

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,

Petitioner,

v.

TELCOM VENTURES LLC.,

Patent Owner.

U.S. Patent No. 10,219,199

“Mobile Device Mode Enablement Responsive To a Proximity Criterion”

DECLARATION OF KEVIN ALMEROOTH, PH.D., IN SUPPORT OF
PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 10,219,199

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LIST OF EXHIBITS

Exhibit	Description
EX1001	U.S. Patent No. 10,219,199 (“’199 patent”)
EX1002	Declaration of Dr. Kevin Almeroth, Ph.D.
EX1003	Exhibit Intentionally Omitted
EX1004	Curriculum Vitae of Dr. Kevin Almeroth, Including List of Recent Expert Witness Engagements of Dr. Kevin Almeroth
EX1005	Prosecution History for U.S. Pat. No. 9,462,411
EX1006	Prosecution History for U.S. Pat. No. 9,832,708
EX1007	Prosecution History for U.S. Pat. No. 10,219,199
EX1008	Prosecution History for U.S. Pat. No. 10,660,015
EX1009	Prosecution History for U.S. Pat. No. 10,674,432
EX1010	Prosecution History for U.S. Pat. No. 11,304,118
EX1011	Prosecution History for U.S. Pat. No. 11,770,756
EX1012	Prosecution History for U.S. Pat. Appl. Pub. No. 2023/0403631
EX1013	Prosecution History for U.S. Pat. No. 11,924,743
EX1014	Prosecution History for U.S. Pat. No. 11,937,172
EX1015	Prosecution History for U.S. Pat. No. 12,028,793
EX1016	Patent Owner’s District Court Infringement Chart for ’708 Patent
EX1017	U.S. Pat. Pub. No. 2009/0069049 (“Jain”)
EX1018	U.S. Pat. Pub. No. 2006/0165060 (“Dua”)
EX1019	U.S. Pat. Pub. No. 2010/0082481
EX1020	U.S. Pub. No. 2010/0082490
EX1021	U.S. Pub. No. 2009/0307140
EX1022	“Product Overview”, Vivotech (Jun. 27, 2007), https://web.archive.org/web/20070627155330/ http://www.vivotech.com/products/vivo_pay/index.asp

Exhibit	Description
EX1023	“Kyocera Wireless Mobile Phones Excel in Cellular South WirelessWallet Consumer Trial”, Kyocera (Oct. 18, 2007), https://americas.kyocera.com/press-releases/press-releases_201503201874.htm
EX1024	U.S. Pub. No. 2005/0137977
EX1025	U.S. Pub. No. 2001/0026632
EX1026	NTT DoCoMo FOMA F900iC Basic Manual
EX1027	Jain et al., “An Identity-Authentication System” (Sep. 1997)
EX1028	U.S. Patent No. 6,957,339
EX1029	Jin et al., “Biohashing: two factor authentication featuring fingerprint data and tokenised random number” (Apr. 27, 2004)
EX1030	Bhargav-Spantzel, “Privacy Preserving Multi-Factor Authentication with Biometrics” (2006)
EX1031	“About NFC Technology”, NFC Forum (Jun. 15, 2006), https://web.archive.org/web/20060615050709/http://www.nfc-forum.org/aboutnfc/about_nfc_technology/
EX1032	Erik Rolf & Viktor Nilsson, “Near Field Communication (NFC) for Mobile Phones” (Aug. 2006)
EX1033	Wall Street Journal, Vivotech (Aug. 12, 2005), https://web.archive.org/web/20060915080521if_/http://www.vivotech.com:80/newsroom/coverage/Videos/Wall_Street_Journal/Wall_Street_Journal.wmv
EX1034	Near Field Communication - Interface and Protocol (NFCIP-1), Standard ECMA-340 (December 2002)
EX1035	NFC Forum News Conference, NFC Forum (June 5, 2006)
EX1036	Dean A. Gratton, “Developing Practical Wireless Applications”, Elsevier Digital Press (2007)
EX1037	Jacki Katzman, “NFC Forum Unveils Technology Architecture and Announces Initial Specifications and Mandatory Tag Format Support”, NFC Forum, at 3 (June 5, 2006)

Exhibit	Description
EX1038	Arumugam et al., “Consumer Electronics Application and Coverage Constraints Using Bluetooth and Proposed Bluetooth Evolution Technologies” (Aug. 2001)
EX1039	U.S. Pub. No. 2010/0082445
EX1040	Information Sciences Institute, RFC 793 Transmission Control Protocol (Sep. 1981), https://datatracker.ietf.org/doc/html/rfc793
EX1041	“Bluetooth Basics”, Bluetooth (Apr. 23, 2006), https://web.archive.org/web/20060423011921/http://www.bluetooth.com/Bluetooth/Learn/Basics/
EX1042	“iPhone Premieres This Friday Night at Apple Retail Stores”, Apple (Jun. 28, 2007), https://www.apple.com/newsroom/2007/06/28iPhone-Premieres-This-Friday-Night-at-Apple-Retail-Stores/
EX1043	“Review: Apple iPhone Bluetooth Headset”, Apple Insider (Jul. 30, 2007), https://appleinsider.com/articles/07/07/30/review_apple_iphone_bluetooth_headset
EX1044	“Eight Bluetooth Headsets Under the Microscope,” Treonauts (Aug. 12, 2005), https://blog.treonauts.com/2005/08/eight_bluetooth.html
EX1045	“Getting Base Stations Ready for LTE”, EETimes (April 17, 2007), https://www.eetimes.com/getting-base-stations-ready-for-lte/
EX1046	3rd Generation Partnership Project; Technical Specification Group Radio Access Network; LTE Physical Layer – General Description (Release 8), 3rd Generation Partnership Project, March 2007
EX1047	Near Field Communication - Interface and Protocol (NFCIP-1), Standard ECMA-340 (2nd Edition, December 2004)

