UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO. LTD.,
Petitioner,

v.

BROADPHONE LLC,
Patent Owner.

Case IPR2024-00154
Patent 8,594,698

DECLARATION OF TODOR V. COOKLEV, PH.D.

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I. INTRODUCTION

1. My name is Todor V. Cooklev. I have been retained as an expert witness to provide my independent opinion in regard to the matters at issue in *inter partes* review of U.S. Patent No. 8,594,698 ("the '698 patent") in IPR2024-00154. I have been retained by Broadphone LLC, the Patent Owner in the above proceedings. Petitioner is Samsung Electronics Co. Ltd. ("Petitioner").

2. I am being compensated at my standard hourly rate for my time spent working in connection with this case. My compensation does not depend on my opinions or on the outcome of this litigation. If called as a witness, I would testify as to the statements and opinions contained in this report.

3. I am not a legal expert and offer no opinions on the law. However, I have been informed by counsel of the various legal standards that apply, and I have applied those standards in arriving at my conclusions.

II. QUALIFICATIONS

4. I am currently professor of electrical and computer engineering at Purdue University in Fort Wayne, Indiana, where I have had several administrative and faculty appointments.

5. I received a Doctor of Philosophy (Ph.D.) degree in Electrical Engineering from Tokyo Institute of Technology in Tokyo, Japan in 1995.

6. I teach several courses related to the hardware and software architectures of wireless systems and wireless devices. My research interests include most aspects of modern wireless systems, including hardware/software architectures. I am the author of the textbook "Modern Communications Systems: A First Course", published by the University of Michigan at the beginning of 2024. Since publication, according to information compiled by the publisher, my textbook has been used at approximately 200 universities in the United States and approximately 100 abroad.

7. I have received research funding from the National Science Foundation (NSF), the Defense Advanced Research Projects Agency (DARPA), the U.S. Air Force Research Laboratory, the Office of Naval Research, and a number of private companies, including major technology companies.

8. I have authored and co-authored more than 100 peer-reviewed articles. I am also a named inventor on 32 U.S. patents, most of which relate to the hardware or software aspects of communication systems. For part of this work in 2019, I was inducted into the Purdue Inventors Hall of Fame. A list of my publications and patents appears in my *curriculum vitae* attached as Appendix 1.

9. In addition to my academic experience, I have experience in private industry. My work has been in the areas of communication protocols, software, digital signal processing, and integrated circuit design for communication systems.

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10. I have contributed to the development of several major standards for communication systems and numerous amendments. I have participated in many meetings of standards committees. I have prepared, submitted, and presented documents relating to technical matters considered by these committees.

11. Between 2000-2002 and 2005-2008 I was a Voting Member of the IEEE 802.11 Working Group. Around 2005-2007 I was Chair or a Study Group within IEEE 802.11. For part of my work I received an award from IEEE Standards Association in 2012. I have reviewed and voted on most IEEE 802.11 standards and amendments published since 2000.

12. During this time period I have also reviewed and voted on other standards. Around 2007-2011 I participated in the Software-Defined Radio Forum (later the Wireless Innovation Forum). Around 2011-2012 I participated in the work of the 3GPP.

13. In 2020, I was elected to serve on the Board of Governors of the IEEE Standards Association. The Board of Governors provides overall leadership of the IEEE Standards Association.

14. Currently, I am a Series Editor for Wireless and Radio Communications of the IEEE Communications Standards Magazine (which is the premier journal in the field of communication standards) and have held that position since 2017. As a member of the Editorial Board I coordinate the review

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of scholarly manuscripts submitted to the wireless and radio communications series.

15. I am qualified by education and experience to testify as an expert with respect to subject matter in the fields of wireless communications, wireless communications protocols, wireless data transmission, wireless device hardware, data and signal processing hardware and software, and wireless device interoperability.

16. I have attached a current copy of my curriculum *vitae* as Appendix 1, which includes a list of my publications. My CV also includes a list of cases during at least the last five years in which I have testified as an expert either at a trial or deposition.

III. COMPENSATION

17. I am being compensated for my work in this case at my standard hourly rate for consulting services. My compensation is not dependent on the outcome of these matters or on my opinions.

