner and two-tuner embodiments).

114. Regardless, in my opinion, a person of ordinary skill in the art would have understood that deciding to scan for WLAN coverage (*e.g.*, based on one or more factors), and then, if WLAN coverage is detected, separately determining whether to handover a packet data session to the WLAN (either by the cellular network or by the mobile station) indicates that the scan for WLAN coverage is performed “proactively.” Ultimately, because the packet data session is not automatically handed over (or at least not right away) if WLAN coverage is detected,

handover is not necessitated based on the status of the connection with the cellular network.

115. In my opinion, a person of ordinary skill in the art would also have recognized that scanning for WLAN coverage constitutes a handoff action. Indeed, a person of ordinary skill in the art would understand that scanning for coverage is an essential part of the handoff process. *See Waharte* at 2 (“At the MAC layer, the handoff process as defined in the IEEE 802.11 Standard can be decomposed into three phases: scanning, authentication and reassociation (Figure 1).”); *Li* at 71 (“The complete handoff process in the IEEE 802.11 MAC layer can be divided into three distinct sub-processes: scanning to obtain a suitable AP, authentication, and re-association.”).⁵

116. The '348 patent also identified three examples of types of handoff actions, including “discovering neighboring network information”:

Once connected to a target network, the mobile can perform a range of actions during the silent period that need to be done

⁵ To be clear, here, I am relying on *Waharte* and *Li* as evidence of a person of ordinary skill in the art’s knowledge and the state of the art. *Waharte* and *Li* are not part of unpatentability Ground 1.

during an actual handoff. In some embodiments, these actions can include some or all of the following:

Neighboring network information discovery: This may be done to discover the information needed by the mobile to handoff into the neighboring network. To do so, the mobile device can listen to advertisements at layer-2, the IP-layer and/or the application layer from the target network to obtain information regarding the target network. This information may include, e.g., the addresses of the access IP routers, addresses of the IP address allocation servers (e.g., Dynamic Host Configuration Protocol (DHCP) servers), addresses of the authentication routers, and other parameter values needed to perform authentication with the target network.

Obtain local IP address from the target network: This may be done to obtain a local IP address from the target network that the mobile can use to receive from IP packets from the target network.

Perform authentication with the target network: This may be done to perform layer-2, layer-3, and/or application-layer authentication with the target network if the target network requires such authentication(s).

'348 patent, 8:45-9:2; *see also id.* at 5:64-6:2. Notably, the '348 patent also appears to suggest that any action associated with establishing a connection to a target network may comprise a handoff action:

In this disclosure, among other actions, the foregoing actions and the action to establish a connection to a target network as are referred to as types of Handoff Actions.

Id. at 9:3-5. A person of ordinary skill in the art would also have understood scanning for WLAN coverage to comprise a handoff action because scanning for WLAN coverage fits within one of the types of handoff actions contemplated by the '348 patent. Indeed, a person of ordinary skill in the art would have recognized that scanning for WLAN coverage comprises “discovering neighboring network information” as it comprises at least listening to advertisements at layer-2 from the target network to obtain information regarding the target network.

117. Accordingly, *Hsu* discloses or suggests a mobile station proactively scanning for WLAN coverage (“proactively perform at least one handoff action”) and, if WLAN coverage is detected, performing access authentication and Mobile IP registration to handover its packet data session to the WLAN (“for potential later handoff to the target network”).

2. Claim 2

- a. **“The method of claim 1, wherein said mobile device sends or receives substantially no traffic over the current access network during the at least one silent period.”**

118. In my opinion, *Hsu* discloses or suggests this feature. For example, *Hsu* discloses that the mobile station may not scan for or switch to a WLAN while the mobile station has an active data session in the cellular network.

In scenario (2) described above, the MS has an active packet data session in the cellular network (i.e., with dedicated channel). The MS may choose not to scan for WLAN while active data session in the cellular network. **In this case, while the MS is active in the cellular network, the MS does not switch to WLAN even though it could access to WLAN.** Although the MS might not be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption. **After the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.**

Id. at [0062]. For the reasons I discussed above in Section IX.B.1.c, a person of ordinary skill in the art would have understood that the period of time in *Hsu* when a mobile station is “idle” with respect to the cellular network is a period of time when the mobile station is “not active in communication” and when the packet data session is not an “active” packet data session. *See, e.g., id.* at [0060] (explaining that, when

the mobile station is idle, the mobile station is “not active in communication”); *id.* at [0029] (equating “active” with “sending/receiving data”).

119. In my opinion, a person of ordinary skill in the art would also have understood that a period of time in which a mobile station is “not active in communication” and has no “active packet data session in the cellular network” comprises a period of time in which the mobile station “sends or receives substantially no traffic over the current access network.” For example, as I discussed above, *Hsu* also explicitly indicates that the term “active” refers to when data is being sent or received:

Interface A: The user 52 may manually load new system selection criteria or modify existing system selection criteria in the preference database 56. System selection criteria are rules that the selector 58 will use for decision making. For example, **if an application is active (i.e., sending/receiving data)** and the WLAN access medium is available, then the system should select the WLAN access medium to transport data traffic. The user may input system selection criteria via a user-graphic interface (e.g., window-based programs).

Id. at [0029]. Thus, a person of ordinary skill in the art would have understood that, when a mobile station is “idle” with respect to the cellular network, the mobile station is not sending or receiving any data via the cellular network.

120. Accordingly, *Hsu* discloses or suggests a mobile station using a period of time when the mobile station is not active in communication and has no active packet data session in the cellular network (“sends or receives substantially no traffic over the current access network during the at least one silent period”) to scan for WLAN coverage.

3. Claim 3

- a. “The method of claim 1, further including having the mobile device use the at least one silent period to connect to the target network so that the mobile device receives advertisement messages from the target network.”**

121. In my opinion, *Hsu* discloses or suggests this feature. For example, *Hsu* discloses tuning away from the cellular network to scan for WLAN coverage when a mobile station becomes idle in the cellular network:

In scenario (2) described above, the MS has an active packet data session in the cellular network (i.e., with dedicated channel). The MS may choose not to scan for WLAN while active data session in the cellular network. In this case, while the MS is active in the cellular network, the MS does not switch to WLAN even though it could access to WLAN. Although the MS might not be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption. **After the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.**

Id. at [0062]. To scan for WLAN coverage, *Hsu* explains that the mobile station may tune to WLAN frequencies and actively or passively scan for WLAN beacons:

The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon. Then, the MS may have the following behaviors. (1) If the MS detects WLAN coverage, the MS tunes back to the cellular network to notify the WLAN search result. The cellular network then sends a signaling message to instruct the MS to handoff to WLAN. The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN. If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064]; *see also id.* at [0082] (describing “passive scanning” and “active scanning”).

122. *Hsu* describes that passively or actively scanning for WLAN coverage includes the mobile station scanning for the WLAN beacons sent by the access point of a WLAN network. *See id.* at [0064] (“The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon.”); *id.* at [0082] (“In passive scanning, the MS 300 listens for the WLAN beacon sent by the AP 320 on WLAN frequencies.”). *Hsu* also explains that WLAN beacons “advertise” the WLAN:

Typically, a cellular system transmits a paging indicator periodically to page a mobile station when there is a pending communication. **Similarly, a WLAN may be advertised by a beacon transmitted by the WLAN.** Both the paging indicator and the beacon require the mobile station to scan for the transmitted signal. As the mobile station often has little information as to the location and accessibility of a WLAN, the mobile station may scan for the WLAN periodically expending considerable power. There is a need therefore for an efficient, accurate method of system detection and selection.

(*id.* at [0008]),

Once the MS has the necessary WLAN information, the MS determines when to scan for WLAN coverage. **Generally, the WLAN will transmit a periodic beacon, which is a signal transmitted to advertise the WLAN.** When the MS is able to receive the beacon, the MS is able to access the WLAN.

(*id.* at [0040]). Thus, in my opinion, a person of ordinary skill in the art would have understood *Hsu* to disclose the mobile station scanning for WLAN beacons comprising advertisement messages from the target network.

123. Accordingly, *Hsu* discloses or suggests waiting until the mobile station becomes idle in the cellular network (“use the at least one silent period”) to tune to a WLAN to scan for WLAN coverage (“to connect to the target network”) to receive WLAN beacons advertising the WLAN that are sent by an access point of the

WLAN (“so that the mobile device receives advertisement messages from the target network”).

4. Claim 4

- a. “The method of claim 1, further including having the mobile device use the at least one silent period to establish a layer-2 connection or association with the target network for receiving IP-layer or high layer advertisements from the target network.”**

124. In my opinion, *Hsu* discloses or suggests this feature. For example, *Hsu* discloses that the mobile station may wait until it is idle in the cellular network to scan for WLAN coverage:

In scenario (2) described above, the MS has an active packet data session in the cellular network (i.e., with dedicated channel). The MS may choose not to scan for WLAN while active data session in the cellular network. In this case, while the MS is active in the cellular network, the MS does not switch to WLAN even though it could access to WLAN. Although the MS might not be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption. **After the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.**

Id. at [0062]. To scan for WLAN coverage, *Hsu* explains that the mobile station may tune to WLAN frequencies and actively or passively scan for WLAN beacons.

Id. at [0064]. After the mobile station detects WLAN coverage, *Hsu* discloses that

the mobile station performs access authentication and Mobile IP registration to handover its packet data session to WLAN:

The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon. Then, the MS may have the following behaviors. (1) **If the MS detects WLAN coverage,** the MS tunes back to the cellular network to notify the WLAN search result. The cellular network then sends a signaling message to instruct the MS to handoff to WLAN. **The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.** If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064]; *see also id.* at [0065], [0067], [0085].

125. In my opinion, a person of ordinary skill in the art would have understood that *Hsu*'s mobile station tuning away from the cellular network and tuning to a WLAN to scan for a WLAN beacon would comprise establishing a layer-2 connection or association with the WLAN. For example, a person of ordinary skill in the art would have understood that scanning for WLAN coverage occurs at the medium access control (MAC) layer—*i.e.*, layer-2. *See Trossen* at [0034] (“A network layer handover provides a procedure by which the mobile node 111 can change its point of attachment to the network. When the mobile node 111 changes

its point of attachment from the current access point 113 to another access point connected to the same current access router 114 a network layer (layer 2) handover occurs, which is transparent to the routing at the IP layer. When the mobile node 111 changes its point of attachment from the current access point 113 to another access point 121 connected to another access router 122 also an IP layer handover occurs, preferably as defined by the Mobile IP of the IETF.”); *Gwon* at [0005] (“A handoff occurs when a MN moves from one radio AP to another. A mere change of radio AP is called a ‘Layer 2 (L2) handoff,’ which does not involve any Layer 3 (L3) signaling at the IP level. If the new radio access point is associated with a new subnet, i.e., if the MN moves from one subnet to another, a changing in routing reachability occurs and requires Layer 3 (L3) protocol action. This L3 protocol action is called a ‘L3 handoff’ and usually involves exchange of a series of IP messages that are used to update routing information for the MN to make sure that data destined to the MN is routed through the new subnet to the MN.”); *Mishra* at 2 (“At this point, the client might not be able to communicate with its current AP. Thus, the client needs to find the potential APs (in range) to associate to. This is accomplished by a MAC layer function: *scan*.”); *Waharte* at 2 (“At the MAC layer, the handoff process as defined in the IEEE 802.11 Standard can be decomposed into three phases: scanning, authentication and reassociation (Figure 1).”); *Li* at 71 (“The complete handoff process in the IEEE 802.11 MAC layer can be divided into three

distinct sub-processes: scanning to obtain a suitable AP, authentication, and re-association.”); *see also* ’348*Pat.*, 2:5-14 (describing the MAC layer as part of layer-2).⁶

126. In my opinion, a person of ordinary skill in the art would also have understood that a mobile station performing Mobile IP registration to handover a packet data session to a network includes obtaining a “care-of-address” (CoA) from agent advertisements sent by a foreign agent of the new network so that the mobile station may register the new CoA with its home agent. *See Gwon* at [0007] (“The L 3 handoff process pursuant to RFC 2002 requires mobility agents, i.e., foreign agents and home agents, to advertise their presence via Agent Advertisement messages. A MN that receives these Agent Advertisements determines whether it is operating on its home subnet or a foreign subnet. When the MN detects that it has entered a new subnet, it obtains a CoA from Agents Advertisements sent from the foreign agent serving the foreign network. The MN then registers the new CoA by sending a registration request including the CoA to its home agent (HA). The L3 handoff completes when the HA receiving the registration request updates its

⁶ To be clear, here, I am relying on *Trossen*, *Gwon*, *Mishra*, *Waharte*, and *Li* as evidence of a person of ordinary skill in the art’s knowledge and the state of the art. *Trossen*, *Gwon*, *Mishra*, *Waharte*, and *Li* are not part of unpatentability Ground 1.

internal binding information for the MN and returns a registration reply to the MN.”).⁷

127. A person of ordinary skill in the art would also have understood that a layer-2 connection or association with the new network would be needed to receive agent advertisements sent by the foreign agent of the new network. Finally, a person of ordinary skill in the art would have understood that agent advertisements sent by a foreign agent constitute IP-layer advertisements. Thus, a person of ordinary skill in the art would have understood that *Hsu*’s mobile station would establish a layer-2 connection or association with the WLAN to scan for WLAN coverage and perform Mobile IP registration, and that *Hsu*’s mobile station would receive IP-layer advertisements from the WLAN to perform Mobile IP registration.

128. Accordingly, *Hsu* discloses or suggests the mobile station waiting for a pending packet data session to become idle in a cellular network (“having the mobile device use the at least one silent period”) to scan for WLAN coverage and perform Mobile IP registration (“to establish a layer-2 connection or association with the

⁷ To be clear, here, I am relying on *Gwon* as evidence of a person of ordinary skill in the art’s knowledge and the state of the art. *Gwon* is not part of unpatentability Ground 1.

target network for receiving IP-layer or high layer advertisements from the target network”) to handover its packet data session to the WLAN.

5. Claim 5

- a. “The method of claim 1, further including having the mobile device use the at least one silent period to perform layer-2, layer-3 or application layer authentication with the target network.”**

129. In my opinion, *Hsu* discloses or suggests this feature. For example, *Hsu* discloses that, after detecting WLAN coverage, the mobile station performs WLAN access authentication:

The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon. Then, the MS may have the following behaviors. (1) If the MS detects WLAN coverage, the MS tunes back to the cellular network to notify the WLAN search result. The cellular network then sends a signaling message to instruct the MS to handoff to WLAN. **The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.** If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064]; *see also id.* at [0065], [0067], [0085] (describing performing access authentication and/or mobile IP registration to handover the mobile station’s packet data session). *Hsu* also depicts the mobile station authenticating with an access point

of the WLAN with respect to scenario (2) in Figure 10B, which I have reproduced below:

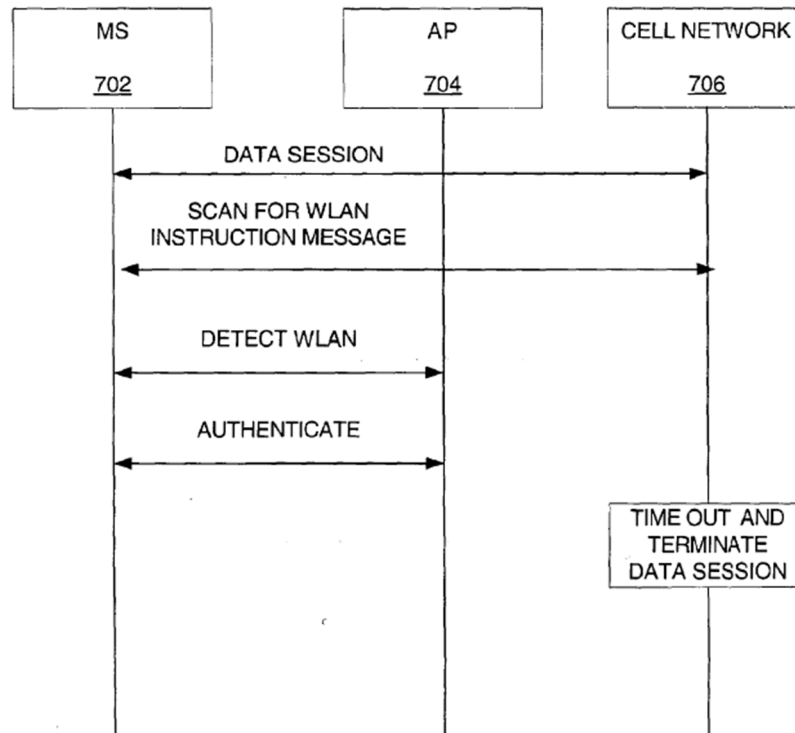


FIG. 10B

Hsu, Ex. 1005, Fig. 10B

See also id. at [0074] (“FIG. 10B illustrates another example of scenario (2), wherein the MS 702 currently has a packet data session with the cell network 706.”).

130. In my opinion, a person of ordinary skill in the art would have understood that *Hsu* performing access authentication to hand over its packet data session to the WLAN would comprise performing layer-2 or layer-3 authentication with the WLAN.

131. As I discussed above in Section IX.B.1.d, *Hsu* discloses a mobile station detecting WLAN coverage when the mobile station becomes idle in the cellular network (*see Hsu*, [0062]), and then performing access authentication and Mobile IP registration to handover a packet data session to the WLAN (*see id.* at [0064]). In my opinion, should the mobile station remain idle within the cellular network after detecting WLAN coverage, it would have been obvious to a person of ordinary skill in the art that the mobile station would perform access authentication and Mobile IP registration while idle in the cellular network (*i.e.*, using the at least one silent period). Indeed, a person of ordinary skill in the art would have understood that proceeding to handover the mobile station's packet data session if the mobile station remains idle within the cellular network would reduce the likelihood of any service interruption, which is also the reason *Hsu* provides for waiting until the mobile station is idle to scan for WLAN coverage. *See id.* at [0062] ("Although the MS might not be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption.").