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Decl. of Dr. Kevin Almeroth

I, Dr. Kevin Almeroth, declare as follows:

I. Introduction

1. I have been retained by Quinn Emanuel Urquhart & Sullivan, LLP on behalf of the Petitioner Samsung Electronics Co., Ltd. (“Petitioner”) as an independent expert in this *inter partes* review (this “Proceeding”) before the Patent Trial and Appeal Board of the United States Patent and Trademark Office (the “Board”) to review claims 1-19 (“the challenged claims”) of U.S. Patent No. 10,219,199 (“the ’199 patent”). I have been asked by the Petitioner to assist in evaluating the claims and the disclosure of the ’199 patent.

A. Qualifications

2. EX1004 is a true and correct copy of my current CV, which describes my education, patents and publications, employment and research history, and professional activities and awards.

1. Educational Background

3. I hold three degrees from the Georgia Institute of Technology: (1) a Bachelor of Science degree in Information and Computer Science (with minors in Economics, Technical Communication, and American Literature) earned in June 1992; (2) a Master of Science degree in Computer Science (with specialization in Networking and Systems) earned in June 1994; and (3) a Doctor of Philosophy (Ph.D.) degree in Computer Science (Dissertation Title: Networking and System

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Support for the Efficient, Scalable Delivery of Services in Interactive Multimedia System, minor in Telecommunications Public Policy) earned in June 1997. I have taken a wide variety of courses as demonstrated by my minor. My undergraduate degree also included a number of courses more typical of a degree in electrical engineering, including digital logic, signal processing, and telecommunications theory.

2. Career

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

5. One of the major concentrations of my research has been the delivery of multimedia content and data between computing devices, including various network architectures. In my research, I have studied large-scale content delivery systems, and the use of servers located in a variety of geographic locations to provide scalable delivery to hundreds or thousands of users simultaneously. I have also studied smaller-scale content delivery systems in which content is exchanged

between individual computers and portable devices. My work has emphasized the exchange of content more efficiently across computer networks, including the scalable delivery of content to many users, mobile computing, satellite networking, delivering content to mobile devices, and network support for data delivery in wireless networks.

6. In 1992, the initial focus of my research was on the provision of interactive functions (*e.g.*, VCR-style functions like pause, rewind, and fast-forward) for near video-on-demand systems in cable systems; in particular, how to aggregate requests for movies at a cable head-end and then how to satisfy a multitude of requests using one audio/video stream broadcast to multiple receivers simultaneously. This research has continually evolved and resulted in the development of techniques to scalably deliver on-demand content, including audio, video, web documents, and other types of data, through the Internet and over other types of networks, including over cable systems, broadband telephone lines, and satellite links.

7. An important component of my research has been investigating the challenges of communicating multimedia content, including video, between computers and across networks including the Internet. I have worked on a variety of research problems and used a number of systems that were developed to deliver multimedia content to users. One content-delivery method I have researched is the

one-to-many communication facility called “multicast,” first deployed as the Multicast Backbone, a virtual overlay network supporting one-to-many communication. Multicast is one technique that can be used on the Internet to provide streaming media support for complex applications like video-on-demand, distance learning, distributed collaboration, distributed games, and large-scale wireless communication. The delivery of media through multicast often involves using Internet infrastructure, devices and protocols, including protocols for routing and TCP/IP.

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

9. More recently, I have also studied issues concerning how users choose content, especially when considering the price of that content. My research has examined how dynamic content pricing can be used to control system load. By raising prices when systems start to become overloaded (*i.e.*, when all available resources are fully utilized) and reducing prices when system capacity is readily

available, users' capacity to pay as well as their willingness can be used as factors in stabilizing the response time of a system. This capability is particularly useful in systems where content is downloaded or streamed on-demand to users.

10. Protecting networks, including their operation and content, has been an underlying theme of my research almost since the beginning of my research career. Starting in 2000, I have been involved in several projects that specifically address security, network protection, and firewalls. After significant background work, a team on which I was a member successfully submitted a \$4.3M grant proposal to the Army Research Office (ARO) at the Department of Defense to propose and develop a high-speed intrusion detection system. Key aspects of the system included associating streams of packets and analyzing them for viruses and other malware. Once the grant was awarded, we spent several years developing and meeting the milestones of the project. A number of my students worked on related projects and published papers on topics ranging from intrusion detection to developing advanced techniques to be incorporated into firewalls. I have also used firewalls, including their associated malware detection features, in developing techniques for the classroom to ensure that students are not distracted by online content.

11. Recent work ties some of the various threads of my past research together. I have investigated content delivery in online social networks and proposed reputation management systems in large-scale social networks and marketplaces. On

the content delivery side, I have looked at issues of caching and cache placement, especially when content being shared and the cache has geographical relevance. We were able to show that effective caching strategies can greatly improve performance and reduce deployment costs. Our work on reputation systems showed that reputations have economic value, and as such, creates a motivation to manipulate reputations. In response, we developed a variety of solutions to protect the integrity of reputations in online social networks. The techniques we developed for content delivery and reputation management were particularly relevant in peer-to-peer communication.