IV. METERIALS CONSIDERED

18. In the course of conducting my analysis and forming my opinions, I have reviewed materials including those listed below:

i. U.S. Patent No. 8,594,698 (the "'698 Patent");

ii. The prosecution history of the '698 patent (Ex. 1004);

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iii. The Declaration signed by Dr. Kevin Almeroth in IPR2024-00154 (Ex. 1002) (the "Almeroth Declaration");

iv. *Curriculum Vitae* of Dr. Kevin Almeroth in IPR2024-00154 (Ex. 1003);

v. U.S. Patent 6,944,465 (Spain-I, Ex. 1011)

vi. Nanda (Ex. 1006)

vii. Damarla (Ex. 1028)

viii. Houri (Ex. 1032)

ix. Blomqvist (Ex. 1033)

x. Hunzinger (Ex. 1054)

xi. The exhibits and other documents cited herein.

V. APPLICABLE LEGAL STANDARDS

A. Level Of Ordinary Skill In The Art

19. My opinions in this declaration are based on the understandings of a person of ordinary skill in the art, which I understand is sometimes referred to as an "ordinary artisan" or by the acronyms "POSITA" or "PHOSITA," as of the time of the invention, which I understand is here assumed to be the effective filing date (September 19, 2006) of the provisional application from which the '698 patent issued. I understand that the person of ordinary skill in the art is a hypothetical

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person who is presumed to have known the relevant art at the time of the invention. By "relevant," I mean relevant to the challenged claims of the '698 patent.

20. I understand that factual indicators of the level of ordinary skill in the art include the various prior art approaches employed, the types of problems encountered in the art, the rapidity with which innovations are made, the sophistication of the technology involved, and the educational background of those actively working in the field. I understand that, in assessing the level of skill of a person of ordinary skill in the art, one should consider the type of problems encountered in the art, the prior solutions to those problems found in the prior art references, the rapidity with which innovations are made, the sophistication of the technology, the level of education of active workers in the field, and my own experience working with those of skill in the art at the time of the invention.

21. In this case, Dr. Almeroth has asserted in his declaration that a person of ordinary skill in the art as of the time of the '698 patent would have had:

> at least a Bachelor's of Science degree in computer science, electrical engineering, or a similar discipline, and two or more years of experience with location-based systems and/or processes or related technologies, such as for example systems/processes for determining mobile device location(s). More education can supplement practical experience and vice versa.

Ex. 1002 [Almeroth-Decl.] ¶ 31.

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22. For the purposes of this declaration, I accept Dr. Almeroth's proposed qualifications of a POSITA.

23. As further discussed below, my opinions as stated in this declaration are valid even if the Board adopts a slightly different level of ordinary skill in the art.

B. My Understanding Of Legal Standards

24. When considering the '698 patent and stating my opinions, I rely on the following legal standards as described to me by the attorneys for Broadphone.

25. I understand that a patent claim is unpatentable if the claimed invention would have been obvious to a person of ordinary skill in the art at the time of the purported invention.

26. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention would have been obvious to a person of ordinary skill in the art at the time of the invention in view of the prior art and in light of the general knowledge in the art as a whole. I also understand that obviousness is ultimately a legal conclusion based on underlying facts of four general types, all of which must be considered: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) any objective indicia of non-obviousness, including any praise of the invention.

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27. I also understand that obviousness may be established under certain circumstances by combining or modifying the teachings of the prior art. Specific teachings, suggestions, or motivations to combine any first prior art reference with a second prior art reference can be explicit or implicit, but must have existed before the date of purported invention. I understand that prior art references themselves may be one source of a specific teaching or suggestion to combine features of the prior art, but that such suggestions or motivations to combine art may come from the knowledge that a person of ordinary skill in the art would have had.

28. I understand that a reference may be relied upon for all that it teaches, including uses beyond its primary purpose, but also including teachings that lead away from the invention. I understand that a reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, although the mere disclosure of alternative designs does not teach away.

29. I further understand that whether there is a reasonable expectation of success in combining references in a particular way is also relevant to the analysis.