132. Moreover, after detecting WLAN coverage, *Hsu* expressly contemplates that a mobile station may consider whether the mobile station is idle in the cellular network (and even waits until the mobile station is idle) before handing over a packet data session. *See id.* at [0085]. For example, *Hsu* provides

that the determination to handover a packet data session may be made by the mobile station based on a number of factors:

After the MS 300 detects WLAN coverage, receives the WLAN beacon, the MS 300 uses certain criteria to handover a packet data session from the cellular network to the WLAN. The criteria may include whether the MS is idle in cellular network (i.e., no dedicated channel) or whether the WLAN signal strength is stable, etc. The MS 300 may wait for a pending packet data session to go dormant in the cellular network. The MS 300d then performs packet data session handover (i.e., sending Mobile IP registration via WLAN). This may be useful to minimize service interruption. Similarly, the MS 300 may perform packet data session handover when the WLAN signal strength is above an acceptable threshold for a specified period of time. In this way, the MS 300 ensures that access to the WLAN is sustainable. The measure may be any measure of channel quality and/or signal strength. The threshold may be predetermined or may dynamically be adjusted based on the actual performance of the communication. This may be useful to avoiding any ping-pong effect whereby the MS 300 switches between WLAN access and cellular network access due to changing conditions or signal strength that is at the margin of tolerance for operation. Still further, upon detection of the WLAN, the MS 300 may notify the user and wait for the user to manually select WLAN.

Id. Indeed, as further evidenced by the passage of *Hsu* reproduced above, *Hsu* explicitly provides that the mobile station may “wait for a pending packet data session to go dormant in the cellular network” before handing over a packet data session, and that doing so “may be useful to minimize service interruption.” *Id.*; *see also id.* at [0096] (“If no activity is detected, the laptop 600 performs WLAN access authentication, followed by Mobile IP registration via the WLAN, and finally release of the cellular packet data service option, as described above.”); *see also* Section IX.B.7.b (discussing *Hsu*’s one-tuner and two-tuner embodiments).

133. *Hsu* also repeatedly explains that handing over a packet data session may include performing access authentication and Mobile IP registration. *See, e.g., id.* at [0064] (“The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.”); *id.* at [0065] (“[T]he MS proceeds to perform WLAN access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.”); *id.* at [0085] (“The MS 300d then performs packet data session handover (i.e., sending Mobile IP registration via WLAN).”); *id.* at [0096] (“If no activity is detected, the laptop 600 performs WLAN access authentication, followed by Mobile IP registration via the WLAN, and finally release of the cellular packet data service option, as described above.”). Thus, a person of ordinary skill in the art would have

recognized that *Hsu* expressly contemplates performing access authentication (and Mobile IP registration) when the mobile station is idle in the cellular network.

134. Accordingly, *Hsu* discloses or suggests the mobile station using a period of time when the mobile station is idle in the cellular network (“having the mobile device use the at least one silent period”) to perform access authentication necessary to handover its packet data session to the WLAN (“to perform layer-2, layer-3 or application layer authentication with the target network”).

6. Claim 6

- a. “The method of claim 1, further including having the mobile device perform the following handoff actions during the at least one silent period: a) discovering neighboring network information; b) obtaining a local IP address from the target network; and c) performing authentication with the target network.”**

135. In my opinion, *Hsu* discloses or suggests these features.

136. *Hsu* describes the mobile station tuning away from the cellular network to scan for the WLAN after the mobile station becomes idle in the cellular network:

In scenario (2) described above, the MS has an active packet data session in the cellular network (i.e., with dedicated channel). The MS may choose not to scan for WLAN while active data session in the cellular network. **In this case, while the MS is active in the cellular network, the MS does not switch to WLAN even though it could access to WLAN.** Although the MS might not be able to take the advantage of high-speed WLAN access, the

MS would not experience service interruption. **After the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.**

Id. at [0062]. In my opinion, a person of ordinary skill in the art would have understood that scanning for WLAN coverage comprises “discovering neighboring network information.” Indeed, this is consistent with the ’348 patent, as it provides that discovering neighboring network information may include listening to advertisements at layer-2 from the target network to obtain information regarding the target network:

Neighboring network information discovery: This may be done to discover the information needed by the mobile to handoff into the neighboring network. **To do so, the mobile device can listen to advertisements at layer-2, the IP-layer and/or the application layer from the target network to obtain information regarding the target network.** This information may include, e.g., the addresses of the access IP routers, addresses of the IP address allocation servers (e.g., Dynamic Host Configuration Protocol (DHCP) servers), addresses of the authentication routers, and other parameter values needed to perform authentication with the target network.

’348 patent, 8:45-9:2; *see also id.* at 5:64-6:2. For the reasons I discussed above in Section IX.B.3.a, a person of ordinary skill in the art would have understood the

beacons described in *Hsu* to comprise advertisement messages. For the reasons I discussed above in Section IX.B.1.d, a person of ordinary skill in the art would have understood scanning for a WLAN beacon to comprise a layer-2 function performed by establishing a layer-2 connection or association with the WLAN. In my opinion, a person of ordinary skill in the art would have thus recognized that scanning for WLAN coverage comprises listening to advertisements at layer-2 from the target network to obtain information regarding the target network. Therefore, a person of ordinary skill in the art would have recognized that scanning for WLAN coverage comprises “discovering neighboring network information” as it comprises listening to advertisements at layer-2 from the target network to obtain information regarding the target network. *See* ’348 patent, 8:50-61.

137. Accordingly, *Hsu* discloses or suggests waiting until the mobile station is idle in the cellular network (“during the at least one silent period”) to scan for WLAN coverage (“a) discovering neighboring network information”).

138. *Hsu* also discloses that, after detecting WLAN coverage, the mobile station performs WLAN access authentication and Mobile IP registration to handover its packet data session to the WLAN:

The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon. Then, the MS may have the following behaviors. (1) **If the MS detects WLAN coverage,**

the MS tunes back to the cellular network to notify the WLAN search result. The cellular network then sends a signaling message to instruct the MS to handoff to WLAN. **The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.** If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064]; *see also id.* at [0065], [0067], [0085] (describing performing access authentication and/or mobile IP registration to handover the mobile station's packet data session). For the reasons I discussed above in Section IX.B.5.a, should the mobile station remain idle within the cellular network after detecting WLAN coverage, it would have been obvious to a person of ordinary skill in the art that the mobile station would perform access authentication and Mobile IP registration while idle in the cellular network (*i.e.*, using the at least one silent period).

139. For example, handing over a packet data session while the mobile station is idle in the cellular network is consistent with an objective identified in *Hsu* (*i.e.*, to avoid or minimize service interruption). *See Hsu*, [0062] (“Although the MS might not be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption.”); *id.* at [0085] (“The MS 300 may wait for a pending packet data session to go dormant in the cellular network. The MS 300d

then performs packet data session handover (i.e., sending Mobile IP registration via WLAN). This may be useful to minimize service interruption.”). *Hsu* also expressly considers proceeding to handover a packet data session after detecting WLAN coverage if the mobile station is idle in the cellular network (*id.*) and that handing over a packet data session includes performing access authentication and Mobile IP registration (*see, e.g., id.* at [0064] (“The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.”); *id.* at [0065] (“[T]he MS proceeds to perform WLAN access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.”); *id.* at [0085] (“The MS 300*d* then performs packet data session handover (i.e., sending Mobile IP registration via WLAN).”); *id.* at [0096] (“If no activity is detected, the laptop 600 performs WLAN access authentication, followed by Mobile IP registration via the WLAN, and finally release of the cellular packet data service option, as described above.”)).

140. Accordingly, *Hsu* discloses or suggests using a period in which the mobile station is idle in the cellular network (“during the at least one silent period”) to perform access authentication (“c) performing authentication with the target network”) and Mobile IP registration (“b) obtaining a local IP address from the target network”).

7. Claim 7

- a. **“The method of claim 1, further including having the mobile device determine if the at least one silent period is sufficient to complete one or more handoff action.”**

141. In my opinion, *Hsu* discloses or suggests this feature.

142. *Hsu* describes an embodiment in which a laptop (or other computing device) operates together with a cellular handset:

Note that a wireless device may include multiple tuners, wherein each tuner is adapted for communication with a different access medium, e.g., WLAN and cellular network. **Alternately, a wireless device may be coupled to another wireless device, wherein each includes a tuner, and the combination results in multiple tuners. In one such configuration, a laptop (computing device) operates together with a cellular handset.** The laptop includes a WLAN card or built-in WLAN port, while the handset supports cellular communications. WLAN information (e.g., ESSID) is provisioned in the laptop to scan for WLAN coverage.

Id. at [0092]. I will hereafter refer to that embodiment herein as the “laptop embodiment.” *See generally id.* at [0092]-[0097] (describing the “laptop embodiment”).

143. With respect to the laptop embodiment, *Hsu* explains that the laptop may choose to switch to a WLAN immediately upon detecting a strong WLAN signal:

As detailed in the example given above and with respect to FIG. 9, **when the laptop 600 has a current packet data session with the cellular network 606, the laptop may detect a strong WLAN signal through the resident tuner. The laptop 600 may choose to switch to WLAN access immediately.** Upon WLAN detection, the laptop 600 needs to be authenticated for WLAN access. For single subscription/authentication of WLAN and cdma2000, the secret is stored in the handset's User Interface Module (UIM) (not shown), which may be removable or non-removable. Thus, signaling messages are needed between the laptop 600 and MS 602 to perform WLAN access authentication. If the WLAN access authentication is successful, the laptop 600 performs Mobile IP registration via the WLAN (i.e., via AP 604). If the Mobile IP registration is successful, the laptop 600 sends a message (e.g., AT command) to the MS 602 to release the packet data session. The MS 602 may identify the data session by a Service Option (SO), such as SO 33 in cdma2000. The laptop 600 may then maintain the packet data session via the cellular network until handover of the packet data session to the WLAN is completed.

Id. at [0095]. Alternatively, *Hsu* explains that the laptop may wait to switch to the WLAN until a current packet data session has no data pending transfer to minimize service interruption:

Alternatively, the laptop may switch to the WLAN if the packet data session currently has no data pending transfer so as to minimize service interruption (e.g., downloading a file).

Upon detecting a strong WLAN signal, the laptop 600 waits for a given time period (e.g., several seconds) to detect any activity of data transfer. If no activity is detected, the laptop 600 performs WLAN access authentication, followed by Mobile IP registration via the WLAN, and finally release of the cellular packet data service option, as described above.

Id. at [0096]. *Hsu* also discloses that after detecting a WLAN signal, the laptop waits a given time period to detect if there is any activity via the cellular network:

Alternatively, the laptop may switch to the WLAN if the packet data session currently has no data pending transfer so as to minimize service interruption (e.g., downloading a file). Upon detecting a strong WLAN signal, the laptop 600 waits for a given time period (e.g., several seconds) to detect any activity of data transfer. If no activity is detected, the laptop 600 performs WLAN access authentication, followed by Mobile IP registration via the WLAN, and finally release of the cellular packet data service option, as described above.

Id. If no activity is detected in that time period, *Hsu* describes the laptop performing WLAN access authentication and Mobile IP registration to handover a packet data session to the WLAN. *Id.*

144. In my opinion, a person of ordinary skill in the art would have recognized that, with respect to the laptop embodiment, *Hsu* discloses the mobile station waiting a “given time period (*e.g.*, several seconds)” as part of a determination whether to handover a packet data session to a WLAN. Indeed, a person of ordinary skill in the art would understand *Hsu* to disclose the mobile station utilizing the determination of whether any activity is detected during the given time period as an additional factor for the mobile station to consider when determining whether to handover a packet data session. *See id.* at [0096].

145. In my opinion, a person of ordinary skill in the art would also recognize that *Hsu* disclosing waiting a “given time period (*e.g.*, several seconds)” comprises *Hsu*’s mobile station determining whether the at least one silent period is a sufficient silent period to proceed to handover a packet data session (*e.g.*, by performing WLAN access authentication and Mobile IP registration). In my opinion, a person of ordinary skill in the art would have understood a period of inactivity at least as long as the given time period indicates that the corresponding silent period is likely an idle period and not simply a momentary pause in activity, such that the corresponding silent period will likely be long enough to perform WLAN access

authentication (and possibly Mobile IP registration). Indeed, a person of ordinary skill in the art would have understood it was common in the art at the time of the alleged invention to determine, before proceeding to take certain actions, whether a period of inactivity is more likely an idle period instead of simply a momentary pause in activity and is thus a period of inactivity suitable for performing those actions. As such, in my opinion, a person of ordinary skill in the art would have recognized that *Hsu* disclosing waiting a given time period during a silent period before proceeding to handover a packet data session (by performing WLAN access authentication and Mobile IP registration) comprises *Hsu*'s mobile station determining whether the silent period is a silent period sufficient to complete one or more handoff actions or simply a momentary pause in activity.

146. For example, *Douglis*⁸ relates to techniques for proactively shutting down inactive modems of an Internet Service Provider ("ISP"). *See, e.g., Douglis*, Abstract, 1:10-12. *Douglis* explains that ISPs often use time-out circuits to measure the duration of an idle period of individual modems and that, at the expiration of a given time period, the connection to an inactive modem is dropped. *Id.* at 2:11-15.

⁸ To be clear, here, I am relying on *Douglis* as evidence of a person of ordinary skill in the art's knowledge and the state of the art. *Douglis* is not part of unpatentability Ground 1.

Douglis discloses a technique for selecting time-out thresholds (*i.e.*, the given time period used by the time-out circuit) for individual users based on the connection pattern for that user. *See id.* at 2:36-52. In doing so, *Douglis* describes employing an adaptive time-out threshold that keeps the number of disconnects that are undesirable (*e.g.*, based on the time and inconvenience of a user having to reconnect) at an acceptably low level relative to the total connect time. *See id.* at 3:2-25. Notably, *Douglis* describes utilizing minimum values for the time-out threshold to avoid disconnecting a modem because of perfectly normal gaps between packets:

In addition to the above modifications to T, both maximum and minimum values for T may be enforced, such as one minute for a minimum and 15 minutes for a maximum. **The former avoids disconnecting the modem because of a perfectly normal gap between packets**, and the latter prevents the algorithm from becoming strictly worse than the most conservative fixed threshold.

Id. at 3:50-55. *Douglis*'s minimum time value for modem inactivity, which prevents disconnections for simply momentary pauses in inactivity, is analogous to Hsu's disclosure of waiting a "given time period (*e.g.*, several seconds)" as part of a determination whether to handover a packet data session to a WLAN. *Douglis* thus demonstrates that a person of ordinary skill in the art would understand *Hsu*'s disclosure of waiting a "given time period (*e.g.*, several seconds)" to be for the

purpose of a mobile station determining whether the silent period is a silent period sufficient to complete one or more handoff actions or simply a momentary pause in activity.

147. As another example, *Moshiri-Tafreshi* discloses techniques for more efficiently utilizing network resources. See *Moshiri-Tafreshi*, Abstract, [0001]. *Moshiri-Tafreshi* explains that inactivity timers were conventionally used to determine if a packet data connection was inactive for a predetermined period of time before network resources dedicated to that connection were released. See *id.* at [0005]. *Moshiri-Tafreshi* describes an improved technique in which two inactivity timers are used to monitor the activity status of a packet data connection: one with a relatively short duration and another with relatively longer duration. See *id.* at [0006]. *Moshiri-Tafreshi* describes these timers as an “inactivity” timer (*e.g.*, with a time out period between one and ten seconds) and a “dormancy” timer (*e.g.*, with a time out period between forty to seventy seconds). See *id.* at [0023], [0032]. Similar to *Douglis*, *Moshiri-Tafreshi*’s disclosure of waiting at least a minimum amount of time after a connection becomes inactive (*e.g.*, 1-10 seconds) before reallocating network resources away from that connection is analogous to *Hsu*’s disclosure of waiting a “given time period (*e.g.*, several seconds).” *Moshiri-Tafreshi* thus demonstrates that a person of ordinary skill in the art reading *Hsu* would understand that a mobile station waits a “given time period (*e.g.*, several seconds),”

as disclosed in *Hsu*, to determine whether the silent period will be of sufficient length to complete one or more handoff actions or is simply a momentary pause in activity.

b. Motivation to Modify *Hsu*'s One-Tuner Embodiment based on *Hsu*'s Two-Tuner Embodiment Disclosure

148. As I discussed previously, *Hsu* explains that, if a mobile station detects WLAN coverage, the mobile station may then proceed to handover its packet data session to the WLAN:

The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon. Then, the MS may have the following behaviors. (1) **If the MS detects WLAN coverage**, the MS tunes back to the cellular network to notify the WLAN search result. The cellular network then sends a signaling message to instruct the MS to handoff to WLAN. **The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.** If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064]. *Hsu* also explains that the determination to handover a packet data session may be based on a signaling message received from the cellular network:

The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon. Then, the MS may have the following behaviors. (1) If the MS detects WLAN coverage, the

MS tunes back to the cellular network to notify the WLAN search result. **The cellular network then sends a signaling message to instruct the MS to handoff to WLAN.** The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN. If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064]. Alternatively (or additionally), *Hsu* provides that the determination to handover a packet data session may be made by the mobile station based on a number of factors:

After the MS 300 detects WLAN coverage, receives the WLAN beacon, the MS 300 uses certain criteria to handover a packet data session from the cellular network to the WLAN. The criteria may include whether the MS is idle in cellular network (i.e., no dedicated channel) or whether the WLAN signal strength is stable, etc. The MS 300 may wait for a pending packet data session to go dormant in the cellular network. The MS 300_d then performs packet data session handover (i.e., sending Mobile IP registration via WLAN). This may be useful to minimize service interruption. Similarly, the MS 300 may perform packet data session handover when the WLAN signal strength is above an acceptable threshold for a specified period of time. In this way, the MS 300 ensures that access to the WLAN is sustainable. The measure may be any

measure of channel quality and/or signal strength. The threshold may be predetermined or may dynamically be adjusted based on the actual performance of the communication. This may be useful to avoiding any ping-pong effect whereby the MS 300 switches between WLAN access and cellular network access due to changing conditions or signal strength that is at the margin of tolerance for operation. Still further, upon detection of the WLAN, the MS 300 may notify the user and wait for the user to manually select WLAN.