12. My involvement in the research community extends to leadership positions for several academic journals and conferences. I am the co-chair of the Steering Committee for the ACM Network and System Support for Digital Audio and Video (NOSSDAV) workshop and on the Steering Committees for the International Conference on Network Protocols (ICNP), ACM Sigcomm Workshop on Challenged Networks (CHANTS), and IEEE Global Internet (GI) Symposium. I have served or am serving on the Editorial Boards of IEEE/ACM Transactions on Networking, IEEE Transactions on Mobile Computing, IEEE Network, ACM Computers in Entertainment, AACE Journal of Interactive Learning Research (JILR), and ACM Computer Communications Review. I have co-chaired a number of conferences and workshops including the IEEE International Conference on

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Network Protocols (ICNP), IEEE Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON), International Conference on Communication Systems and Networks (COMSNETS), IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS), the International Workshop On Wireless Network Measurement (WiNMee), ACM Sigcomm Workshop on Challenged Networks (CHANTS), the Network Group Communication (NGC) workshop, and the Global Internet Symposium, and I have served on the program committees for numerous conferences.

13. Furthermore, in the courses I taught at UCSB, a significant portion of my curriculum covered aspects of the Internet and network communication including the physical and data link layers of the Open System Interconnect (OSI) protocol stack, and standardized protocols for communicating across a variety of physical media such as cable systems, telephone lines, wireless, and high-speed Local Area Networks (LANs). The courses I have taught also cover most major topics in Internet communication, including data communication, multimedia encoding, and mobile application design. My research and courses have covered a range of physical infrastructures for delivering content over networks, including cable, Integrated Services Digital Network (ISDN), Ethernet, Asynchronous Transfer Mode (ATM), fiber, and Digital Subscriber Line (DSL). For a complete list of courses I have taught, see my curriculum vitae (EX1004).

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

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

16. Additional details about my employment history, fields of expertise, and publications are further included in my CV (EX1004).

3. Other Relevant Qualifications

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

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

19. I am an author or co-author of approximately 200 technical papers, published software systems, IETF Internet Drafts and IETF Request for Comments (RFCs). A complete list of my publications is in my CV (EX1004).

20. I have been awarded numerous teaching awards, including Computer Science Outstanding Faculty Member (1997-98, 1998-99, 1999-2000, 2004-06,

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UCSB Spotlight on Excellence Award (2000-01), and UCSB Academic Senate Distinguished Teaching Award (2006-07).

B. Previous Expert Witness Testimony

21. The list of recent matters in which I have testified can be found at the end of EX1004.

C. Preparation for this Declaration

22. In forming my opinions, I have considered the '199 patent specification, including the Abstract, the figures, and the claim language itself, as would have been understood by a person of ordinary skill in the art as of the priority date of the '199 patent (a "POSITA"). My understanding of "POSITA" and "priority date" are set forth below. I have also reviewed the file history of the '199 patent, the Exhibits that are listed in the list of Exhibits, and any other material cited in this declaration.

23. In forming my opinions, I have relied on my personal knowledge and professional experience, and on the documents and information referenced in this declaration.

24. This declaration explains, based on facts and information available to me to date, the subject matter and opinions related to this Proceeding. As such, I am prepared to provide expert testimony regarding opinions formed resulting from my

analysis of the issues considered in this declaration if asked about those issues by the Board or by the private parties' attorneys.

25. Additionally, I may discuss my own work, teachings, and knowledge of the state of the art in the relevant time period. I may rely on handbooks, textbooks, technical literature, and the like to demonstrate the state of the art in the relevant period and the evolution of relevant technologies.

26. Throughout this declaration, I refer to specific pages of the '199 patent and other documents. The citations are intended to be exemplary and are not intended to convey that the citations are the only source of evidence to support the propositions for which they are cited.

27. I am being compensated for my time spent on this matter at a rate of \$850 per hour, and my compensation is in no way contingent upon the outcome of this matter or on the opinions I offer. All of the opinions expressed in this declaration are my own.

II. Legal Understanding

28. In this section, I describe my understanding of certain legal standards that I have relied upon in forming my opinions set forth in this declaration. I have been informed of these legal standards by Petitioner's attorneys. I am not an attorney and I have not thoroughly researched the law on patent invalidity. I am relying only on instructions from Petitioner's attorneys for these legal standards.

A. Claim Construction

29. I have been instructed by counsel that claim construction is a matter of law for the arbiter of law to decide. I understand that in an *inter partes* review, claims are construed using the same claim construction standard that would be used to construe the claim in a civil action.

30. I understand that a patent may include two types of claims, independent claims and dependent claims. An independent claim stands alone and includes only the limitations it recites. A dependent claim can depend on an independent claim or another dependent claim. I understand that a dependent claim includes all the limitations that it recites in addition to the limitations recited in the claim from which it depends.

B. Anticipation

31. I understand that a patent claim is anticipated when a single piece of prior art describes every element of the claimed invention, either expressly or inherently, arranged in the same way as in the claim. For inherent anticipation to be found, it is required that the missing descriptive material is necessarily present in the prior art. I understand that, for the purpose of an *inter partes* review, prior art that anticipates a claim can include both patents and printed publications from anywhere in the world.

C. Obviousness

32. I understand that a patent claim is unpatentable and invalid if the subject matter of the claim as a whole would have been obvious to a POSITA as of the time of the invention at issue. My understanding of a POSITA is set forth below. I understand that the following factors must be evaluated to determine whether the claimed subject matter is obvious: (1) the scope and content of the prior art; (2) the difference or differences, if any, between each claim of the patent and the prior art; and (3) the level of ordinary skill in the art at the time the patent was filed. Unlike anticipation, which allows consideration of only one item of prior art, I understand that obviousness may be shown by considering more than one item of prior art. Moreover, I have been informed and I understand that the so-called objective indicia of non-obviousness, also known as “secondary considerations,” are also to be considered when assessing obviousness. These include: (1) commercial success; (2) long-felt but unresolved needs; (3) copying of the invention by others in the field; (4) initial expressions of disbelief by experts in the field; (5) failure of others to solve the problem that the inventor solved; and (6) unexpected results. I also understand that evidence of objective indicia of non-obviousness must be commensurate in scope with the claimed subject matter.