30. I understand that it is improper to use hindsight to combine references or elements of references to reconstruct the invention using the claims as a guide.

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My analysis of the prior art is made from the perspective of a person of ordinary skill in the art at the time of the invention.

31. I am not offering any legal opinions in this declaration nor am I qualified to do so. I only consider such legal standards in framing my opinions and conclusions as well as placing assertions made by Petitioner in the Petition into the proper context. Additionally, from a subject matter perspective, I understand that the petitioner always has the burden of persuasion regarding a challenge of patentability of an invention under an inter partes review.

VI. OVERVIEW OF THE ’698 PATENT

32. At a high level, the ’698 Patent is directed to a method by which a portable radio communication device can determine whether it is located near a location previously chosen by its user. In particular, the ’698 Patent claims a two-step process in which the portable device (a) monitors its location by measuring a varying signal characteristic of received communication signals and (b) determines whether it is within proximity of the user’s chosen location by comparing IDs and numbers based on the varying signal characteristic.

33. Claim 1 of the ’698Patent is representative, and recites:

> 1. A location-determining method, operable by a first portable RF communications device, the method comprising:
>
> (a) the first portable RF communications device monitoring its location by (i) receiving communications signals from a first plurality

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of fixed-location service-area antenna stations capable of RF communication with the first portable RF communications device wherein the antenna stations are substantially continuously operating, (ii) identifying at least one ID within at least one of the received communications signals, and (iii) measuring a varying signal characteristic other than ID, which signal characteristic is associated with a received communications signal from each of the first plurality of antenna stations; and

(b) the first portable RF communications device determining if a first monitored location, monitored in accordance with part (a), is within proximity of a location chosen by a user of the first portable RF communications device, as a result of electronically comparing (i) the at least one ID at the first monitored location with at least one ID at the location chosen by the user and (ii) at least one number based on the varying signal characteristic of the communications signals from each of the first plurality of antenna stations at the first monitored location with at least one number based on corresponding varying signal characteristics of the communications signals from each of the first plurality of antenna stations at the location chosen by the user.

VII. OPINIONS

34. Both Spain-I and Nanda specifically teach that when the database is stored on a remote server, *the comparisons are **also** performed on the remote server*. For instance, Spain-I describes two mutually exclusive embodiments; in the first, the database is stored on the mobile unit and the comparisons are performed

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at the MU, and in the second, the database is stored at a remote server and the comparisons are performed at the location server:

> Once the fingerprint is generated, its association with a certain location has to be determined. According to this invention this is done by utilizing a fingerprint database that contains a number of fingerprints along with their corresponding location identities. ***In one embodiment the database is stored in the mobile unit***. The generated fingerprint is compared with the fingerprints in the database and the fingerprint in the database that is closest to the generated fingerprint is selected as the match. The corresponding location in the database is then chosen as the location of the mobile unit. In one embodiment, the search algorithm takes more than one fingerprint from the database that are closest to the generated fingerprint and interpolates the most plausible location for the mobile unit from the locations of the chosen fingerprints.
>
> ***In another embodiment, the fingerprint database is stored at the location server*** and the generated fingerprint (in the mobile unit) is transmitted to the location server over the wireless link. ***The search for the closest fingerprint is then done in the location server from which it determines the location of the mobile unit***.
>
> FIG. 3 depicts the flow of events in this case…. [T]he mobile unit captures the fingerprint of its current location (box 303)…. Subsequently the fingerprint is transmitted over the wireless link to the location server as shown in box 305. ***The location server has a database into which it executes a search for the closest matching fingerprint, as shown in box 307.*** Box 309 shows the process culminating in the retrieval of the best matching fingerprint along with its corresponding location. In one embodiment the search also returns a confidence measure that depicts the closeness of the match.

Spain-I at 5:61-6:30. Dr. Almeroth specifically relies on the second embodiment, where the location determination is performed by the location server. Ex. 1002 ¶¶ 185, 194 (citing Ex-1011, 6:9-14, 6:15-30). There is no embodiment in Spain-I, nor any obviousness theory in the Petition, of an embodiment where the database is

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stored on the location server, but the determination operation is performed by the MU.