Id. at [0085]. For example, *Hsu* provides that the mobile station may determine whether to handover a packet data session from the cellular network based on, for example, whether the mobile station is idle in the cellular network or whether the WLAN signal strength is stable. *Id.*

149. Notably, *Hsu* discloses that the mobile station detects WLAN coverage and performs system selection between a WLAN and cellular system:

In such a device, the single tuner is used for communication with both the cellular system and the WLAN system. **The MS detects WLAN coverage and performs system selection between WLAN and cellular system, wherein the MS may only tune to one system (WLAN or cellular) at a given time.**

Hsu, [0059]. *Hsu* also explains that the mobile station performs system detection and selection in a number of scenarios, including scenario (2) discussed herein, in

which the mobile station has an active packet data session with a cellular network and desires to scan for WLAN coverage:

The MS performs system detection and selection in the following scenarios: (1) the MS is idle (not active in communication) with respect to the cellular network, having no dedicated channel, and desires to scan for WLAN; **(2) the MS has an active packet data session with the cellular network, having a dedicated channel, and desires to scan for WLAN;** (3) the MS is tuned to the WLAN, and desires to receive cellular pages; and (4) the MS is tuned to the WLAN but with low signal strength.

Id. at [0060]. However, with respect to scenario (2), *Hsu* does not provide implementation details for the mobile station selecting between a WLAN and cellular network after WLAN coverage is detected and, in turn, determining whether to handover a packet data session from a cellular network to a WLAN. In view of this lack of implementation details, a person of ordinary skill in the art would have been motivated to look elsewhere in *Hsu*'s disclosure for this information.

150. In addition to the embodiments previously described herein, *Hsu* also describes an embodiment in which the mobile station has two tuners and can simultaneously tune to a cellular frequency and a WLAN frequency:

In the following example, the Mobile Station (MS) has two tuners that can tune to a cellular frequency and the WLAN

frequency simultaneously. A MS 300 is illustrated in FIG. 6 having an ESSID list 302, which is stored in memory, a first tuner, tuner A 304, and a second tuner, tuner B 306. **Tuner A is configured for communication with a WLAN. Tuner B 306 is configured for communication with a wireless cellular network.** As illustrated, when MS 300 is within range of accessing AP 320, tuner A 304 scans for a WLAN beacon transmitted by AP 320. The WLAN beacon is transmitted periodically and identifies the WLAN supported by AP 320. Tuner B 306 scans for a paging indicator from the cellular network transmitted by Base station Transceiver System (BTS) 322. In this way, the MS 300 may scan for WLAN coverage while also scanning for cellular pages. Thus, the MS 300 detects WLAN coverage and performs system selection between WLAN and the cellular system using one tuner for each access medium.

Id. at [0077]. I will hereafter refer to that embodiment herein as the “two-tuner embodiment.” *See generally id.* at [0076]-[0091] (describing the “two-tuner embodiment”).

151. With respect to the two-tuner embodiment, *Hsu* explains that the mobile station may consider various criteria when deciding whether to scan for WLAN coverage or to handover a packet data session from the cellular network to the WLAN. For example, in addition to an application status (or whether there is an on-going packet data session), *Hsu* explains that user commands, pre-configured

preferences, and other criteria may be considered when determining whether to scan for WLAN coverage:

The MS 300 may decide to scan for WLAN coverage based on one or more factors, e.g., user command(s), pre-configured preference(s), application status (e.g., on-going packet data session), WLAN availability advertisement as received from the cellular network, etc. One WLAN protocol defined by IEEE 802.11, and referred to herein as “802.11,” allows the MS 300 to scan for WLAN coverage passively or actively. In passive scanning, the MS 300 listens for the WLAN beacon sent by the AP 320 on WLAN frequencies. The WLAN beacon contains the ESSID of AP 320, referred to as ESSID (AP 320). If the ESSID(AP 320) matches an ESSID stored in the MS 300 ESID list 302, this is an indication that the MS 300 has detected WLAN coverage, and that such coverage is provided by the MS 300 service provider. In active scanning, the MS 300 transmits a Probe Request that contains the ESSID of the MS 300. If the AP 320 receives the Probe Request and the ESSID of the MS 300 matches the ESSID of the AP 320, the AP 320 transmits a Probe Response to the MS 300. If the MS has a list of multiple ESSIDs, the MS may transmit a Probe Request containing an ESSID having the highest preference. The ESSID preference may be stored as a system selection parameter in the Preference Database (described hereinabove).

Id. at [0082]. *Hsu* also provides that the determination to handover a packet data session may be made by the mobile station based on a number of factors:

After the MS 300 detects WLAN coverage, receives the WLAN beacon, the MS 300 uses certain criteria to handover a packet data session from the cellular network to the WLAN. The criteria may include whether the MS is idle in cellular network (i.e., no dedicated channel) or whether the WLAN signal strength is stable, etc. The MS 300 may wait for a pending packet data session to go dormant in the cellular network. The MS 300^d then performs packet data session handover (i.e., sending Mobile IP registration via WLAN). This may be useful to minimize service interruption. Similarly, the MS 300 may perform packet data session handover when the WLAN signal strength is above an acceptable threshold for a specified period of time. In this way, the MS 300 ensures that access to the WLAN is sustainable. The measure may be any measure of channel quality and/or signal strength. The threshold may be predetermined or may dynamically be adjusted based on the actual performance of the communication. This may be useful to avoiding any ping-pong effect whereby the MS 300 switches between WLAN access and cellular network access due to changing conditions or signal strength that is at the margin of tolerance for operation. Still further, upon detection of the WLAN, the MS 300 may notify the user and wait for the user to manually select WLAN.

Id. at [0085].

152. In view of *Hsu*'s disclosure with respect to the one-tuner embodiment and scenario (2) that the mobile station performs system detection and selects between a WLAN and cellular network after WLAN coverage is detected, a person of ordinary skill in the art would have been motivated to incorporate—in the one-tuner embodiment—*Hsu*'s disclosure regarding the manner in which the mobile station may determine whether to handover a packet data session based on a number of factors, as explained with respect to the two-tuner embodiment. Indeed, in view of the lack of implementation details provided with respect to the one-tuner embodiment, a person of ordinary skill in the art would have been motivated to look to identify implementation details and would have readily found the disclosure with respect to the two-tuner embodiment. Moreover, a person of ordinary skill in the art would have recognized that *Hsu*'s disclosure regarding using certain criteria to determine whether to handover a packet data session would apply equally to the one-tuner embodiment.

153. As such, and in view of *Hsu*'s disclosure of performing system detection and selection by the mobile station in the one-tuner embodiment (including with respect to scenario (2)) (*see, e.g., id.* at [0060]), a person of ordinary skill in the art would have been motivated to incorporate *Hsu*'s technique for determining whether to handover a packet data session based on various criteria (as described

with respect to *Hsu*'s two-tuner embodiment) in *Hsu*'s one-tuner embodiment to enable the mobile station to determine whether to handover a packet data session based, for example, on whether the mobile station is idle in the cellular network, which may be useful to minimize service interruption, as *Hsu* describes. In my opinion, a person of ordinary skill in the art would have found it obvious to combine the disclosure of *Hsu*'s separate embodiments in this manner because doing so would have amounted to the mere application of a known technique (a mobile station using certain criteria to determine whether to handover a packet data session) to a known method (*Hsu*'s mobile station performing both system detection and selection) ready for improvement to yield a predictable result. In addition, a person of ordinary skill in the art would have known that it would amount to the use of a known technique (a mobile station using certain criteria to determine whether to handover a packet data session) to improve similar devices (*Hsu*'s mobile station with one tuner) in the same way.

c. Motivation to Further Modify *Hsu*'s One-Tuner Embodiment based on *Hsu*'s Laptop Embodiment Disclosure

154. Moreover, in my opinion, a person of ordinary skill in the art would also have been motivated to utilize the same technique described with respect to *Hsu*'s laptop embodiment for also considering whether a period when no data transfer activity exists is expected to be a silent period long enough to perform

WLAN access authentication (and possibly Mobile IP registration) with respect to *Hsu*'s one-tuner embodiment. Indeed, a person of ordinary skill in the art would have found it obvious to incorporate this teaching with respect to *Hsu*'s laptop embodiment in *Hsu*'s one-tuner embodiment because it would have amounted to merely applying a known technique (*Hsu*'s technique for determining whether a period when no data transfer activity exists is expected to be a silent period long enough to perform WLAN access authentication and Mobile IP registration) to a known device (the mobile station described in *Hsu*'s one-tuner embodiment) ready for improvement to yield predictable results (improving the process by which handoff to the WLAN is triggered).

155. Accordingly, *Hsu* discloses or suggests the mobile station determining whether a period when there is no activity of data transfer is expected to be a long enough silent period to perform WLAN access authentication and Mobile IP registration (“having the mobile device determine if the at least one silent period is sufficient to complete one or more handoff action”).

156. I have been asked to assume that Patent Owner may argue that a person of ordinary skill in the art would not have been motivated to incorporate *Hsu*'s disclosure regarding a mobile station using certain criteria to determine whether to handover a packet data session (including waiting a “given time period (*e.g.*, several seconds),” as described with respect to the laptop embodiment) into *Hsu*'s one-tuner

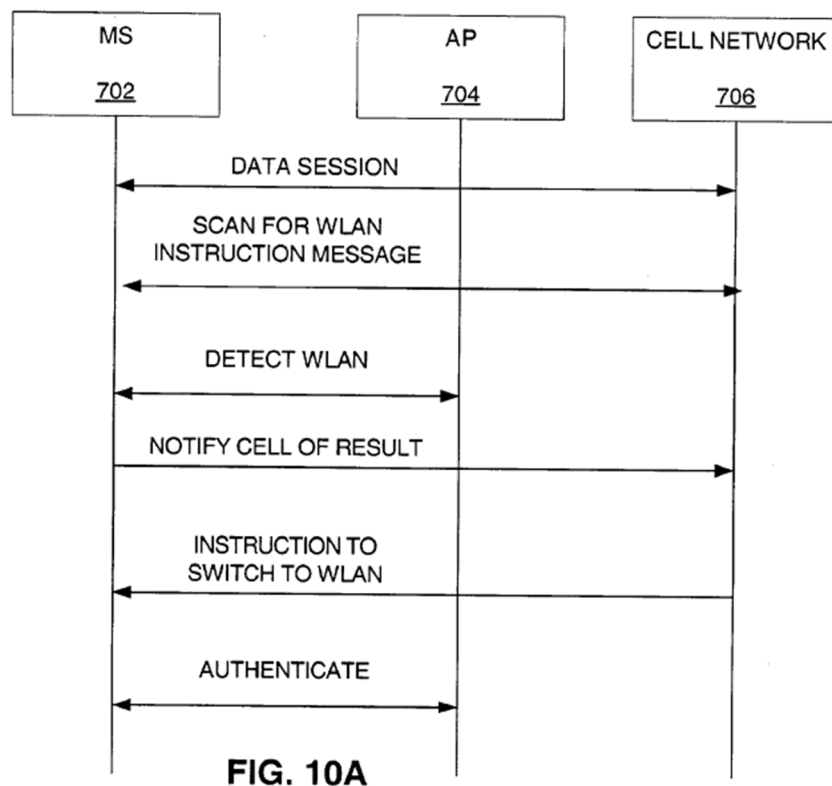
embodiment in an implementation in which, after scanning for WLAN coverage, the mobile station tunes back to the cellular network to notify the cellular network of the WLAN search result. In my opinion, such an argument is incorrect because *Hsu* specifically contemplates an implementation, with respect to the one-tuner embodiment and scenario (2), in which the mobile station tunes back to the cellular network to notify the cellular network of the scan result and then proceeds to initiate a handover without receiving instructions from the cellular network. *See id.* at [0074] (describing Figure 10B discussed further below).

157. Indeed, as I discussed above in Section IX.B.1.c, *Hsu* describes an implementation (with respect to the one-tuner embodiment and scenario (2)) in which, if the mobile station detects WLAN coverage, the mobile station tunes back to the cellular network to notify the cellular network of the WLAN search result, receives a signaling message from the cellular network to handoff to the WLAN, and then tunes to the WLAN to perform access authentication and Mobile IP registration to handover its packet data session to the WLAN:

The MS tunes to WLAN frequencies and actively or passively scans for the WLAN beacon. Then, the MS may have the following behaviors. (1) **If the MS detects WLAN coverage**, the MS tunes back to the cellular network to notify the WLAN search result. The cellular network then sends a signaling message to instruct the MS to handoff to WLAN. **The MS tunes**

to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN. If access authentication or Mobile IP registration fails, the MS may tune back to the cellular network and originate for packet data service option.

Id. at [0064]. *Hsu* also depicts this implementation with respect to scenario (2)—in which the mobile station proceeds to handover a packet data session based on instruction received from the cellular network—in Figure 10A, which I have reproduced below:



Hsu, Ex. 1005, Fig. 10A

158. *Hsu* also describes an implementation (with respect to the one-tuner embodiment and scenario (2)) in which, if the mobile station detects WLAN coverage, the mobile station may not return to the cellular network and instead proceeds to perform access authentication and Mobile IP registration to handover its packet data session to the WLAN:

(2) If the MS detects WLAN coverage, the MS does not return to the cellular network to notify the WLAN search result. Instead, the MS proceeds to perform WLAN access authentication and optionally Mobile IP registration to handover its packet data session to WLAN. In this case, if the cellular network didn't receive the signaling reply message after a timeout, the network assumes that the MS has left the cellular system and hence removes the MS's packet data session.

Id. at [0065].

159. *Hsu* also describes (and depicts) an implementation with respect to scenario (2) in which the mobile station notifies the cellular network of the scan result while also determining whether to proceed to handover a packet data session without receiving an instruction from the cellular network. *See id.* at [0074], FIG. 10B. For example, a person of ordinary skill in the art would recognize that there may be a number of reasons a mobile station may notify a cellular network of a scan result even when the cellular network is not determining whether a packet data

session is to be handed off, including in implementations in which the cellular network is responsible for maintaining and provisioning WLAN information to a mobile station. *See, e.g., id.* at [0036]-[0053] (describing generally techniques by which a cellular network may provide a mobile station with information regarding WLANs of which the cellular network is aware). The foregoing implementation is depicted in Figure 10B, which I have reproduced below:

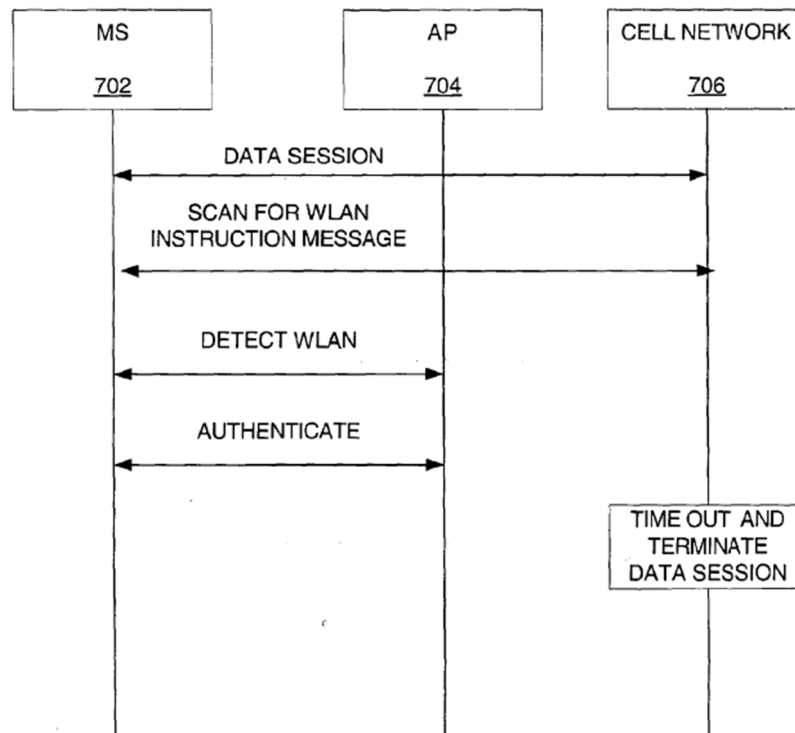


FIG. 10B

Hsu, Ex. 1005, Fig. 10B

Notably, with respect to Figure 10B, *Hsu* provides that, upon detecting WLAN coverage, the mobile station tunes to the cellular network to notify the cellular network of the scan result but nevertheless proceeds to initiate authentication to

handover a packet data session to the WLAN without receiving an instruction from the cellular network:

FIG. 10B illustrates another example of scenario (2), wherein the MS 702 currently has a packet data session with the cell network 706. The MS 702 scans for a WLAN instruction message from the cell network 706. Using the WLAN instruction message, which provisions the MS, the MS scans for WLAN coverage. **Upon detection of the WLAN, the MS 702 notifies the cell network of the result. As illustrated, the MS 702 detects a WLAN (AP 704), and in response initiates authentication with the AP 704.** The cellular network 706 then starts a timer, and when a time out period is expired, the cellular network 706 removes the data session.