III. The '199 Patent

33. The '199 patent is titled “Mobile device mode enablement responsive to a proximity criterion.”

34. The '199 patent lists inventors Peter D. Karabinis and Rajendra Singh.

35. The '199 patent was filed as U.S. Patent Application No. 15/800,885 on November 1, 2017, and issued on February 26, 2019.

A. Priority Date

36. The '199 patent claims priority to U.S. Patent Application No. 12/264,711, filed on November 4, 2008.

37. More specifically, U.S. Patent Application No. 15/800,885 is a continuation of U.S. Patent Application No. 15/251,882 (issued as the '708 Patent), which is a continuation of U.S. Patent Application No. 12/264,711, filed on November 4, 2008, and issued as U.S. Patent No. 9,462,411 on October 4, 2016.

B. Specification

38. The specification assumes familiarity with a “wireless communications device” such as “a wireless terminal, a wireless/mobile phone, a Personal Digital Assistant (PDA), a smart phone, a multi-media device including Global Positioning System (GPS) capability, etc.” EX1001 at 3:5-9; *see also id.* at 1:48-2:7. It relies on long-established, generic concepts of computer systems such as “authorization” (5:38-42), “sensors” capable of detecting, inter alia, physiological input (mentioned

only at 6:21-27), “short-range communications” (mentioned in the specification only at 8:25-30 and 8:60-61), “air interface[s]” (6:55-56, with a recitation of then-existing interfaces at 7:14-24), and “communications service[s]” (9:9-10). The specification acknowledges that the “adaptivity and mobility aspects of wireless communications” were already “important in people’s lives” at the time of alleged invention. EX1001 at 1:27-28. It also assumes that mobile phones could act as digital wallets. EX1001 at 1:37-40. The specification does not disclose or purport to disclose new or improved means of sensing (including physiological/biometric sensing) or proximity detection.

C. Prosecution History

1. Prosecution History of the ’199 Patent (EX1007)

39. The Examiner issued a single rejection to the claims of the ’199 patent as obvious over US 2007/0260710 (Dowling) in view of US 2007/0129077 (Iguchi). EX1007 at 110. Thereafter, Applicant amended the claims by adding limitations related to wireless communications being in response to a “proximity condition” being satisfied and in response to a “physiological parameter,” and also specified that the first and second air interfaces used unlicensed and licensed frequencies, respectively. (*Id.* at 174, 183). Applicant then argued that the prior art does not meet the “proximity condition” and “physiological parameter” limitations. EX1007 at 184-85. Applicant also sought to distinguish dependent claim 3. *Id.* at 185-86.

40. In its Notice of Allowance, the Examiner **disagreed** with Applicant and stated that the prior art (Dowling) discloses the “proximity condition” limitation and instead cited to other limitations as the basis for allowance. EX1007 at 203.

2. '411 Patent File History

41. U.S. Patent Application No. 12/264,711 was filed on November 4, 2008 and issued on October 4, 2016 as U.S. Patent No. 9,462,411 (“’411 patent”).

42. Throughout prosecution, the Examiner rejected the claims of the ’411 patent nine times, primarily on obviousness grounds. EX1005 at 74, 127, 197, 240, 295, 330, 382, 420, 453. Accordingly, Applicant amended the claims substantially, including a final Examiner’s Amendment for allowance. EX1005 at 108, 166, 220, 266, 316, 351, 407, 434, 498. The breadth of the claims caused many of these rejections and amendments. EX1005 at 410 (“The Examiner also indicated that our response should make it clear where support for any claim amendments are found, and how these claim amendments distinguish over the cited art, as the claims are broad. The undersigned indicated that the claims are broad, but that their filing date of November 4, 2008 is quite early relative to the claimed invention.”).

43. For claim 1’s sensing of physiological data, Applicant argued to distinguish prior art where the relevant fingerprint sensor was not “smartphone-based.” EX1005 at 484. Further, Applicant distinguished the prior art because the cited prior art, US 2007/0197261 (“Humbel”) indicated that “the combination of

NFC transceiver plus biometric finger sensor did not yet exist in a mobile phone at the time of filing of Humbel.” EX1005 at 483.

44. For the sequencing of limitations in claim 1, Applicant conceded in an amendment that “the ‘detecting’ has been moved after the ‘sensing’ in the claim in order to provide proper antecedent basis for the ‘living organism,’ and to also indicate that the ‘detecting’ and the ‘sensing’ can occur in either order and/or simultaneously.” EX1005 at 435.

45. Applicant argued throughout several amendments that claim 1’s “selectively communicating ... responsive to the proximity criterion and a value of the physiological data ... and refraining ...” distinguished it from prior art. EX1005 at 225, 272, 274, 322, 354, 356, 357, 411, 437. Within these amendments, Applicant exchanged “preferentially” for “selectively.” EX1005 at 407. Further, Applicant argued to distinguish this limitation from prior art where there “is no refraining ... because communications using both air interfaces takes place.” EX1005 at 356; *see also* EX1005 at 355 (“both air interfaces would come into play simultaneously”). Additionally, Applicant argued to distinguish prior art where the communication “selections are based purely on which mode is enabled, but neither mode is selected preferentially, and neither mode is avoided, based on any criteria other than the selected mode.” EX1005 at 357.