35. Nanda likewise teaches an alternative embodiment where both the database storage and the location determination are situated on a remote server. This is presented in the final non-boilerplate paragraph of Nanda's specification, as an alternative to "the above examples," *i.e.* all of the other embodiments of Nanda:

> In the above examples, ***the mobile device generates the fingerprints and stores a fingerprint database***. However, some or all of the fingerprints may alternatively be stored somewhere further up the wide area wireless communication network such as a ***database 111 accessible by the MSC [mobile switching center] 110***. ***In this instance, the processing requirements and storage requirements may be reduced for the mobile device.*** In operation, the mobile device would create a current fingerprint and transmit that fingerprint to the MSC (or BSC possibly if the database was there). ***The MSC would then perform the fingerprint comparison*** and instruct the mobile device whether or not to search for an access point beacon signal. In this arrangement, the MSC could receive fingerprints from multiple mobile devices and have a much larger database of available access points than would be found in a single mobile device. Alternatively, a personalized fingerprint database may be created for each user of the wide area wireless communication network and stored at their home system.

Nanda (Ex. 1006) at 12:14-31. Dr. Almeroth relies on this embodiment. Ex. 1002 ¶¶ 185, 187 (citing Ex-1006, 12:14-31). Dr. Almeroth also relies on this disclosure for Claim 5. *Id.* ¶¶ 194, 197 (cross-referencing Claim 3 analysis and citing Ex-1006 at 12:26-29).

36. Spain-I and Nanda unambiguously disclose that when the fingerprint database is stored on a remote server, it is the ***remote server*** (not the mobile unit)

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that "determines the location of the mobile unit" (Spain-I at 6:13-14) or "perform[s] the fingerprint comparison" (Nanda at 12:23-24). As I explain below, Dr. Almeroth gives forth no motivation for a POSITA to have stored the fingerprint database on the remote server but perform the fingerprint comparison on the mobile unit, as required by his theory for claims 3 and 5.

37. A POSITA considering the teachings of Spain-I, Nanda, and Hunzinger would have avoided storing the fingerprint database on the server while performing the fingerprint comparison on the MU. Nanda recites that the benefit of storing the fingerprint database on the server is to reduce the "processing requirements and storage requirements" for the MU. Nanda at 12:19-20. These benefits come about from the ability of the MU to offload both processing and storage to the server, *e.g.*, if the server performs the location determination, the MU does not need to consume power loading the relevant data into memory and performing comparison operations that may require significant computation. If the determination process is performed by the MU, then the MU must perform at least as much computation as in Nanda's primary embodiment.

38. A POSITA would thus recognize that moving the database from the MU to the server, without similarly moving the computation to the server, would not reduce the computational load on the MU, and accordingly would not save any power at the MU. A POSITA would furthermore recognize that storing the

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database on a server but requiring the MU to perform the determination computation would likely *increase* the power consumption of the MU. There must be some facility (not explained in the Petition) to communicate location information between the MU and the server in order to enable the MU to perform computations based on a remote database. Such communications would necessarily consume both bandwidth and power, which are precious resources in a wireless communication system.

39. A POSITA therefore would have readily understood that Dr. Almeroth's claim 4 and 6 combination would involve two significant drawbacks regarding bandwidth and power consumption.

VIII. CONCLUSION

40. Although my complete opinions are set forth above, for convenience I summarize several points of my opinions in conclusion. For the foregoing reasons, based on my expertise and experience and the record of this case that I have reviewed, it is my opinion that claim 6 is not obvious over the identified prior art.

41. I understand that my opinions discussed above support a legal conclusion that claim 6 is not obvious.

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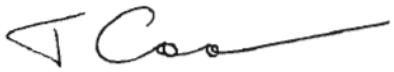
In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will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

I hereby declare that all statements made herein of my own knowledge are true and all statements made herein on information and belief were and are believed by me to be true, and that all statements herein were and are 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 and that any such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Respectfully submitted,

Dated: August 20, 2024



Todor V. Cooklev, Ph.D.

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