Id. at [0074]. As such, *Hsu* expressly describes, with respect to the one-tuner embodiment and scenario (2), an implementation in which the mobile station tunes back to the cellular network to notify the cellular network of the scan result and determines whether to proceed to handoff its packet data session without input from cellular network.

8. Claim 8

- a. **“The method of claim 1, further including having the mobile device determine if the at least one silent period is sufficient to complete one or more handoff action by comparison to a pre-set or a dynamically determined threshold.”**

160. In my opinion, *Hsu* discloses or suggests these features. For example, as I discussed above in Section IX.B.7.a, *Hsu* discloses, with respect to its laptop embodiment, waiting for a given time period when no data transfer activity exists to determine whether no data transfer activity still exists before performing WLAN access authentication (and possibly Mobile IP registration):

Alternatively, the laptop may switch to the WLAN if the packet data session currently has no data pending transfer so as to minimize service interruption (e.g., downloading a file). **Upon detecting a strong WLAN signal, the laptop 600 waits for a given time period (e.g., several seconds) to detect any activity of data transfer. If no activity is detected, the laptop 600 performs WLAN access authentication, followed by Mobile IP registration via the WLAN, and finally release of the cellular packet data service option, as described above.**

Id. at [0096]. And for the reasons I discussed above in Sections IX.B.7.b and IX.B.7.c, a person of ordinary skill in the art would have been motivated to utilize the same technique for determining whether a period when no data transfer activity exists is expected to be a silent period of sufficient length to perform WLAN access

authentication (and possibly Mobile IP registration) with respect to *Hsu*'s one-tuner embodiment.

161. In my opinion, a person of ordinary skill in the art would also have understood *Hsu* to disclose determining whether a period when no data transfer activity exists is expected to be a silent period of sufficient length to perform WLAN access authentication (and possibly Mobile IP registration) by comparing a measured length of a time with no data transfer activity to a given time period and that the given time period amounts to a pre-set threshold.

162. Accordingly, in my opinion, a person of ordinary skill in the art would have understood *Hsu* to disclose or suggest determining whether a period when no data transfer activity exists is expected to be a silent period of sufficient length to perform WLAN access authentication (and possibly Mobile IP registration) ("having the mobile device determine if the at least one silent period is sufficient to complete one or more handoff action") by comparing a measured length of a time when no data transfer activity exists to a given time period ("by comparison to a pre-set ... threshold").

9. Claim 13

- a. **“The method of claim 1, further including having said mobile device select a target network to which the mobile may switch to.”**

163. In my opinion, *Hsu* discloses or suggests this feature. For example, *Hsu* discloses the mobile station detecting WLAN coverage and performing system selection between a WLAN and cellular system:

In such a device, the single tuner is used for communication with both the cellular system and the WLAN system. **The MS detects WLAN coverage and performs system selection between WLAN and cellular system, wherein the MS may only tune to one system (WLAN or cellular) at a given time.**

Hsu, [0059]. *Hsu* also explains that the mobile station may only tune to either WLAN or cellular at a given time. *Id.* As such, a person of ordinary skill in the art would have understood *Hsu* to disclose the mobile station selecting to tune to either the WLAN or cellular network. Furthermore, *Hsu* explains that the mobile station performs system detection and selection in a number of scenarios, including scenario (2) discussed herein, in which the mobile station has an active packet data session with a cellular network and desires to scan for WLAN coverage:

The MS performs system detection and selection in the following scenarios: (1) the MS is idle (not active in communication) with respect to the cellular network, having no dedicated channel, and desires to scan for WLAN; **(2) the MS**

**has an active packet data session with the cellular network,
having a dedicated channel, and desires to scan for WLAN;**
(3) the MS is tuned to the WLAN, and desires to receive cellular
pages; and (4) the MS is tuned to the WLAN but with low signal
strength.

Id. at [0060].

164. *Hsu* also describes and depicts in Figure 1 a mobile station adapted for system detection and selection and that such a mobile station includes a selector 58. *See id.* at [0009] (“FIG. 1 is a mobile station adapted for system detection and selection.”); *see also id.* at [0026]-[0035] (describing Figure 1). For example, such a mobile station is depicted in Figure 1, which I have reproduced below:

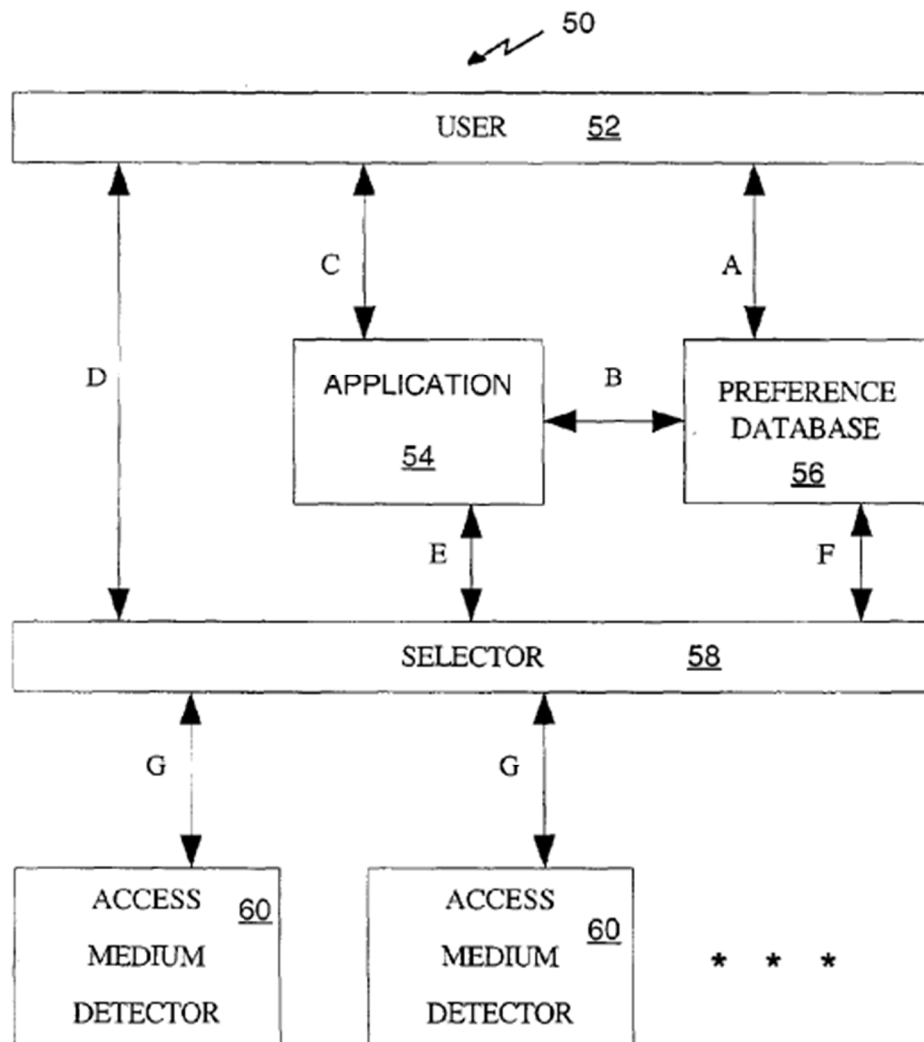


FIG. 1

Hsu, Ex. 1005, Fig. 1

Hsu explains that selector 58 is responsible for selecting an access medium based on a number of criteria, including detection results, system selection criteria, application status, and/or user request:

An Access Medium Detector (AMD) 60 detects the availability of a wireless access medium and reports the results to the selector

58. **The selector 58 is responsible for** enabling or disabling one or more Access Medium Detectors 60 and **selecting an access medium based on the detection results, system selection criteria, application status, and/or user request.** The Selector 60 may inform the system selection result to the user 52 and/or application 54. The selector 60 communicates with application 54 via interface E, with preference database 56 via interface F, and with AMDs 60 via interface G. The selector 58 further communicates with user 52 via interface D.

Id. at [0028]; *see also id.* at [0027] (“In one embodiment, the system selection criterion considers the availability of wireless access and selects WLAN when available.”); *id.* at [0035] (“The Access Medium Detector 60 may indicate the detection result to the Selector 58.”).

165. Accordingly, *Hsu* discloses or suggests the mobile station selecting a system to tune or switch to from between WLAN and cellular systems (“having said mobile device select a target network to which the mobile may switch to”).

10. Claim 14

- a. **“The method of claim 13, further including when a target network is selected and an actionable silent period is detected, switching the mobile device’s layer-2 connection to the target network.”**

166. In my opinion, *Hsu* discloses or suggests these features.

167. For the reasons I discussed above in Section IX.B.7.a, *Hsu* discloses performing system detection and selection by the mobile station in the one-tuner embodiment (including with respect to scenario (2)). *See Hsu*, [0059]-[0060]. For the reasons I discussed above in Section IX.B.7.b, it would have been obvious to a person of ordinary skill in the art to incorporate *Hsu*'s technique for determining whether to proceed to handover a packet data session (*e.g.*, by performing access authentication and Mobile IP registration) based on various criteria (as described with respect to *Hsu*'s two-tuner embodiment (*see id.* at [0085])) in *Hsu*'s one-tuner embodiment. In my opinion, a person of ordinary skill in the art would also have recognized that determining whether to proceed to handover a packet data session amounts to selecting a network to which the mobile station may switch to (or cause a packet data session to be handed off to).

168. For the reasons discussed above in Section IX.B.7.c, a person of ordinary skill in the art would also have been motivated to wait for a given time period when no data transfer activity exists to determine whether no data transfer activity still exists, as taught by *Hsu*, before performing WLAN access authentication and Mobile IP registration. In my opinion, a person of ordinary skill in the art would have understood that such a silent period constitutes an actionable silent period. And for the reasons I discussed above in Section IX.B.4.a, a person of ordinary skill in the art would have understood that *Hsu*'s mobile station would

establish a layer-2 connection or association with the WLAN to scan for WLAN coverage and perform Mobile IP registration.

169. Accordingly, a person of ordinary skill in the art would have understood *Hsu* to disclose or suggest performing system selection between WLAN and cellular systems (“when a target network is selected”) and, when the mobile station is idle in the cellular network for a period of sufficient length (“and an actionable silent period is detected”), performing access authentication and Mobile IP registration with the WLAN (“switching the mobile device’s layer-2 connection to the target network”) to handover its packet data session to the WLAN.

11. Claim 15

- a. **“The method of claim 1, further including having the mobile device connect successfully to the target network”**

170. In my opinion, *Hsu* discloses or suggests this feature. For example, *Hsu* discloses tuning away from the cellular network to scan (passively or actively) for WLAN coverage when a mobile station becomes idle in the cellular network. *See Hsu*, [0062]; *see also id.* at [0082] (describing “passive scanning” and “active scanning”). For the reasons I discussed above in Section IX.B.4.a, a person of ordinary skill in the art would have understood that *Hsu*’s mobile station tuning away from the cellular network and tuning to a WLAN to scan for a WLAN beacon would comprise establishing a layer-2 connection or association with the WLAN.

171. Accordingly, *Hsu* discloses or suggests a mobile station tuning away from the cellular network to a WLAN to scan for WLAN coverage (“having the mobile device connect successfully to the target network”).

- b. “and before a current actionable silent period expires, having the mobile device enter an information discovery phase to listen to the target network's advertisement messages to learn information needed to perform handoffs at different protocol layers to the target network,”**

172. In my opinion, *Hsu* discloses or suggests this feature. For example, *Hsu* discloses that, “[a]fter the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.” *Hsu*, ¶[0062]. *Hsu* describes that passively or actively scanning for WLAN coverage includes the mobile station scanning for the WLAN beacons sent by the access point of a WLAN network (*see id.* at [0064], [0082]), and that WLAN beacons “advertise” the WLAN (*see id.* at [0008], [0040]). Thus, and for the reasons I discussed above in Sections IX.B.1.d and IX.B.3.a, a person of ordinary skill in the art would have understood scanning for WLAN coverage to comprise listening to advertisement messages from the target network.

173. *Hsu* also discloses that, after the mobile station detects WLAN coverage, the mobile station “performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.” *Id.* at [0064]; *see also*

id. at [0065]. For the reasons I discussed above in Section IX.B.7.c, a person of ordinary skill in the art would have been motivated to wait for a given time period when no data transfer activity exists to determine whether no data transfer activity still exists, as taught by *Hsu*, before performing WLAN access authentication and Mobile IP registration. As I discussed above in Section IX.B.4.a, a person of ordinary skill in the art would also have understood that a mobile station performing Mobile IP registration to handover a packet data session to a network includes obtaining a “care-of-address” (CoA) from agent advertisements sent by a foreign agent of the new network so that the mobile station may register the new CoA with its home agent. *See, e.g., Gwon*, [0007] (“The L 3 handoff process pursuant to RFC 2002 requires mobility agents, i.e., foreign agents and home agents, to advertise their presence via Agent Advertisement messages. A MN that receives these Agent Advertisements determines whether it is operating on its home subnet or a foreign subnet. When the MN detects that it has entered a new subnet, it obtains a CoA from Agents Advertisements sent from the foreign agent serving the foreign network. The MN then registers the new CoA by sending a registration request including the CoA to its home agent (HA). The L3 handoff completes when the HA receiving the

registration request updates its internal binding information for the MN and returns a registration reply to the MN.”).⁹

174. Accordingly, a person of ordinary skill in the art would have understood *Hsu* to disclose or suggest that, after the MS becomes idle in the cellular network and remains idle for a period of sufficient length (“before a current actionable silent period expires”), the mobile station scans for WLAN coverage and, if WLAN coverage is detected, proceeds to obtain a CoA from an agent advertisement sent by a foreign agent (“having the mobile device enter an information discovery phase to listen to the target network's advertisement messages”) so that the mobile station may perform access authentication and Mobile IP registration to handover its packet data session to the WLAN (“to learn information needed to perform handoffs at different protocol layers to the target network”).

⁹ To be clear, here, I am relying on *Gwon* as evidence of a person of ordinary skill in the art’s knowledge and the state of the art. *Gwon* is not part of unpatentability Ground 1.

- c. **“and if the current actionable silent period has not expired after the information discovery phase, having the mobile device start at least one handoff action”**

175. In my opinion, *Hsu* discloses or suggests this feature. For example, *Hsu* discloses that, after the mobile station detects WLAN coverage, the mobile station “performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.” *Hsu*, [0064]. For the reasons I discussed above in Section IX.B.6.a, a person of ordinary skill in the art would have understood that, when the mobile station remains idle within the cellular network after detecting WLAN coverage, the mobile station would perform access authentication and Mobile IP registration while idle in the cellular network (*i.e.*, using the at least one silent period). Indeed, *Hsu* explains that the mobile station may use certain criteria to determine whether to handover a packet data session from a cellular network to a WLAN, including “whether the MS is idle in cellular network” (*id.* at [0085]), and that handing over a packet data session includes performing access authentication and Mobile IP registration (*see id.* at [0064] (“The MS tunes to WLAN and performs access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.”)).

176. Accordingly, a person of ordinary skill in the art would have understood *Hsu* to disclose or suggest that, if the mobile station remains idle within the cellular

network after detecting WLAN coverage (“if the current actionable silent period has not expired after the information discovery phase”), the mobile station proceeds to perform access authentication and Mobile IP registration to handover its packet data session to the WLAN (“having the mobile device start at least one handoff action”).

C. Ground 2: *Hsu* and *Hutchison* Render Obvious Claims 10, 11, 20, and 21

177. I have reviewed *Hsu* and *Hutchison*, and as described below, it is my opinion that *Hsu* and *Hutchison* disclose or suggest all of the features of claims 10, 11, 20, and 21 of the ’348 patent.

1. Claim 10

- a. “The method of claim 1, further including the mobile device monitoring time periods between packets entering and/or leaving the mobile device over the current access network that the mobile device currently uses to transport its application traffic.”**

178. In my opinion, *Hsu* in combination with *Hutchison* discloses or suggests this feature.

179. As I discussed above in Section IX.B.1.c, *Hsu* discloses waiting until a mobile station becomes idle in a cellular network to tune to a WLAN to scan for WLAN coverage:

In scenario (2) described above, the MS has an active packet data session in the cellular network (i.e., with dedicated channel). The MS may choose not to scan for WLAN while active data session

in the cellular network. **In this case, while the MS is active in the cellular network, the MS does not switch to WLAN even though it could access to WLAN.** Although the MS might not be able to take the advantage of high-speed WLAN access, the MS would not experience service interruption. **After the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.**

Id. at [0062]. Thus, *Hsu* discloses monitoring the sending and receiving of packets via the cellular network, which a person of ordinary skill in the art would readily understand comprises a current access network that the mobile station uses to transport its application traffic until a current packet data session is handed over to the WLAN.

180. *Hsu* also discloses waiting for a given time period when there is no activity of data transfer to determine whether there is still no activity before performing WLAN access authentication (and possibly Mobile IP registration):

Alternatively, the laptop may switch to the WLAN if the packet data session currently has no data pending transfer so as to minimize service interruption (e.g., downloading a file). **Upon detecting a strong WLAN signal, the laptop 600 waits for a given time period (e.g., several seconds) to detect any activity of data transfer. If no activity is detected, the laptop 600 performs WLAN access authentication, followed by Mobile**

IP registration via the WLAN, and finally release of the cellular packet data service option, as described above.