D. Level of Ordinary Skill in the Art

46. I understand that a person of ordinary skill in the art (“POSITA”) is a hypothetical person who is presumed to be aware of all pertinent art, thinks along conventional wisdom in the art, and is a person of ordinary creativity—not an automaton. In deciding the level of ordinary skill, I understand that the following factors may be considered:

- The levels of education and experience of persons working in the field;
- The types of problems encountered in the field; and
- The sophistication of the technology.

47. I understand that asserted claims must be evaluated from the perspective of a POSITA. In my opinion, the relevant art for this patent relates to smartphones transmitting data (*e.g.*, to perform financial transactions), *i.e.*, applications for secure wireless communications, including over short and long range communication protocols. I understand that the relevant point in time for determining the qualifications of a person of ordinary skill in the state-of-the-art is the time of the alleged invention, which I assume to be the earliest effective filing date for the patent. Here, I understand that the earliest alleged priority date is November 4, 2008.

48. In my opinion, a person of ordinary skill in the art at the time of the ’199 patent (“POSITA”) had at least a Bachelor of Science in electrical engineering,

computer engineering, or similar fields and at least two years of practical experience in the field of secure wireless communication applications. This level of skill is approximate, and more experience would compensate for less formal education, and vice versa.

49. I meet these criteria now and met them at the time of the alleged invention. I have applied this level of skill in my analysis. My opinions would not change if a slightly higher or lower level of ordinary skill applied.

E. Claim Construction

50. I have been instructed by Petitioner to perform my technical analysis of the disclosures of the prior art by applying the plain and ordinary meaning of all claim terms. I have not been asked to opine on the correctness of any claim constructions.

51. I reserve the right to provide additional opinions concerning claim construction or the application of certain claim constructions to the prior art, as appropriate, and to respond to any particular claim construction-related argument advanced by PO and/or its expert.

52. As described in more detail in the remainder of this declaration, the prior art discloses or renders obvious the challenged claims under any reasonable potential claim interpretation.

F. Challenged Claims

53. I understand that claims 1-19 are at issue in Petitioner's petition for *inter partes* review. They are reproduced below for reference.

Claim	Limitation
1[pre]	A method of operating a smartphone to wirelessly provide information to an entity using a first air interface, to wirelessly receive information from the entity using the first air interface; and to wirelessly receive a communications service from a wireless network using a second air interface that differs from the first air interface, wherein the communications service is received by the smartphone from the wireless network absent involving the entity and wherein the entity functions independently of the communications service, the method comprising:
1[a]	detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity;
1[b]	in response to at least the proximity condition having been satisfied between the smartphone and the entity, establishing a wireless short-range communications link between the smartphone and the entity to provide by the smartphone, using the first air interface, information to the entity and to receive by the smartphone information from the entity;
1[c]	in response to at least the proximity condition having been satisfied between the smartphone and the entity and in response to a physiological parameter, wirelessly providing by the smartphone, using the first air interface, information to the entity and wirelessly receiving by the smartphone, using the first air interface, information from the entity independently of, and absent involving the entity in, receiving by the smartphone the communications service from the wireless network using the second air interface; and
1[d]	wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network absent involving the entity, absent providing by the smartphone information to the entity, and absent receiving by the smartphone information from the entity,

Claim	Limitation
1[e]	wherein the wireless short-range communications link used by the first air interface is based upon unlicensed frequencies,
1[f]	wherein the second air interface uses a wireless communications link that is based upon licensed frequencies, and
1[g]	wherein the first air interface is not involved in providing the communications service to the smartphone.
2[pre]	The method of claim 1,
2[a]	wherein said wirelessly providing by the smartphone, using the first air interface, information to the entity and wirelessly receiving by the smartphone, using the first air interface, information from the entity independently of, and absent involving the entity in, receiving by the smartphone the communications service from the wireless network using the second air interface is performed over a first time interval;
2[b]	wherein said wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network absent involving the entity, absent providing by the smartphone information to the entity, and absent receiving by the smartphone information from the entity is performed over a second time interval; and wherein the first and second time intervals are non-overlapping with one another.
3[pre]	The method of claim 1,
3[a]	wherein the wireless short-range communications link that is based upon unlicensed frequencies is further based upon a Time Division Duplex (TDD) protocol, and
3[b]	wherein the second air interface that uses a wireless communications link that is based upon licensed frequencies is further based upon an Orthogonal Frequency Division Multiplexed (OFDM) and/or Orthogonal Frequency Division Multiple Access (OFDMA) protocol.
4[pre]	The method of claim 1,

Claim	Limitation
4[a]	wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity is based, at least in part, on receiving a short-range signal from the entity over the first air interface.
5[pre]	The method of claim 4,
5[a]	wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity is based, at least in part, on a measurement of signal strength of the short-range signal.
6[pre]	The method of claim 1,
6[a]	wherein a value of the physiological parameter is provided by using a sensor of the smartphone.
7[pre]	The method of claim 1, wherein said wirelessly providing by the smartphone, using the first air interface, information to the entity comprises:
7[a]	being proximate to a specific location within a store, then detecting a short-range signal being transmitted from said specific location within the store, and then performing a transaction to pay for one or more items.
8[pre]	The method of claim 1,
8[a]	wherein the entity comprises a check-out counter in a store, and wherein said wirelessly providing by the smartphone, using the first air interface, information to the entity comprises: performing a financial transaction to pay for one or more items.
9[pre]	The method of claim 1,
9[a]	wherein establishing the wireless short-range communications link between the smartphone and the entity is performed in response to the physiological parameter.
10[pre]	A system comprising:

Claim	Limitation
10[a]	a smartphone that is configured to perform operations comprising:
10[b]	detecting by the smartphone that a proximity condition is satisfied between the smartphone and an entity;
10[c]	in response to at least the proximity condition having been satisfied between the smartphone and the entity, establishing a wireless short-range communications link between the smartphone and the entity to provide by the smartphone, using a first air interface, information to the entity and to receive by the smartphone information from the entity;
10[d]	in response to at least the proximity condition having been satisfied between the smartphone and the entity and in response to a physiological parameter, wirelessly providing, using the first air interface, information to the entity and wirelessly receiving, using the first air interface, information from the entity independently of, and absent involving the entity in, receiving a communications service from a wireless network using a second air interface that differs from the first air interface; and
10[e]	wirelessly receiving, using the second air interface, the communications service from the wireless network absent involving the entity, absent providing information to the entity, and absent receiving information from the entity,
10[f]	wherein the wireless short-range communications link used by the first air interface is based upon unlicensed frequencies,
10[g]	wherein the second air interface uses a wireless communications link that is based upon licensed frequencies, and
10[h]	wherein the first air interface is not involved in providing the communications service to the smartphone.
11[pre]	The system according to claim 10, further comprising
11[a]	the entity.
12[pre]	The system of claim 10,

Claim	Limitation
12[a]	wherein said wirelessly providing, using a first air interface, information to an entity and wirelessly receiving, using the first air interface, information from the entity independently of, and absent involving the entity in, receiving a communications service from a wireless network using a second air interface that differs from the first air interface is performed over a first time interval;
12[b]	wherein said wirelessly receiving, using the second air interface, the communications service from the wireless network absent involving the entity, absent providing information to the entity, and absent receiving information from the entity is performed over a second time interval; and
12[c]	wherein the first and second time intervals are non-overlapping with one another.
13[pre]	The system of claim 10,
13[a]	wherein the second air interface is based upon an Orthogonal Frequency Division Multiplexed (OFDM) and/or Orthogonal Frequency Division Multiple Access (OFDMA) protocol.
14[pre]	The system of claim 10,
14[a]	wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and an entity is based, at least in part, on receiving a short-range signal from the entity over the first air interface.
15[pre]	The system of claim 14,
15[a]	wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and an entity is based, at least in part, on a measurement of signal strength of the short-range signal.
16[pre]	The system of claim 10,
16[a]	wherein a value of the physiological parameter is provided by using a sensor of the smartphone.

Claim	Limitation
17[pre]	The system of claim 10, wherein said wirelessly providing, using the first air interface, information to the entity comprises:
17[a]	being proximate to a specific location within a store, then detecting a short-range signal being transmitted from said specific location within the store, and then performing a transaction to pay for one or more items.
18[pre]	The system of claim 10,
18[a]	wherein the entity comprises a check-out counter in a store, and
18[b]	wherein said wirelessly providing, using the first air interface, information to the entity comprises: performing a financial transaction to pay for one or more items.
19[pre]	The system of claim 10,
19[a]	wherein establishing the wireless short-range communications link between the smartphone and the entity is performed in response to the physiological parameter.

IV. State of the Art

54. As the '199 patent recognizes, even before the patent's priority date, mobile phones could communicate using a variety of wireless protocols and frequencies that were well known at the time of alleged invention in late 2008. EX1001 at 1:48-2:7. The market for mobile phones capable of cellular network communications had been well-established since the 1990s, with the Nokia 3210 released in 1999 eventually selling over 160 million units. Manufacturers added other standardized wireless communication technology to mobile phones by the early 2000s. The first IEEE standard for Wi-Fi (802.11) was published in 1997, and

by 2005 phones with both cellular and Wi-Fi communication capabilities, such as the 2005 Samsung SCH-i730, were common. So too were phones with Bluetooth capabilities, such as the Nokia 6310 and, again, the Samsung SCH-i730.

55. Near Field Communications (NFC), which allows for short-range wireless communication using RFID technology (more specifically, magnetic field induction), facilitating communication between devices in close proximity, was also common at that time. Examples of mobile phones with integrated NFC capabilities include the 2004 Fujitsu F900ic, the 2004 Nokia 3220 NFC Shell, and the 2007 Nokia 6131 NFC.

56. Manufacturers quickly began exploring applications to leverage devices that had both cellular capabilities and these secondary communication capabilities. One of those applications was mobile payment. Mobile payment technology was commercially deployed as early as 2004 in Japan with NTT Docomo's support of the Sony FeliCa chip for mobile phones coupled with Osaifu-Keitai ("Wallet Mobile") software. This technology was also deployed in the United States, with mobile phone and payment companies teaming up to conduct pilot programs of their own mobile payment software, including a 2006 pilot by Nokia and MasterCard, a 2007 pilot program by Motorola and Discover, a 2007 pilot by Kyocera and MasterCard, and companies such as ViVOtech releasing full mobile payment solutions. *See* EX1022:



See also screenshot from EX1033:



57. As mobile phones evolved into smartphones and were increasingly used for sensitive activities (*e.g.*, financial transactions) and to store sensitive user data (*e.g.*, payment account information), mobile phone security received industry attention. One security mechanism that gained popularity in the early 2000s was biometric authentication. By the early 2000s, fingerprint scanners were routinely integrated into mobile phones, such as the 2000 SAGEM MC 959, 2003 Fujitsu F505i, 2004 Pantech GI100, and 2007 Toshiba G500 and G900. For example, the mobile phones used for mobile payments in the 2007 Kyocera and MasterCard trial included fingerprint scanners and required biometric authentication. See EX1023

Error! Hyperlink reference not valid.(describing Kyocera trial of “mobile payment technology” from ViVOtech with “biometric security, with fingerprint scanners from Atrua Technologies for transactional security on the test handsets”).