Id. at [0096]. As such, *Hsu* also discloses monitoring a time period since a last packet was sent or received, but it does not expressly describe monitoring time periods between packets.

181. *Hutchison* is directed to techniques for performing timer-based sleep to extend battery life for a terminal in a wireless communication system. *See Hutchison*, Abstract; *see also id.* at [0023]. *Hutchison* discloses a process 500 for performing timer-based sleep by a terminal that includes estimating the probability of data traffic for the terminal. *See id.* at [0057]-[0058]. *Hutchison*'s process 500 is depicted in Figure 5, which I have reproduced below:

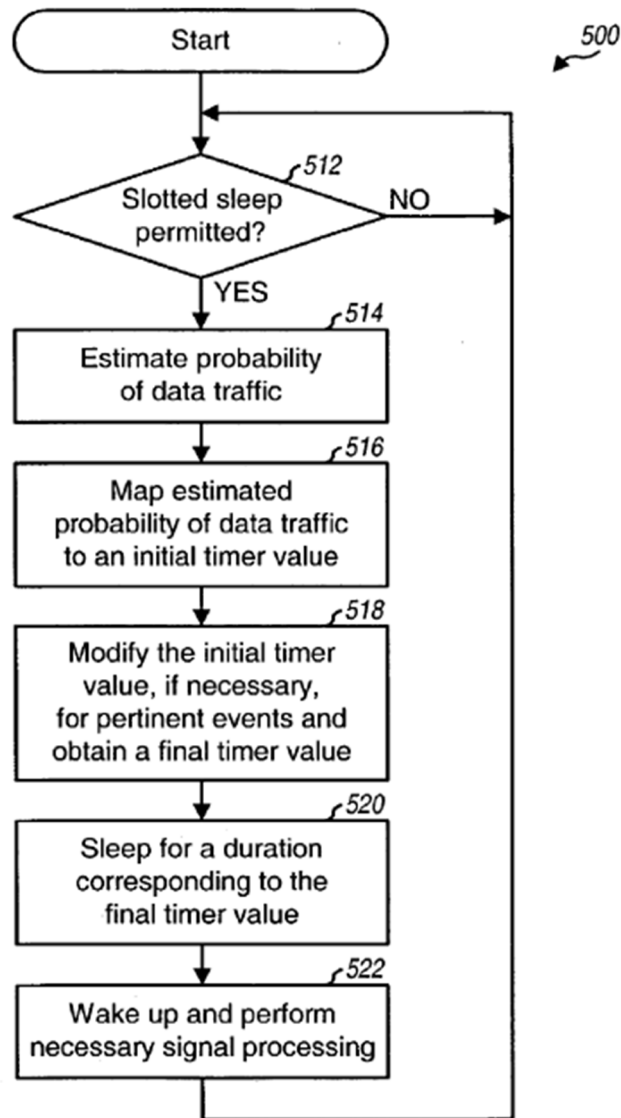


FIG. 5

Hutchison, Ex. 1006, Fig. 5

182. With respect to process 500, *Hutchison* explains that the probability of data traffic may be estimated based on the time since last activity using a particular function:

FIG. 5 shows a flow diagram of an embodiment of a process 500 for performing timer-based sleep by a terminal. Initially, a determination is made whether or not slotted sleep is permitted for the terminal (step 512). This determination may be made based on session information for the terminal. For the HDR system, slotted sleep may be permitted, for example, while the terminal is in the Idle state whereby a session is opened but a connection is not opened. If slotted sleep is not permitted, then the process returns to step 512.

Otherwise, if slotted sleep is permitted, then the probability of data traffic for the terminal is estimated (step 514). **As described above, the probability of data traffic may be estimated based on (1) the time since last activity and (2) a particular function defining probability of data traffic versus time since last activity.** The time since last activity may be set equal to the time since the terminal enters the Idle state.

Id. at [0057]-[0058]. *Hutchison* discloses that the estimated probability is then mapped to an initial timer value:

The estimated probability of data traffic is then mapped to an initial timer value (step 516). As noted above, a set of probability threshold values may be used and mapped to a set of timer values. The initial timer value would then be the timer value associated with the probability threshold value to which the estimated probability of data traffic is mapped.

Id. at [0059].

183. For example, Hutchison describes further, with respect to Figure 4, a particular function that may be used to determine an initial timer value based on the probability of data traffic for a terminal:

The initial timer value is determined based on the probability of data traffic for the terminal, which may be estimated based on a particular function such as the one shown in FIG.

4. A set of probability threshold values may be defined for the probability of data traffic, as shown in FIG. 4. This set of probability threshold values may be mapped to a corresponding set of inactivity time threshold values for the time since last activity, as also shown in FIG. 4. The set of probability threshold values may also be mapped to a corresponding set of timer values. The specific initial timer value to use may then be dependent on the time since last activity, as quantized by these sets of threshold values.

Id. at [0045]. I have reproduced *Hutchison*'s Figure 4 below:

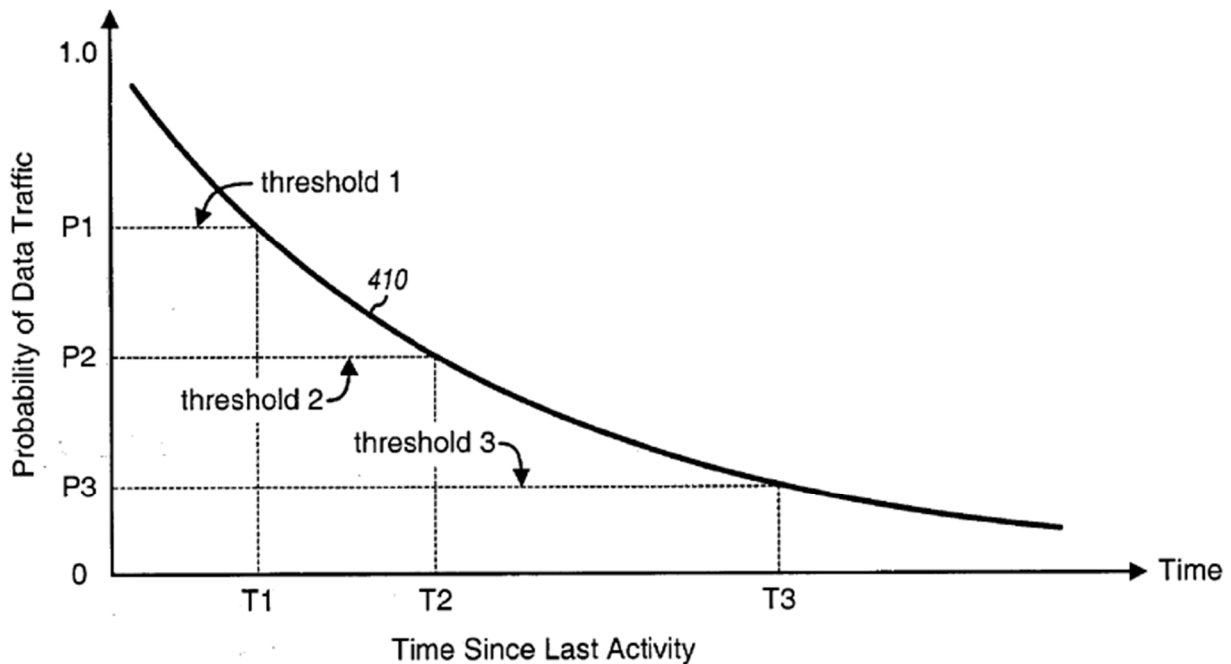


FIG. 4

Hutchison, Ex. 1006, Fig. 4

Notably, *Hutchison* explains that the function depicted in Figure 4 may be based on usage modeling:

Plot 410 indicates that, in general, the probability of data traffic is inversely related to the time since last activity. Plot 410 may approximate a logarithm function (as shown in FIG. 4) or some other function, depending on various factors. **Plot 410 may be characterized** (1) by observing the activities of a number of terminals in the system, (2) **based on usage modeling**, (3) based on scheduled data traffic, or (4) by some other means.

Id. at [0041].

184. *Hutchison* further discloses that, once the estimated probability is mapped to an initial timer value, the initial timer value may be modified to account for one or more pertinent events (such as events required for link maintenance):

The initial timer value may be modified due to one or a combination of pertinent events (e.g., required for link maintenance), as described above (step 518). The result of step 518 is a final timer value indicative of the duration of the next sleep by the terminal. This final timer value may be equal to zero (to indicate no sleep), the time until the next paging slot (to indicate a “normal” sleep), or multiple paging slot cycles (to indicate an extended sleep, i.e., a sleep through of one or more designated paging slots). The final value is loaded into the timer that is used to keep track of the duration of time to sleep.

Id. at [0060]. For example, *Hutchison* explains that such pertinent events may include events related to a hand-off:

Link maintenance events may include (1) synchronization with system time, (2) registration and/or authentication with the system, (3) monitoring messages from the system for updated system overhead information, **(4) hand-off from one access point to another access point, (5) hand-off from one system to another system, (6) hand-off from one subnet (or access point) to another subnet,** and (6) possibly others. The rate at which timing synchronization needs to be performed may be dependent on the stability of the terminal's time hypothesis. If the

sleep is too long, then the terminal's internal clock may drift too much. In that case, the terminal's timing may be sufficiently skewed such that it cannot efficiently perform the required signal processing when it wakes up from a sleep. Operation in a second system or mode (e.g., IS-2000) may improve the time hypothesis. The rates at which registration, system overhead information updating, and hand-off need to be performed may be dependent on various factors such as network topology.

Id. at [0052]. Once the timer value is modified, *Hutchison* discloses that the terminal performs a sleep for a time corresponding to the final value:

The terminal then performs a sleep for the duration of time corresponding to the final value loaded into the timer (step 520). Upon expiration of the timer, the terminal wakes up and performs the necessary signal processing (522). For example, the terminal can process the signals from the system, update its system overhead information, synchronize its timing, and so on. Thereafter, the process returns to step 512. Process 500 may be terminated by an occurrence of any one of a number of specified events (e.g., a request to open the connection).

Id. at [0061].

185. *Hutchison* discloses that, for an HDR system, the timer may be enabled if a terminal has an opened session but a closed connection (*i.e.*, the timer may be enabled if the terminal is in the Idle state):

In an embodiment, the timer is enabled for use based on session information for the terminal. **For the HDR system, the timer may be enabled if the terminal has an opened session but a closed connection (i.e., the timer may be enabled if the terminal is in the Idle state). If enabled, the timer is loaded with a particular value prior to entering sleep. The duration of the sleep is then determined by the value loaded into the timer.**

Id. at [0043]. If enabled, *Hutchison* explains that the duration of a sleep may be determined by the particular value loaded into the timer. *Id.*

186. Ultimately, *Hutchison* discloses selecting a final timer value such that a link can be maintained and acceptable data traffic monitoring can be achieved:

In general, the final timer value may be determined by the initial timer value and any modifications required by pertinent events for the terminal. It is desirable to not sleep during data traffic, since data would be lost if such were to occur. It is also desirable to not sleep when link maintenance is required, since the link may be lost in that case. **Thus, the final timer value is selected so that the link can be maintained and acceptable data traffic monitoring can be achieved. That is, the sleep time is selected such that undesirable sleep through of data traffic and/or required link maintenance events is limited to within an acceptable level.**

Id. at [0056]. For example, the final timer value (and thus, the sleep time) is selected such that undesirable sleep through data traffic or required link maintenance events is kept to an acceptable level. *Id.*; *see also id.* at [0052] (describing link maintenance events as including “hand-off from one access point to another access point,” “hand-off from one system to another system,” and “hand-off from one subnet (or access point) to another subnet,” among others).

187. In my opinion, a person of ordinary skill in the art would have understood *Hutchison*’s technique for performing timer-based sleep that involves using the time since last activity to estimate the probability of data traffic to reach or suggest monitoring time periods between packets entering and/or leaving the mobile device over the current access network that the mobile device currently uses to transport its application traffic. For example, *Hutchison* describes a terminal monitoring signals transmitted and received, including when the terminal is in an idle state. *Hutchison*, [0037]-[0038]. *Hutchison* also explicitly provides that recent usage and the likelihood of data traffic calculated and utilized by the terminal refers to both the transmission and reception of data:

Techniques are provided herein for performing timer-based sleep to extend sleep time and thus battery life for terminals in wireless communication systems, such as the HDR system. **It is recognized that the likelihood of data traffic (i.e., transmission and/or reception of data) for a terminal for**

some applications (e.g., packet data) is related to recent usage. In particular, most data exchanges in a data session are not expected to have lengthy intervals of no data traffic, and the probability of data traffic is considered to have a relationship to recent data traffic. Thus, if the recent usage indicates that data traffic is unlikely, then the terminal can continue to maintain the link but can monitor the signals from the system at a reduced rate.

Id. at [0039]; *see also id.* at [0070] (describing the terminal storing various inputs and data in a memory unit, including “usage model data”). In my opinion, a person of ordinary skill in the art would have understood *Hutchison* to disclose the terminal monitoring signals from the system (e.g., “while in the Idle state”) and recognized that doing so would allow the terminal to monitor usage (for the purposes of “usage modeling”) and determine a time since last activity based at least on the last signal entering the terminal from the system. Indeed, a person of ordinary skill in the art would have readily recognized that *Hutchison*’s terminal would monitor usage to obtain (and store) related data for the purposes of “usage modeling.” Accordingly, in *Hutchison*’s technique for performing timer-based sleep, a person of ordinary skill in the art would have understood *Hutchison* to disclose a terminal monitoring time periods between packets entering and/or leaving the terminal over an access network that the terminal currently uses to transport its application traffic.

b. Motivation to Modify *Hsu* in view of *Hutchison*

188. In my opinion, a person of ordinary skill the art would have readily recognized that *Hutchison* describes implementing its process for performing timer-based sleep in a system similar to *Hsu*'s. Indeed, *Hutchison* explicitly provides that its techniques for performing timer-based sleep are provided for use in wireless communication systems, such as an HDR system. *Hutchison*, [0039] ("Techniques are provided herein for performing timer-based sleep to extend sleep time and thus battery life for terminals in wireless communication systems, such as the HDR system."). Similarly, a person of ordinary skill in the art would have understood *Hsu* to disclose that its mobile station (or access terminal) may comprise an HDR subscriber station. *See Hsu*, [0025].

189. In my opinion, a person of ordinary skill in the art would have thus found it obvious to modify *Hsu*'s mobile station to implement the process for performing timer-based sleep described in *Hutchison*. Notably, with respect to the two-tuner embodiment, *Hsu* recognizes that it is desirable to maximize sleep time: "For conserving power, it is desirable to maximize a sleep mode for MS 300. In other words, it is desirable to maximize the time when MS 300 is using reduced power, or is in a sleep mode." *Hsu*, [0083]. In my opinion, a person of ordinary skill in the art would have recognized that the desire to maximize a sleep mode would have similarly applied to the one-tuner embodiment. Indeed, *Hsu* repeatedly stresses

the need to conserve battery power (*e.g.*, by maximizing a sleep mode). For example, *Hsu* notes the importance power conservation in system detection and selection generally:

Power conservation is an important design criterion in system detection and selection. Conservation of power at the mobile device is highly desirable to extend the operational time of the device between recharging the battery. If the MS 300 decides to scan for WLAN coverage, it is desirable to minimize power consumption during such scan while still monitoring cellular paging.

Id. at [0081]. *Hsu* also identifies battery conservation as a contributing factor in the preference for scanning for WLAN coverage automatically as opposed to manual operations based on user input:

Once the MS has the necessary WLAN information, the MS determines when to scan for WLAN coverage. Generally, the WLAN will transmit a periodic beacon, which is a signal transmitted to advertise the WLAN. When the MS is able to receive the beacon, the MS is able to access the WLAN. The user 52 may enable or disable WLAN scan, however, the process may not be user friendly, because of the manual operations required by the user. An automated operation may be preferred, which is transparent to the user. According to one embodiment, a scanning method transparent to the user 52 provides for the MS to scan periodically. **Periodic scanning is expensive when the**

MS is not in WLAN coverage area as scanning drains battery power.

Id. at [0040].

190. In view of *Hsu*'s stated desire to conserve battery power by maximize a sleep mode, a person of ordinary skill in the art would have been motivated to modify *Hsu*'s mobile station to utilize *Hutchison*'s techniques for performing timer-based sleep. Indeed, incorporating this technique into *Hsu*'s mobile station would have been obvious to a person of ordinary skill in the art because it amounts to applying a known technique (using *Hutchison*'s technique for performing timer-based sleep) to a known device (*Hsu*'s mobile station) ready for improvement (to maximize a sleep mode for the mobile station while also ensuring a sleep time is selected such that undesirable sleep through data traffic and/or required link maintenance events is limited to within an acceptable level). Additionally, it would amount to the use of a known technique (using *Hutchison*'s technique for performing timer-based sleep) to improve similar devices (*Hsu*'s mobile station) in the same way.

191. Accordingly, the *Hsu-Hutchison* device discloses or suggests monitoring time periods between packets entering and/or leaving the mobile station ("the mobile device monitoring time periods between packets entering and/or leaving the mobile device") to track usage and a time since last activity over a current

network (“over the current access network that the mobile device currently uses to transport its application traffic”) to perform timer-based sleep.