V. Grounds

Ground	Basis	Reference	Claims
1	§103	Jain (U.S. Pat. Appl. Pub. No. 2009/0069049)	1-19
2	§103	Dua (U.S. Pat. Appl. Pub. No. 2006/0165060)	1-19

A. Ground 1: Jain (EX1017)

1. Background

58. I have been advised that Jain is prior art under at least pre-AIA 35 U.S.C. § 102(e), having been filed Sept. 5, 2008, and thus before the earliest effective filing date of the '199 patent. In my opinion, Jain discloses all limitations of the '199 patent claims, but Petitioner has presented Jain as an obviousness reference in the event Patent Owner argues there are differences between Jain's disclosure and the '199 patent claims.

59. '199 patent claim 1 requires a smartphone (1) wirelessly providing and receiving information to/from an entity using a short-range first air interface; and (2) wirelessly receiving a communication service from a wireless network using a second air interface. The claim then requires communicating with the entity via the first air interface to (a) detect a proximity condition is satisfied; (b) sense a physiological parameter; and (c) in response to detecting proximity establishing a

wireless short-range communications link to the entity and wirelessly providing and receiving information to/from the entity.

60. In my opinion, Jain discloses such a smartphone capable of using both (1) NFC and other proximity signals (*e.g.*, Fig. 1, device 110a communicating with POS 114); and (2) cellular radio technology (Fig. 2, device 110c or 110d communicating with financial institutions 116a-c). Jain then further discloses or renders obvious (a) detecting device 110 is sufficiently close to POS 114 (*e.g.*, ¶[0030]), (b) detecting a PIN, which Jain recognizes in other contexts can be replaced with biometrics (*e.g.*, ¶[0029]); and (c) if the conditions of (a) and (b) are met, exchanging information with the POS using NFC or other proximity signals (*e.g.*, ¶¶[0023], [0051]).

2. Analysis

(a) Claim 1

- (i) 1[pre][i]: *A method of operating a smartphone; to wirelessly provide information to an entity using a first air interface, to wirelessly receive information from the entity using the first air interface;*

61. In my opinion, Jain discloses this limitation. Jain describes operating a “mobile device 110,” which can be a “*smartphone*,” with a “transaction card 112” attached thereto or incorporated to “wirelessly execut[e] transactions” with retail point-of-sale terminal 114 belonging to a merchant (*entity*) using NFC or Bluetooth

(*first air interface*). Jain ¶¶[0005], [0018], [0021], [0029]. [0019]. This is shown in

Fig. 1 (annotated below):

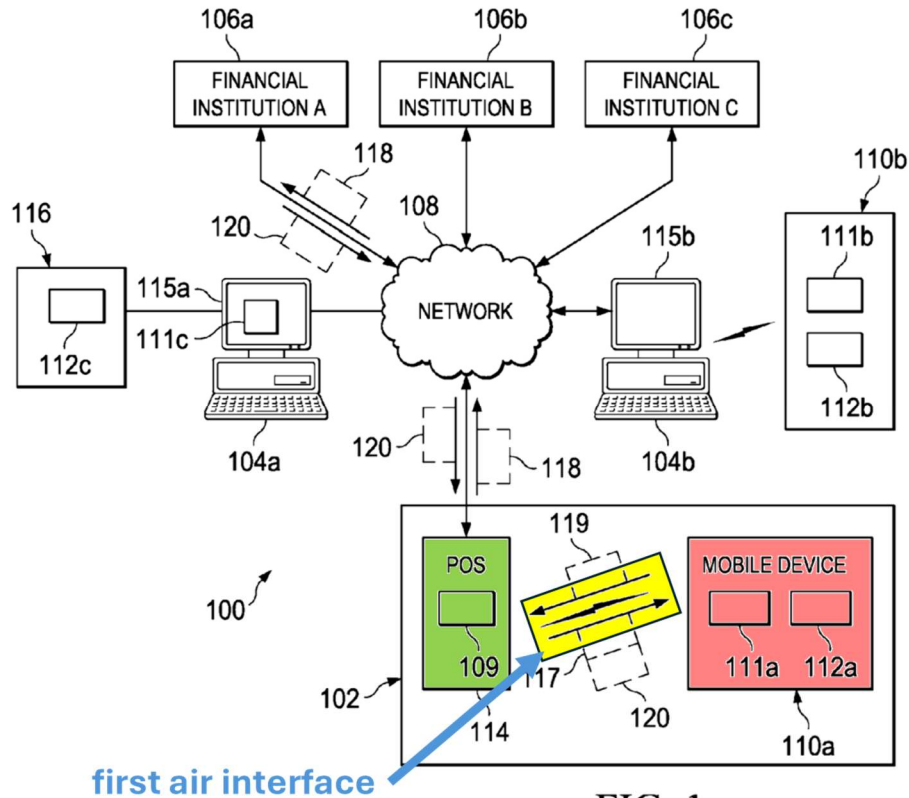


FIG. 1

62. Jain Figure 1 provides an example of such wireless transactions, where a customer's mobile device 110a with transaction card 112a (*a smartphone*) (red box) wirelessly executing transactions with a nearby POS device 114 (belonging to an entity) (green box) using short-range NFC (*first air interface*) (yellow). Jain ¶[0019]. The POS device 114 transmits transaction request 117 to mobile device 110 (*wirelessly receive information from the entity*) when in close proximity to the POS. Jain ¶[0027]. The mobile device 110 then sends a transaction response 119 (*wirelessly provide information to an entity*) that identifies information associated

with a payment account. *Id.* The POS device 114 then sends a transaction authorization request 118 to a financial institution 106 (shown as either 106a, 106b, or 106c). *Id.* The financial institution transmits authorization response 120 to the POS device 114, which in turn transmits it to mobile device 110 (*wirelessly receive information from the entity*). *Id.* The exchange between the mobile device 110 and POS device 114 uses short range signals such as NFC or Bluetooth (*first air interface*). *Id.* ¶[0023].