2. Claim 11

- a. “The method of claim 1, further including having the mobile device predict an actionable silence period based on said monitoring of time periods and a prediction model.”**

192. In my opinion, *Hsu* in combination with *Hutchison* discloses or suggests this feature. For example, and as I discussed above in Section IX.C.1.a, *Hutchison* discloses a process for performing timer-based sleep by a terminal that includes estimating the probability of data traffic for the terminal “based on (1) the time since last activity and (2) a particular function defining probability of data traffic versus time since last activity.” *Hutchison*, [0057]-[0058]. *Hutchison* also discloses that such a function may be based on usage modeling:

Plot 410 indicates that, in general, the probability of data traffic is inversely related to the time since last activity. Plot 410 may approximate a logarithm function (as shown in FIG. 4) or some other function, depending on various factors. **Plot 410 may be characterized** (1) by observing the activities of a number of terminals in the system, (2) **based on usage modeling**, (3) based on scheduled data traffic, or (4) by some other means.

Id. at [0041],

The plot shown in FIG. 4 is an example plot based on a specific usage model. Other plots with different shapes may also be used, and this is within the scope of the invention. For example, the probability of data traffic may start to curve up after a particular amount of time since last activity (instead of asymptotically approaching zero as shown in FIG. 4). This upturn characteristic may reflect the fact that the terminal may become overdue for data traffic after an extended period of inactivity.

Id. at [0049].

193. *Hutchison* explains that the probability of data traffic is used to determine an initial timer value, which may then be modified based on pertinent events to obtain a final timer value:

The specific value to be loaded into the timer may be determined by various factors such as the probability of data traffic, other pertinent events, and so on. **In one specific embodiment that is described in detail below, an initial timer value is first determined based on an estimated probability of data traffic for the terminal. This initial timer value may then be modified by pertinent events to obtain a final timer value. The final value is then loaded into the timer.**

Id. at [0044]; *see also id.* at [0060] (reproduced below). *Hutchison* further explains that the resulting final timer value corresponds to a duration of a next sleep by the terminal:

The initial timer value may be modified due to one or a combination of pertinent events (e.g., required for link maintenance), as described above (step 518). The result of step 518 is a final timer value indicative of the duration of the next sleep by the terminal. This final timer value may be equal to zero (to indicate no sleep), the time until the next paging slot (to indicate a “normal” sleep), or multiple paging slot cycles (to indicate an extended sleep, i.e., a sleep through of one or more designated paging slots). The final value is loaded into the timer that is used to keep track of the duration of time to sleep.

Id. at [0060].

194. In my opinion, and as I discussed above in Section IX.C.1.a, a person of ordinary skill in the art would have understood *Hutchison* to disclose the terminal monitoring signals from the system (e.g., “while in the Idle state”) and recognized that doing so would allow the terminal to monitor usage and determine a time since last activity based at least on the last signal entering the terminal from the system. *See id.* at [0023] (“In one method, the probability of data traffic for the terminal is initially estimated (e.g., based on time since last activity and a particular usage

model).”); *see also id.* at [0070] (describing the terminal storing various inputs and data in a memory unit, including “usage model data”).

195. In my opinion, a person of ordinary skill in the art would also have understood a particular function defining a probability of data traffic versus time since last activity to comprise a prediction model. For example, *Hutchison* notes repeatedly that such a function may be based on or comprises “usage modeling” or “a specific usage model.” *Id.* at [0041], [0049]; *see also id.* at [0013] (“In accordance with the method, the probability of data traffic for the terminal is initially estimated (e.g., based on the time since last activity by the terminal and a particular usage model).”). *Hutchison* also explains that such a function is used to estimate a probability of data traffic that the terminal uses to determine a *next* sleep by the terminal. *Id.* at [0060]. In my opinion, a person of ordinary skill in the art would also have understood *Hutchison*’s final timer value indicative of the duration of a next sleep by the terminal to comprise a prediction of an actionable silent period of the terminal. Indeed, by modifying the initial timer value to account for pertinent events (such as the performance of a handoff (*see id.* at [0051]-[0052])), a person of ordinary skill in the art would have understood *Hutchison* to disclose or suggest ensuring a next sleep coincides with a time of no activity of sufficient length to perform a handoff.

196. Notably, *Hutchison* explains the initial timer value is modified to account for pertinent events. For example, *Hutchison* explains that the final timer value indicating a duration of next sleep is selected to ensure a link can be maintained:

In general, the final timer value may be determined by the initial timer value and any modifications required by pertinent events for the terminal. It is desirable to not sleep during data traffic, since data would be lost if such were to occur. **It is also desirable to not sleep when link maintenance is required, since the link may be lost in that case. Thus, the final timer value is selected so that the link can be maintained and acceptable data traffic monitoring can be achieved.** That is, the sleep time is selected such that undesirable sleep through of data traffic and/or required link maintenance events is limited to within an acceptable level.

Id. at [0056]; *see also id.* at [0052] (describing link maintenance events as including “hand-off from one access point to another access point,” “hand-off from one system to another system,” and “hand-off from one subnet (or access point) to another subnet,” among others). Thus, a person of ordinary skill in the art would have understood *Hutchison* to disclose determining a duration of a next sleep by first determining an initial timer value amounting to a period of time where there is likely not data traffic and then subtracting from that timer value the time needed to perform one or more actions related to a link maintenance event (such as one or more actions

related to a “hand-off”). As such, a person of ordinary skill in the art would have recognized that the initial timer value is indicative of a period of time where there is likely not data traffic and that is at least long enough to perform the one or more actions related to a link maintenance event.

197. Accordingly, a person of ordinary skill in the art would have under that, when *Hsu*’s mobile station is modified to utilize *Hutchison*’s techniques for performing timer-based sleep, the *Hsu-Hutchison* device discloses or suggests determining an initial timer value indicative of a period of time where there is likely not data traffic and that is at least long enough to perform the one or more actions related to a link maintenance event (“having the mobile predict an actionable silent period”), and that such an initial timer value is determined based on the time since last activity (“based on said monitoring of time periods”) and a particular function defining probability of data traffic versus time since last activity (“and a prediction model”).

3. Claim 20

a. “A mobile device having silent proactive handoff capability, comprising:”

198. I understand that “[a] mobile device having silent proactive handoff capability, comprising:” is the preamble of claim 20 of the ’348 patent. I have been

asked to assume that the preamble is a claim limitation. Under this assumption, in my opinion, *Hsu* discloses or suggests this feature.

199. For example, as I discussed above in Section IX.B.1.a, *Hsu* discloses or suggests a mobile station configured to wait for a pending packet data session to go dormant in the cellular network to scan for WLAN coverage and, after detecting WLAN coverage, proceeding to perform access authentication and Mobile IP registration to handover its packet data session to a WLAN. For the reasons discussed above in Section IX.B.1.c, a person of ordinary skill in the art would have understood that a period in *Hsu* “[a]fter the MS becomes idle in the cellular network” comprises “at least one silent period of an application.” And, as I discussed above in Section IX.B.1.d, a person of ordinary skill in the art would have understood *Hsu* to disclose a “proactive” handoff technique at least because *Hsu* discloses performing handoff actions based on factors aside from the connection with the cellular network degrading, and thus requiring handoff. Thus, in my opinion, a person of ordinary skill in the art would have readily appreciated that *Hsu* discloses its mobile station having silent proactive handoff capability.

200. Accordingly, *Hsu* discloses or suggests a mobile station (“a mobile device”) proactively scanning for WLAN coverage and performing handover of a packet data session to a WLAN when the mobile station is idle in the cellular network (“having silent proactive handoff capability”).

- b. “a) a traffic monitor component configured to monitor time periods between packets transmitted to or from the mobile device over a current access network;”**

201. In my opinion, *Hsu* in combination with *Hutchison* discloses or suggests this feature for the reasons I discussed above in Section IX.C.1.a. For example, *Hutchison* discloses a process for performing timer-based sleep by a terminal that includes estimating the probability of data traffic for the terminal. *See, e.g., Hutchison*, [0057]-[0058]. To do so, *Hutchison* describes utilizing a time since last activity and a usage model. *See, e.g., id.* at [0023] (“In one method, the probability of data traffic for the terminal is initially estimated (e.g., based on time since last activity and a particular usage model).”). In my opinion, a person of ordinary skill in the art would have recognized *Hutchison* to disclose the terminal monitoring time periods between packets entering and/or leaving the terminal over an access network that the terminal currently uses to transport its application traffic to obtain data for the purposes of usage modeling and to determine a time since last activity based at least on the last signal entering the terminal from the system. And for the reasons I discussed above in Section IX.C.1.b, a person of ordinary skill in the art would have found it obvious to modify *Hsu*’s mobile station to implement the process for performing timer-based sleep described in *Hutchison*.

202. Accordingly, in my opinion, a person of ordinary skill in the art would have understood the *Hsu-Hutchison* device to disclose or suggest a mobile station configured to (“a mobile device ... comprising: ... a) a traffic monitor component configured to”) determine a time since last activity (“monitor time periods between packets transmitted to or from the mobile device”) by monitoring signals received from the system (“over a current access network”).

203. I have been asked to assume that Patent Owner may argue that claim 20 of the '348 patent requires a separate “traffic monitor component” configured to monitor time periods between packets transmitted to or from the mobile device. In my opinion, such an argument would be incorrect because the '348 patent specifically provides that the functional components described can be implemented in a number of ways, including in software:

As indicated above, the various functional components of the mobile device can be implemented in a variety of ways, as would be understood by those in the art based on this disclosure. For example, some or all of the functional components can be implemented in software at the application layer and/or at the kernel layer. Additionally, some or all of the functional components can be implemented in hardware, firmware and/or on micro-chips.

'348 patent at 15:22-29. The '348 patent also specifically refers to the component configured to monitor time periods between packets transmitted to or from the mobile device as a “functional component” of the mobile device:

In the preferred embodiments, the mobile device has a **functional component** referred to in this disclosure as a **Traffic Monitor** that is **configured to monitor the time periods between packets (e.g., inter-packet times) entering and/or leaving the mobile device** over the current access network (i.e., the network the mobile uses currently to transport its application traffic), such as shown at step 20 in FIG. 1.

Id., 9:48-54. Therefore, in my opinion, a person of ordinary skill in the art would have understood claim 20 to require that the mobile device include “a traffic monitor component” or simply otherwise be configured to monitor time periods between packets transmitted to or from the mobile device.

- c. **“b) a target network selector component configured to select a target network to which the mobile device may potentially switch to when an actionable silence period is detected;”**

204. In my opinion, *Hsu* in combination with *Hutchison* discloses or suggests this feature for the reasons I discussed above in Section IX.B.9.a. For example, *Hsu* discloses the mobile station detecting WLAN coverage and performing system selection between a WLAN and cellular system:

In such a device, the single tuner is used for communication with both the cellular system and the WLAN system. **The MS detects WLAN coverage and performs system selection between WLAN and cellular system, wherein the MS may only tune to one system (WLAN or cellular) at a given time.**

Hsu, [0059]; *see also id.* at FIG. 1, [0009], [0026]-[0035] (depicting and describing a mobile station adapted for system detection and selection that includes a selector 58); *id.* at [0060] (describing the mobile station performing system detection and selection with respect to scenario (2)).

205. Accordingly, in my opinion, a person of ordinary skill in the art would have understood the *Hsu-Hutchison* device to disclose or suggest a mobile station configured to (“a mobile device ... comprising: ... b) a target network selector component configured to”) select a system to tune (or connect) to as between WLAN and cellular systems (“select a target network to which the mobile device may potentially switch to when an actionable silence period is detected”).

206. I have been asked to assume that Patent Owner may argue that claim 20 of the '348 patent requires a separate “target network selector component” configured to select a target network to which the mobile device may potentially switch to when an actionable silence period is detected monitor time periods between packets transmitted to or from the mobile device. In my opinion, such an argument would be incorrect because the '348 patent specifically provides that the functional

components described can be implemented in a number of ways, including in software:

As indicated above, the various functional components of the mobile device can be implemented in a variety of ways, as would be understood by those in the art based on this disclosure. For example, some or all of the functional components can be implemented in software at the application layer and/or at the kernel layer. Additionally, some or all of the functional components can be implemented in hardware, firmware and/or on micro-chips.

'348 patent at 15:22-29. The '348 patent also specifically refers to the component configured to select a target network as a “functional component” of the mobile device:

As also shown in FIG. 1, the mobile device also preferably includes a functional component referred to in this disclosure as a Target Network Selector that selects a target network to which the mobile device may switch to, such as, e.g., shown at step 30 in FIG. 1. In some preferred embodiments, as shown in FIG. 1, the target network selector operates in parallel to the traffic monitor. In various embodiments, the target network selection can be based on any criteria deemed appropriate to satisfy the requirements of the mobile device and the applications running on the mobile device. These criteria may include, for

example, the detection of a new radio network, when the radio signal strength of the current network drops to a threshold.

Id. at 10:29-41. Therefore, in my opinion, a person of ordinary skill in the art would have understood claim 20 to require that the mobile device include “a target network selector component” or simply otherwise be configured to select a target network to which the mobile device may potentially switch to when an actionable silence period is detected monitor time periods between packets transmitted to or from the mobile device.

d. “c) a silence predictor component configured to predict the actionable silence period of an application; and”

207. In my opinion, *Hsu* in combination with *Hutchison* discloses or suggests this feature for the reasons I discussed above in Section IX.C.2.a. For example, *Hutchison* disclosing using the probability of data traffic to determine an initial timer value, which may then be modified based on pertinent events to obtain a final timer value:

The specific value to be loaded into the timer may be determined by various factors such as the probability of data traffic, other pertinent events, and so on. **In one specific embodiment that is described in detail below, an initial timer value is first determined based on an estimated probability of data traffic for the terminal. This initial timer value may then be**

modified by pertinent events to obtain a final timer value.

The final value is then loaded into the timer.

Hutchison, [0044]. *Hutchison* further explains that the resulting final timer value corresponds to a duration of a next sleep by the terminal:

The initial timer value may be modified due to one or a combination of pertinent events (e.g., required for link maintenance), as described above (step 518). The result of step 518 is a final timer value indicative of the duration of the next sleep by the terminal. This final timer value may be equal to zero (to indicate no sleep), the time until the next paging slot (to indicate a “normal” sleep), or multiple paging slot cycles (to indicate an extended sleep, i.e., a sleep through of one or more designated paging slots). The final value is loaded into the timer that is used to keep track of the duration of time to sleep.

Id. at [0060]. In my opinion, for the reasons I discussed above in Section IX.C.2.a, a person of ordinary skill in the art would also have understood *Hutchison* describing determining a final timer value indicative of the duration of a next sleep by the terminal to comprise predicting an actionable silent period of the terminal.

208. Accordingly, in my opinion, a person of ordinary skill in the art would have understood the *Hsu-Hutchison* device to disclose or suggest a mobile station configured to (“a mobile device ... comprising: ... c) a silence predictor component

configured to”) determine a final timer value indicative of the duration of a next sleep by the terminal (“predict the actionable silence period of an application”).

209. I have been asked to assume that Patent Owner may argue that claim 20 of the ’348 patent requires a separate “silence predictor component” configured to predict the actionable silence period of an application. In my opinion, such an argument would be incorrect because the ’348 patent specifically provides that the functional components described can be implemented in a number of ways, including in software:

As indicated above, the various functional components of the mobile device can be implemented in a variety of ways, as would be understood by those in the art based on this disclosure. For example, some or all of the functional components can be implemented in software at the application layer and/or at the kernel layer. Additionally, some or all of the functional components can be implemented in hardware, firmware and/or on micro-chips.

’348 patent at 15:22-29. The ’348 patent also specifically refers to the component configured to predict an actionable silence period of an application as a “functional component” of the mobile device:

In the preferred embodiments, the mobile device also includes a functional component called an ASP Predictor that uses the output from the Traffic Monitor and a

prediction model to detect the next ASP and to predict its length, such as, e.g., shown at step 40 in FIG. 1. While a variety of known prediction models may be used (as would be understood by those in the art based on this disclosure), some non-limiting examples of illustrative prediction models can include Wiener Process models and/or time series models, such as, e.g., auto-regression models.

Id. at 9:55-64. Therefore, in my opinion, a person of ordinary skill in the art would have understood claim 20 to require that the mobile device include “silence predictor component” or simply otherwise be configured to predict an actionable silent period of an application.

- e. **“d) a silent handoff controller configured to control a silent proactive handoff to a target network during the actionable silent period.”**

210. In my opinion, *Hsu* in combination with *Hutchison* discloses or suggests this feature. For example, as I discussed above in Sections IX.B.1.a and IX.C.3.a, *Hsu* discloses or suggests a mobile station configured to wait for an active packet data session to become idle in the cellular network to scan for WLAN coverage and, after detecting WLAN coverage, proceeding to perform access authentication and Mobile IP registration to handover its packet data session to a WLAN.

211. For the reasons I discussed above in Section IX.B.1.c, a person of ordinary skill in the art would have understood that a period in *Hsu* “[a]fter the MS becomes idle in the cellular network” comprises “at least one silent period of an application.” And, as I discussed above in Section **Error! Reference source not found.**IX.B.1.d, a person of ordinary skill in the art would have understood *Hsu* to disclose a “proactive” handoff technique at least because *Hsu* discloses performing handoff actions based on factors aside from the connection with the cellular network degrading, and thus requiring handoff.

212. Accordingly, a person of ordinary skill in the art would have understood the *Hsu-Hutchison* device to disclose or suggest a mobile station configured to (“a mobile device ... comprising: ... d) a silent handoff controller configured to”) proactively scan for WLAN coverage and perform handover of a packet data session to a WLAN when the mobile station is idle in the cellular network (“control a silent proactive handoff to a target network during the actionable silent period”).

213. I have been asked to assume that Patent Owner may argue that claim 20 of the ’348 patent requires a separate “silence handoff controller” configured to control a silent proactive handoff to a target network during the actionable silent period. In my opinion, such an argument would be incorrect because the ’348 patent specifically provides that the functional components described can be implemented in a number of ways, including in software:

As indicated above, the various functional components of the mobile device can be implemented in a variety of ways, as would be understood by those in the art based on this disclosure. For example, some or all of the functional components can be implemented in software at the application layer and/or at the kernel layer. Additionally, some or all of the functional components can be implemented in hardware, firmware and/or on micro-chips.

'348 patent at 15:22-29. The '348 patent also specifically refers to the component configured to control a silent proactive handoff to a target network during the actionable silent period as a “functional component” of the mobile device:

With reference to the embodiment shown in FIG. 1, **the mobile device can include a functional component referred to herein as a silent proactive handoff processor (SPH Processor) 5, which can, e.g., be configured to perform processing functions of the silent proactive handoff methodologies.** In addition, the mobile device can also include a component 6 that includes an algorithm or process to detect if enough information about a candidate network is available, as well as a component 7 that includes a mobile speed detection algorithm or process.

Id. at 9:35-44. Therefore, in my opinion, a person of ordinary skill in the art would have understood claim 20 to require that the mobile device include “silence handoff

controller” or simply otherwise be configured to control a silent proactive handoff to a target network during a actionable silent period.

4. Claim 21

- a. “The mobile device of claim 20, wherein said silent handoff controller is configured to establish connections to a target network, to discover network information about a target network, to obtain a local IP address for the mobile device from the target network, and to perform authentication with the target network.”**

214. In my opinion, *Hsu* in combination with *Hutchison* discloses or suggests these features. For example, *Hsu* discloses that the mobile station may wait for an active packet data session to become idle in the cellular network to scan for WLAN coverage: “After the MS becomes idle in the cellular network, the MS tunes away from the cellular network to scan for the WLAN.” *Hsu*, [0062]. After the mobile station detects WLAN coverage, *Hsu* discloses that the mobile station “performs WLAN access authentication and optionally Mobile IP registration to handover its packet data session to WLAN.” *Id.* at ¶[0064].

215. For the reasons I discussed above in Section IX.B.1.c, a person of ordinary skill in the art would have understood the mobile station in *Hsu* tuning away from the cellular network to scan for WLAN coverage to comprise the mobile station establishing a connection to the WLAN. And for the reasons I discussed above in Section IX.B.1.d, a person of ordinary skill in the art would have understood

scanning for WLAN coverage to comprise discovering network information about the WLAN.

216. Accordingly, the *Hsu-Hutchison* device discloses or suggests *Hsu*'s mobile station configured to tune away from the cellular network to scan for the WLAN ("wherein said silent handoff controller is configured to establish connections to a target network), and, after detecting WLAN coverage by receiving a beacon from the WLAN ("to discover network information about a target network"), perform both Mobile IP registration and access authentication ("to obtain a local IP address for the mobile device from the target network, and to perform authentication with the target network").

D. Ground 3: *Hsu* and *Shoaib* Render Obvious Claims 16 and 17

217. I have reviewed *Hsu* and *Shoaib*, and as described below, it is my opinion that *Hsu* and *Shoaib* disclose or suggest all of the features of claims 16 and 17 of the '348 patent.

1. Claim 16

- a. **“The method of claim 15, further including after having the mobile device start said at least one handoff action, in the event that the current network continues to satisfy the mobile device's requirements, having the mobile device switch its network connection back to the current network.”**

218. In my opinion, *Hsu* in combination with *Shoaib* discloses or suggests these features.

219. For the reasons I discussed above in Section IX.B.7.b, *Hsu* discloses performing system detection and selection by the mobile station in the one-tuner embodiment (including with respect to scenario (2)) (*see Hsu*, [0059]-[0060]), and it would have been obvious to a person of ordinary skill in the art to incorporate *Hsu*'s technique for determining whether to proceed to handover a packet data session (*e.g.*, by performing access authentication and Mobile IP registration) based on various criteria (as described with respect to *Hsu*'s two-tuner embodiment (*see id.* at [0085])) in *Hsu*'s one-tuner embodiment.

220. In my opinion, it would also have been obvious to a person of ordinary skill in the art to look to identify additional criteria to consider when determining whether to proceed to handover a packet data session from a cellular network to a WLAN in view of *Hsu*'s open-ended disclosure regarding the criteria to consider when making such a determination. For example, *Hsu* explains that various criteria

may be used to determine whether to handover a packet data session from the cellular network to the WLAN after WLAN coverage is detected:

After the MS 300 detects WLAN coverage, receives the WLAN beacon, the MS 300 uses certain criteria to handover a packet data session from the cellular network to the WLAN. **The criteria may include whether the MS is idle in cellular network (i.e., no dedicated channel) or whether the WLAN signal strength is stable, etc.** The MS 300 may wait for a pending packet data session to go dormant in the cellular network. The MS 300 then performs packet data session handover (i.e., sending Mobile IP registration via WLAN). This may be useful to minimize service interruption. Similarly, the MS 300 may perform packet data session handover when the WLAN signal strength is above an acceptable threshold for a specified period of time. In this way, the MS 300 ensures that access to the WLAN is sustainable. The measure may be any measure of channel quality and/or signal strength. The threshold may be predetermined or may dynamically be adjusted based on the actual performance of the communication. This may be useful to avoiding any ping-pong effect whereby the MS 300 switches between WLAN access and cellular network access due to changing conditions or signal strength that is at the margin of tolerance for operation. Still further, upon detection of the WLAN, the MS 300 may notify the user and wait for the user to manually select WLAN.

Id. at [0085]. In my opinion, a person of ordinary skill in the art would have understood that *Hsu*'s use of "etc." at the end of the list of criteria identified for potential consideration when making such a determination indicates that *Hsu* expressly contemplates that one or more additional criteria may be used. In my opinion, a person of ordinary skill in the art would also have recognized that it was known in the art to consider a wide variety of factors when determining whether to handover a packet data session from one network to another. *See, e.g., Shoaib*, [0008] (discussed further below).

221. *Shoaib* discloses a method of performing a handover from one network to another that includes evaluating various criteria and initiating a trigger that causes the handover:

One aspect of the present invention regards a method of handing over from a first network to a second network that includes operating a mobile terminal via a first network, evaluating at least one criteria of either the first network or a second network and initiating a trigger that causes a handover from the first network to the second network so that the mobile terminal operates via the second network.

Shoaib, [0014]. *Shoaib* also discloses an application layer triggering mechanism that determines the triggers required given a set of circumstances:

A second aspect of the present invention regards a network selection system that includes a mobile terminal in communication with a first network, a second network in communication with the first network and an application layer triggering mechanism that determines which one of a plurality of triggers is required in a certain set of circumstances to provide a particular application.

Id. at [0015].

222. Notably, in the “Background of the Invention” section, *Shoaib* notes that, “[t]raditionally, handovers between networks are initiated on the basis of the received signal strength, which is measured at the network and the mobile device.”

Id. at [0005]. *Shoaib* also explains that, while it possible to initiate a handoff manually, it is preferable that handovers are performed automatically based on a number of factors:

While it is possible to initiate the handover processor manually via the mobile terminal, it is preferred that a process is developed where the handover is done automatically. In the case of automatic handover, it is very important for the mobile terminal 102 to know when to do the handover and to which network in a heterogeneous environment such as shown in FIG. 1. It is known that the handover decision can be based on a number of factors.

Id. at [0008]. Among such factors, *Shoaib* explains that one is information locally available on the mobile device, which may include the signal strength of a current point of attachment, among other information:

A second factor to consider is that some information is locally available on the mobile device. Such information can include information about the geographical location of the mobile device, signal strength with the current point of attachment, signal strength of the target network, type of applications that are running along with application specific, QoS, bandwidth, security requirements and battery consumption level etc.

Id. at [0009].

223. *Shoaib* discloses a triggering mechanism that determines the type of trigger that is required in particular circumstances:

An algorithm for an application layer triggering mechanism is shown and described in FIG. 2. As will be described below, the application layer triggering mechanism 200 determines which type of trigger is required in a certain set of circumstances and to provide the required trigger to applications.

Id. at [0034]. *Shoaib* also explains that there are four types of triggers that may be provided, including a handover trigger signal that initiates a handover process with a target network:

There are four types of triggers contemplated: 1) a pre-authentication trigger signal 202 (PT) that triggers pre-authentication initiation of the mobile terminal with the handover target network(s), 2) a service adaptability trigger signal 204 (ST) that signals an application that it can perform any necessary adaptation in anticipation of an impending handover, 3) a pre-caching trigger signal 206 (CT) that sends a trigger signal to a cache management system in order to pre-cache content at the cache server nearest to the target base station **and 4) a handover trigger signal 208 (HT) that initiates the handover process with the target network.**

Id. at [0035]. *Shoaib* discloses evaluating the various criteria to determine whether to initiate one or more of the trigger signals (with or without user input):

A certain set of criteria need to be met in order to signal one or more of the above-mentioned trigger signals. This set of criteria corresponds to the many different aspects that need to be considered before making a triggering decision. The triggering mechanism 200 evaluates these criteria in parallel. The results of this evaluation are combined to determine a composite triggering criteria. If the composite triggering criteria are satisfied, then the triggering mechanism 200 checks the remote (target) network signal criteria and if that is also satisfied it may initiate one or more trigger signals with or without user input depending on the situation or pre-defined settings.

Id. at [0036].

224. Among the various criteria that may be considered, *Shoaib* describes considering a “local signal criteria” that looks at a signal strength of a current point of attachment and determines whether the signal strength is satisfactory:

Local signal criteria 240 look at signal strength of the current point of attachment. Some possible signal strength states are: 1) SL000—No signal; 2) SL100—Extremely bad signal; 3) SL200—Poor signal; 4) SL300—Acceptable signal; 5) SL400—Good signal and 6) SL500—Excellent signal. **Local signal criteria 240 is evaluated at step 252 and is satisfied when the signal strength with the current point of attachment becomes poor or worst (states <SL300).**

The local signal criteria 240 is a qualitative criteria, which is derived from a quantitative criteria that is specific to access technology. For example, a good signal strength is specified by the vender and the operator depending on the wireless system (e.g., 6.1 dB). Note that should the local signal criteria 240 not be met, then the application state information will be saved per step 254.

Id. at [0072]-[0073].

225. *Shoaib* explains that the various criteria identified, including local signal criteria 240, may be continuously evaluated and used to separately trigger one of more operations, including pre-authentication and/or handover:

All the criteria 212, 222, 218, 220, 236, 238, 240 and 242 are continuously evaluated and results in the evaluation being sent to the composite trigger selector 272, which determines what type(s) of trigger(s) may be required. Only if the composite trigger selector 272 determines the need for one or more triggers, then a remote signal criteria 260 is applied. This helps in saving battery resources on the mobile device because the mobile device does not have to scan for target networks at all times.

(*id.* at [0080]),

Once the triggering is entered either manually or automatically, the triggering is initiated per step 270 so that either the pre-authentication trigger 202, the service adaptability trigger 204, the pre-caching trigger 206 or the handover trigger 208 is initiated.

(*id.* at [0090]).

226. In my opinion, having reviewed the foregoing passages of *Shoaib*, a person of ordinary skill in the art would readily understand *Shoaib* to disclose evaluating a signal strength of a current point of attachment (*i.e.*, local signal criteria 240) to determine whether to perform one or more actions, including initiating a handover from the current point of attachment to a target network. A person of ordinary skill in the art would also have appreciated that this is further evidenced by

Shoaib's claim 9, which, when considered in combination with *Shoaib*'s independent claim 1 from which claim 9 depends, requires operating a mobile terminal via a first network, evaluating a local signal level, and initiating a trigger that causes a handover from the first network to a second network so that the mobile terminal operates via the second network. *Id.* at claims 1 & 9 (together claiming a method that includes evaluating a local signal level and initiating a trigger that causes a handover from one network to another network).

b. Motivation to Modify *Hsu* in view of *Shoaib*

227. In my opinion, a person of ordinary skill in the art would have been motivated to modify *Hsu*'s mobile station to consider a signal strength of a current point of attachment when determining whether to proceed to handover a packet data session from a cellular network to a WLAN after WLAN coverage is detected, as taught by *Shoaib*. For example, as I discussed above, it would have been obvious to a person of ordinary skill in the art to look to identify additional criteria to consider when determining whether to proceed to handover a packet data session from a cellular network to a WLAN at least in view of *Hsu*'s open-ended disclosure regarding the criteria to consider when making such a determination. *See Hsu*, [0085] ("The criteria may include whether the MS is idle in cellular network (i.e., no dedicated channel) or whether the WLAN signal strength is stable, etc."). A person of ordinary skill in the art would also have recognized that considering the

signal strength of a current network before proceeding to handover a packet data session from a cellular network to a WLAN after WLAN coverage is detected would enable the mobile station to forego completing a handover from the cellular network to a WLAN if the strength of the signal remains strong, which may be particularly beneficial in reducing the number of handoffs performed or if the cellular network is a preferred network at a given time or for particular applications or types of applications.

228. In my opinion, when considering the signal strength of a current network before proceeding to handover a packet data session from a cellular network to a WLAN, it also would have been obvious to a person of ordinary skill in the art to switch back to (or continue using) a current network if the current network continues to satisfy the mobile device's requirements. For example, *Shoaib* explains that evaluating local signal criteria may include determining a signal strength state:

Local signal criteria 240 look at signal strength of the current point of attachment. **Some possible signal strength states are:**
1) SL000—No signal; 2) SL100—Extremely bad signal; 3) SL200—Poor signal; 4) SL300—Acceptable signal; 5) SL400—Good signal and 6) SL500—Excellent signal. Local signal criteria 240 is evaluated at step 252 and is satisfied when the signal strength with the current point of attachment becomes poor or worst (states <SL300).

Shoaib, [0072]. *Shoaib* also explains that the local signal criteria is “satisfied” when the signal strength becomes poor or worse. *Id.* Having reviewed the foregoing passage of *Shoaib*, a person of ordinary skill in the art would have understood *Shoaib* to disclose that, when the signal strength of the current point of attachment is acceptable or better (states $\geq$ SL300), the current point of attachment satisfies the mobile device’s requirements, and that, when the signal strength of the current point of attachment is poor or worse (states $<$ SL300), the current point of attachment does not satisfy the mobile device’s requirements.

229. In my opinion, it would also have been obvious to a person of ordinary skill in the art, when utilizing a local signal level as a criteria for determining whether to handover a packet data session from the cellular network to the WLAN, to switch back to (or continue using) a current network if the current network continues to satisfy the mobile device's requirements. Indeed, a person of ordinary skill in the art would have recognized that it was well known in the art to check whether a current network satisfies a mobile device’s requirements before initiating the final steps to handover a packet data session to another network.

230. For example, as I discussed above, *Chaskar*¹⁰ relates to controlling handover between networks. *See Chaskar*, [0002]. *Chaskar* describes handoff schemes as being logically partitioned into a “proactive” phase and a “reactive” phases:

FIGS. 6 and 7 also show the logical partitioning of each of the handoff schemes into two phases: Phase 1, i.e. preparing a handover procedure, which is the **proactive phase and needs to be completed when WLAN signal is still strong**, and Phase 2, i.e. performing actual handover, **which is reactive, i.e., can be initiated after WLAN signal starts to fade noticeably**.

Id. at [0062]. *Chaskar* explains that the “proactive” phase (*i.e.*, “Phase 1”) comprises preparing a handover procedure and that the “reactive” phase (*i.e.*, “Phase 2”) comprises performing the actual handover. *Id.* *Chaskar* also discloses an embodiment in which, after initiating Phase 1, a mobile node again detects the signal strength of a current network:

After initiation of phase 1, the mobile node again detects WLAN signal strength from the AP, and while the detected WLAN signal strength is larger than a predetermined threshold

¹⁰ To be clear, here, I am relying on *Chaskar* as evidence of a person of ordinary skill in the art’s knowledge and the state of the art. *Chaskar* is not part of unpatentability Ground 3.

Th2, the mobile node remains in a waiting state. After the signal strength has fallen below Th2, handoff phase 2 is initiated.

Id. at [0071]; *see also id.* at [0073]. If the current network satisfies the mobile node's requirements (*i.e.*, if the WLAN signal strength is greater than a predetermined threshold), *Chaskar* explains that the mobile node waits and does not initiate Phase 2. *Id.* Conversely, if the current network does not satisfy the mobile node's requirements (*i.e.*, if the WLAN signal strength has fallen below the predetermined threshold), *Chaskar* explains that the mobile node proceeds to initiate Phase 2. *Id.* A person of ordinary skill in the art would have thus understood *Chaskar* to disclose, after performing proactive handoff operations, checking whether a current network satisfies the mobile device's requirements before proceed to handover a packet data session, and, if the current network continues to satisfy the mobile device's requirements, declining to initiate a handover and instead switching back to and using the current network to send or receive any application traffic.

231. As another example, *Jagadeesan*¹¹ is directed to assisting with a handoff decision in a wireless environment. *See Jagadeesan*, Abstract, [0001]. Specifically, *Jagadeesan* describes techniques that enable a mobile station to make an intelligent decision regarding the switching of a communication session from one network (*e.g.*, a cellular network) to another (*e.g.*, a WLAN). *See id.* at [0004], [0015]. *Jagadeesan* explains that one consideration in determining whether to perform a handoff is the signal strength of a current connection:

Fundamentally, mobile station 28 needs to decide when to perform a handoff between two platforms. In this example, the two platforms are 802.11 (which is part of enterprise network 14) and cellular network 12. This determination is part of the handoff heuristics. One helpful aspect of the heuristics is the ability of mobile station 28 to monitor the signal strength of 802.11. **When that signal degrades to a certain point, then mobile station 28 could recognize that it is losing the 802.11 signal such that it should start performing a handoff.**

Id. at [0017]. *Jagadeesan* also describes a mobile station, after associating with a access point, monitoring the previously connected network and waiting to register

¹¹ To be clear, here, I am relying on *Jagadeesan* as evidence of a person of ordinary skill in the art's knowledge and the state of the art. *Jagadeesan* is not part of unpatentability Ground 3.

with a new network associated with the access point until the signal strength of the previously connected network drops below a threshold:

Note that once mobile station 28 hits a portal AP on its way out of the building, it may elect to register with cellular network 12 immediately. This is illustrated by step 110. Similarly, mobile station 28 may be configured such that, once it associates with a portal AP, it registers with that cellular network. **Another configuration option could relate to a scenario where mobile station 28, after associating with a portal AP, monitors signal strength such that when the signal strength drops below a given threshold, then mobile station 28 opts to register.**

Id. at [0045]. In my opinion, and as evidenced by at least *Chaskar* and *Jagadeesan*, it would have been obvious to a person of ordinary skill in the art to utilize a local signal level as a criteria for determining whether to proceed to handover a packet data session from the cellular network to the WLAN, and, if the cellular network continues to satisfy the mobile station's requirements, to switch back to (or continue using) the cellular network.

232. For at least the foregoing reasons, it would have been obvious to a person of ordinary skill in the art to modify *Hsu*'s mobile station based on the teachings of *Shoaib* because it would have amounted to merely applying a known technique (considering a local signal level when determining whether to handover a packet data session from the cellular network to the WLAN, as taught by *Shoaib*) to

a known device (*Hsu's* mobile station) ready for improvement (*Hsu* already discloses using criteria to determine whether to handover a packet data session). In addition, a person of ordinary skill in the art would also have recognized that it would amount to the use of a known technique (using the signal level of a current network to determine whether to handover a packet data session) to improve similar devices (*Hsu's* mobile station) in the same way.

233. Accordingly, the *Hsu-Shoaib* device discloses or suggests the mobile station, after detecting WLAN coverage (“after having the mobile device start said at least one handoff action”), considering the signal strength of a current point of attachment when determining whether to proceed to handover a packet data session to the WLAN, and if the cellular network continues to satisfy the mobile device’s requirements (“in the event that the current network continues to satisfy the mobile device's requirements”), switching back to (or continuing to use) the cellular network (“having the mobile device switch its network connection back to the current network”).

2. Claim 17

- a. **“The method of claim 15, further including after having the mobile device start said at least one handoff action, in the event that the current network does not continue to satisfy the mobile device's requirements, having the mobile device perform the remaining handoff steps to finish a handoff.”**

234. In my opinion, *Hsu* in combination with *Shoaib* discloses or suggests these features. For the reasons I discussed above in Section IX.D.1.b, it would have been obvious to a person of ordinary skill in the art to consider a signal strength of a current point of attachment when determining whether to proceed to handover a packet data session from a cellular network to a WLAN after WLAN coverage is detected, as taught by *Shoaib*.

235. In my opinion, it would also have been obvious to a person of ordinary skill in the art, when utilizing a local signal level as a criteria for determining whether to handover a packet data session from the cellular network to the WLAN, to proceed to handoff a packet data session if the cellular network no longer satisfies the mobile device's requirements. Indeed, for the reasons I discussed above in Section IX.D.1.b, a person of ordinary skill in the art would have recognized that it was well known in the art to check whether a current network satisfies a mobile device's requirements before initiating the final steps to handover a packet data session to another network. Moreover, and as evidenced by at least *Chaskar* and *Jagadeesan*

discussed above,¹² it would have been obvious to a person of ordinary skill in the art to utilize a local signal level as a criteria for determining whether to proceed to handover a packet data session from the cellular network to the WLAN, and, if the cellular network does not continue to satisfy the mobile station's requirements, to proceed to handoff the packet data session to the WLAN network.

236. Accordingly, the *Hsu-Shoaib* device discloses or suggests the mobile station, after detecting WLAN coverage (“after having the mobile device start said at least one handoff action”), considering the signal strength of a current point of attachment when determining whether to proceed to handover a packet data session to the WLAN, and if the cellular network does not continue to satisfy the mobile device's requirements (“in the event that the current network does not continue to satisfy the mobile device's requirements”), proceeding to handover a current packet data session (or continuing to use) the cellular network (“having the mobile device perform the remaining handoff steps to finish a handoff”).

¹² To be clear, here, I am relying on *Chaskar* and *Jagadeesan* as evidence of a person of ordinary skill in the art's knowledge and the state of the art. *Chaskar* and *Jagadeesan* are not part of unpatentability Ground 3.

E. Ground 4: *Hsu* and *Ivanov* Render Obvious Claims 18 and 19

237. I have reviewed *Hsu* and *Ivanov*, and as described below, it is my opinion that *Hsu* and *Ivanov* disclose or suggest all of the features of claims 18 and 19 of the '348 patent.

1. Claim 18

- a. “The method of claim 1, further including having said mobile device make a determination as to whether to utilize a silent proactive handoff based on an estimation of the time that the mobile device will be within a candidate network.”**

238. In my opinion, *Hsu* in combination with *Ivanov* discloses or suggests this feature.

239. For the reasons I discussed above in Section IX.B.7.b, *Hsu* discloses performing system detection and selection by the mobile station in the one-tuner embodiment (including with respect to scenario (2)) (*see Hsu*, [0059]-[0060]), and it would have been obvious to a person of ordinary skill in the art to incorporate *Hsu*'s technique for determining whether to proceed to handover a packet data session (*e.g.*, by performing access authentication and Mobile IP registration) based on various criteria (as described with respect to *Hsu*'s two-tuner embodiment (*see id.* at [0085])) in *Hsu*'s one-tuner embodiment. Moreover, for the reasons I discussed above in Section IX.D.1.a, it would have been obvious to a person of

ordinary skill in the art to look to identify additional criteria to consider when determining whether to proceed to handover a packet data session from a cellular network to a WLAN at least in view of *Hsu*'s open-ended disclosure regarding the criteria to consider when making such a determination. *See id.* at [0085] ("The criteria may include whether the MS is idle in cellular network (i.e., no dedicated channel) or whether the WLAN signal strength is stable, etc.").

240. *Ivanov* discloses a mobile speed-sensitive handover method for mixed cell structures. *See Ivanov*, Abstract. *Ivanov* discloses considering the speed of a mobile station when determining whether to handover a mobile device from one network (specifically, "a macro cell") to another network (specifically, "a micro cell"):

In a mobile radio network of the type initially set forth, this object is inventively achieved by **a hand over from the radio coverage domain of a macro cell into one or more further micro cells that takes the speed of a mobile radio subscriber into consideration and is implemented in addition to the static hand over decisions**, being carried out such that a determination is made in the hand over decision process for a mobile station allocated to the base station of the macro cell, by comparison of the measured data about level, quality, distance and the like and/or of the quantities derived from the measured data that are calculated by the mobile station and/or by the base

station to thresholds, as to whether it is located in the radio coverage domain of the micro cell contained in the macro cell or approaches this and, given a positive result, a means for time acquisition (timer) having an arbitrary but fixed time interval is started during which a determination is continuously made on the basis of the measured data arriving in the hand over decision process as to whether the mobile station is still located in the radio coverage domain of the micro cell; and such that, after expiration of the time interval, a hand over for the appertaining mobile station into the micro cell is requested in that case wherein it is still located in the radio coverage domain of the micro cell and no hand over is requested for that case wherein the mobile station is no longer located in the radio coverage domain of the micro cell.

Id. at 2:51-56. For example, *Ivanov* discloses a method that utilizes a timer (or time interval), whereby if a mobile station is still located in the domain of a micro cell after the time interval, a handover for the mobile station into the micro cell is requested:

In this speed-sensitive hand over method for hierarchic cell structures, a check is carried out to see whether the mobile stations have traversed the radio coverage domain of a micro cell within a time interval. When the mobile stations are still located in the radio coverage domain with respect to the micro cell after the time interval, i.e. after the expiration of a timer, then a hand

over for the appertaining mobile stations into the micro cell is requested.

Id. at 3:10-17.

241. *Ivanov* describes, as an example, the implementation of the speed-sensitive handover method with respect to a micro cell having a size of 500 meters:

A numerical example shall also be recited below in order to make the relationship between the hand over decision and the vehicle speed clear. **A hierarchic cell structure is thereby considered, composed of a macro cell and of a micro cell having a size of 500 m.** A mobile station having an average speed of 10 km/h requires approximately 180 s for traversing the micro cell. When the mobile station has an average speed of 30 km/h, then it requires approximately 60 s and a mobile station having a speed of approximately 60 km/h traverses the micro cell in 30 seconds.

Id. at 7:11-20. Given the size of the micro cell, *Ivanov* explains that a mobile station having an average speed of 10 km/h would require approximately 180 seconds to traverse the cell, a mobile station having an average speed of 30 km/h would require approximately 60 seconds to traverse the cell, and a mobile station having an average speed of 60 km/h would require approximately 30 seconds to traverse the micro cell.

Id. at 7:15-20 (reproduced above). Assuming such a micro cell has a time interval of 60 seconds, *Ivanov* explains that mobile stations that travel into the cell at speeds less than 30 km/h will request a handover into the cell (because the mobile stations

will be within the cell for more than 60 seconds), whereas mobile stations that travel into the cell at speeds greater than 30 km/h will not request a handover into the cell (because the mobile stations will not be within the cell for at least 60 seconds):

Assuming a time interval of 60 seconds associated with the timer administered for this micro cell, **mobile stations, allocated to the macro cell, that travel into the micro cell at a speed less than 30 km/h will request a hand over into this micro cell.** Correspondingly, **mobile stations, traversing the micro cell at a speed greater than 30 km/h will remain served by the macro cell, i.e., these mobile stations will not request a hand over into this micro cell.**

Id. at 7:21-29.

242. In my opinion, a person of ordinary skill in the art would have understood *Ivanov* to disclose determining whether to handover a packet data session from one network (or cell) to another based on an estimated time the mobile station will be within the network, which may be calculated using the speed at which the mobile station is moving. For example, *Ivanov* discloses considering the estimated time in which a mobile station will be within a micro cell and determining that mobile stations traveling in excess of a certain speed (e.g., 30 km/h) will proceed to handover a packet data session because such mobile stations are estimated to be within the micro cell for at least as long as a pre-determined (or fixed) time interval

and determining that mobile stations traveling at speeds less than a certain speed (e.g., 30 km/h) will not handover a packet data session because such mobile stations are not estimated to be within the micro cell for at least as long as a pre-determined (or fixed) time interval.

b. Motivation to Modify *Hsu* in view of *Ivanov*

243. In my opinion, a person of ordinary skill in the art would have been motivated to modify *Hsu*'s mobile station to consider the speed at which the mobile station is moving and, in turn, an estimated time the mobile station will be within a network when determining whether to handover a packet data session from the cellular network to the WLAN, as taught by *Ivanov*, as additional criteria for the mobile station to consider when determining whether to proceed to handover a packet data session from a cellular network to a WLAN after WLAN coverage is detected. For example, as I discussed above in Section IX.D.1.a, it would have been obvious to a person of ordinary skill in the art to look to identify additional criteria to consider when determining whether to proceed to handover a packet data session from a cellular network to a WLAN at least in view of *Hsu*'s open-ended disclosure regarding the criteria to consider when making such a determination. *See Hsu*, [0085] ("The criteria may include whether the MS is idle in cellular network (i.e., no dedicated channel) or whether the WLAN signal strength is stable, etc.").

244. Additionally, a person of ordinary skill in the art would have understood that it was well known to consider the speed at which a mobile station is moving and/or an estimated time that a mobile station will be within a network when determining whether to handover a packet data session from one network to another. For example, as I discussed above in Section IX.D.1.a, *Shoaib*¹³ describes considering various criteria to determine whether to initiate one or more triggers associated with performing a handover from one network to another. For example, *Shoaib* explains that the criteria may be evaluated to determine whether to pre-authenticate or initiate a handover from one network to another. *See Shoaib*, [0035]-[0036]. Among the criteria identified for consideration, *Shoaib* discloses evaluating location criteria to determine whether to make a triggering decision, and that location criteria may include a position of the mobile terminal in relation to the coverage area, a speed and direction of the mobile terminal, and whether moving towards away from a point of attachment. *Id.* at [0040]-[0045]; *see also id.* at [0080] (describing

¹³ To be clear, here, I am relying on *Shoaib* as evidence of a person of ordinary skill in the art's knowledge and the state of the art. *Shoaib* is not part of unpatentability Ground 4.

continuously evaluating location criteria). *Jabbari*¹⁴ also discloses a number of speed-sensitive handoff algorithms that were known and used at the time of the alleged invention. *See generally Jabbari* at 1539-1540.

245. Moreover, a person of ordinary skill in the art would also have recognized that considering the speed at which the mobile station is moving and, in turn, an estimated time the mobile station will be within a network when determining whether to handover a packet data session from the cellular network to the WLAN would reduce the number of handoffs and, in particular, the occurrence of the negative ping-pong effect acknowledged by *Hsu*:

After the MS 300 detects WLAN coverage, receives the WLAN beacon, the MS 300 uses certain criteria to handover a packet data session from the cellular network to the WLAN. The criteria may include whether the MS is idle in cellular network (i.e., no dedicated channel) or whether the WLAN signal strength is stable, etc. The MS 300 may wait for a pending packet data session to go dormant in the cellular network. The MS 300^d then performs packet data session handover (i.e., sending Mobile IP registration via WLAN). This may be useful to minimize service

¹⁴ To be clear, here, I am relying on *Jabbari* as evidence of a person of ordinary skill in the art's knowledge and the state of the art. *Jabbari* is not part of unpatentability Ground 4.

interruption. Similarly, the MS 300 may perform packet data session handover when the WLAN signal strength is above an acceptable threshold for a specified period of time. In this way, the MS 300 ensures that access to the WLAN is sustainable. The measure may be any measure of channel quality and/or signal strength. The threshold may be predetermined or may dynamically be adjusted based on the actual performance of the communication. **This may be useful to avoiding any ping-pong effect whereby the MS 300 switches between WLAN access and cellular network access due to changing conditions or signal strength that is at the margin of tolerance for operation.** Still further, upon detection of the WLAN, the MS 300 may notify the user and wait for the user to manually select WLAN.

See Hsu, [0085]; see also Ivanov, 2:48-50 (“It is an object of the present invention to reduce the plurality of hand overs for rapidly moving mobile stations in such a mixed cell structure.”). Indeed, a person of ordinary skill in the art would have appreciated that, by considering the speed at which the mobile station is moving and, in turn, an estimated time the mobile station will be within a network when determining whether to proceed to handover a packet data session from the cellular network to the WLAN, the occurrence of rapid handovers between networks may be reduced as a packet data session may not be handed over from, for example, a cellular network to a WLAN when the mobile station would only be within the

domain of the WLAN for a short period of time. A person of ordinary skill in the art would understand that, if a packet data session is handed over to the WLAN in such circumstances, the packet data session would need to promptly handed over again, either back to the cellular network or to another network, when the mobile station leaves the domain of the WLAN.

246. For at least the foregoing reasons, it would have been obvious to a person of ordinary skill in the art to modify *Hsu's* mobile station based on the teachings of *Ivanov* because it would have amounted to merely applying a known technique (using a speed-sensitive handover method, such as described in *Ivanov*, that considers the speed at which the mobile station is moving and, in turn, an estimated time the mobile station will be within a network) to a known device (*Hsu's* mobile station) ready for improvement (to reduce the frequency of handovers for mobile stations when moving). In addition, a person of ordinary skill in the art would also have recognized that it would amount to the use of a known technique (using speed-sensitive handover techniques) to improve similar devices (*Hsu's* mobile station) in the same way.

247. Accordingly, the *Hsu-Ivanov* device discloses or suggests the mobile station determining whether to proceed to handover a packet data session from the cellular network to the WLAN (“having said mobile device make a determination as to whether to utilize a silent proactive handoff”) based on the speed at which the

mobile station is moving and, in turn, an estimated time the mobile station will be within a network (“based on an estimation of the time that the mobile device will be within a candidate network”).

2. Claim 19

- a. “The method of claim 18, further including having said mobile device make said determination based on one or more of the following parameters: types of user applications; relative speed at which the mobile device is moving; and a predicted size of a candidate network.”**

248. In my opinion, *Hsu* in combination with *Ivanov* discloses or suggests these features. Indeed, for the reasons I discussed above in Section IX.E.1.b, a person of ordinary skill in the art would have been motivated to modify *Hsu*’s mobile station to consider the speed at which the mobile station is moving and, in turn, an estimated time the mobile station will be within a network when determining whether to handover a packet data session from the cellular network to the WLAN, as taught by *Ivanov*, as additional criteria for the mobile station to consider when determining whether to proceed to handover a packet data session from a cellular network to a WLAN.

249. Accordingly, the *Hsu-Ivanov* device discloses or suggests the mobile station determining whether to proceed to handover a packet data session from the cellular network to the WLAN (“having said mobile device make said

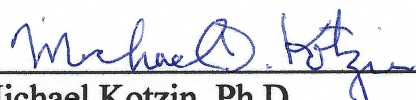
determination”) based on the speed at which the mobile station is moving (“based on ... relative speed at which the mobile device is moving”) and, in turn, an estimated time the mobile station will be within a network.

X. CONCLUSION

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

Date: January 30, 2025

Respectfully submitted,


Michael Kotzin, Ph.D.