63. Jain interfaces the mobile device 110 (e.g., “a smartphone” (¶[0018])) with a transaction card 112 that “convert[s] the mobile device 110 to a contactless payment device loaded with a financial vehicle (FV) that may be, for example, a credit card, a debit card, a gift card and/or other retail payment product” (¶[0029]). In such embodiments, transaction card 112 is included as part of the mobile device 110 (i.e., the smartphone). Jain ¶[0019] (“The offline store 102 includes a mobile device [110a¹] having a transaction card 112a and a Point of Sale (POS) device 114 that executes transactions with customers.”), Fig. 1 (showing transaction card 112a within mobile device 110a).

¹ The reference to “10a” in the specification is an obvious typographic error.

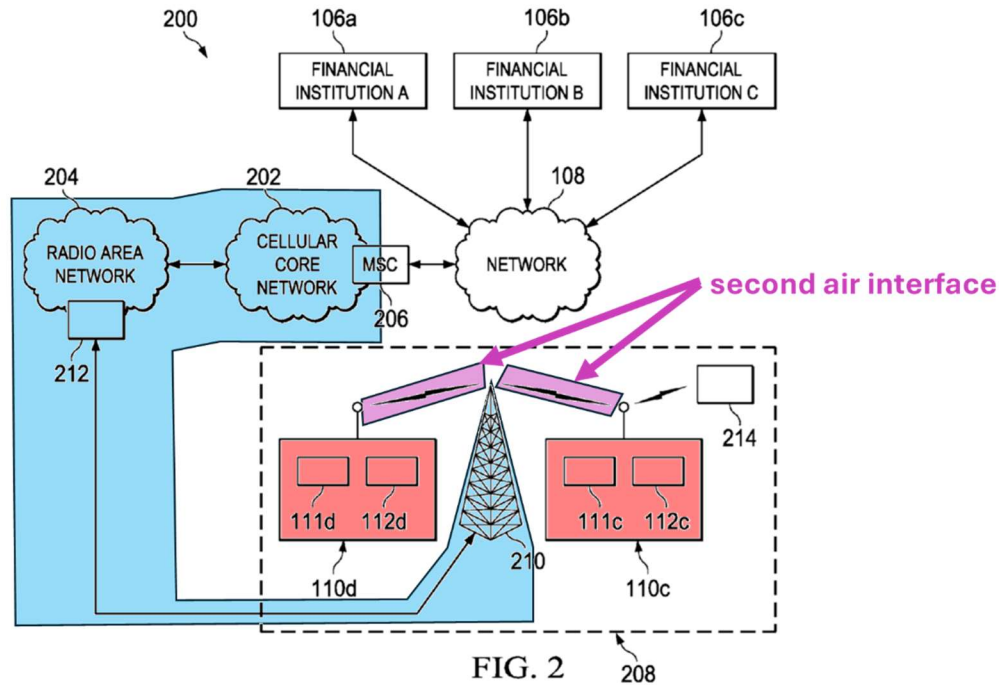
No figures show a “10a” and Jain’s Figure 1 clearly shows element 110a that matches the description of “10a” in the specification.

64. Moreover, in my opinion Jain at least renders obvious implementing the processes discussed herein in connection with a transaction card 112 that is integrated into mobile device 110. A POSITA would make this change because separability of the transaction card is not always advantageous (e.g., a smartphone vendor might find it commercially advantageous to provide transaction card functionality with their smartphone but not allow users to leverage that functionality with other devices). Also, integrating transaction card 112 with mobile device 110 allows the host device to achieve the benefits disclosed in Jain without incurring the cost of implementing an independent transaction card while leveraging components of the mobile device 110. Finally, incorporating transaction card 112 into mobile device 110 protects against inadvertent loss of the transaction card 112 if it were to, e.g., become detached from mobile device 110 without the user noticing.

- (ii) **1[pre][ii]: *to wirelessly receive a communications service from a wireless network using a second air interface that differs from the first air interface, wherein the communications service is received by the smartphone from the wireless network absent involving the entity and wherein the entity functions independently of the communications service, the method comprising:***

65. In my opinion, Jain discloses this limitation. Jain explains that the mobile device 110 with transaction card 112 (*smartphone*) may connect to a cellular network to communicate with financial institutions via cellular radio technology (*wirelessly receive a communications service from a wireless network using a*

second air interface that differs from the first air interface) to, e.g., activate the transaction card as part of process 900 or receive payment receipts after completing financial transactions.² *Id.* ¶[0046], [0081]. This is shown in Fig. 2 (annotated below). *Id.* ¶[0041].



66. Jain’s mobile device 110d or 110c (*smartphone*) (**red box**) *wirelessly receive[s]* cellular service from base station 210, radio area network 204, and cellular

² Jain uses the term “financial institution” to refer to devices, such as devices in an enterprise that authorize transactions through the network 108 by accepting data from clients and returning appropriate responses using, for example, the HTML or XML formats. Jain ¶[0038], [0039].

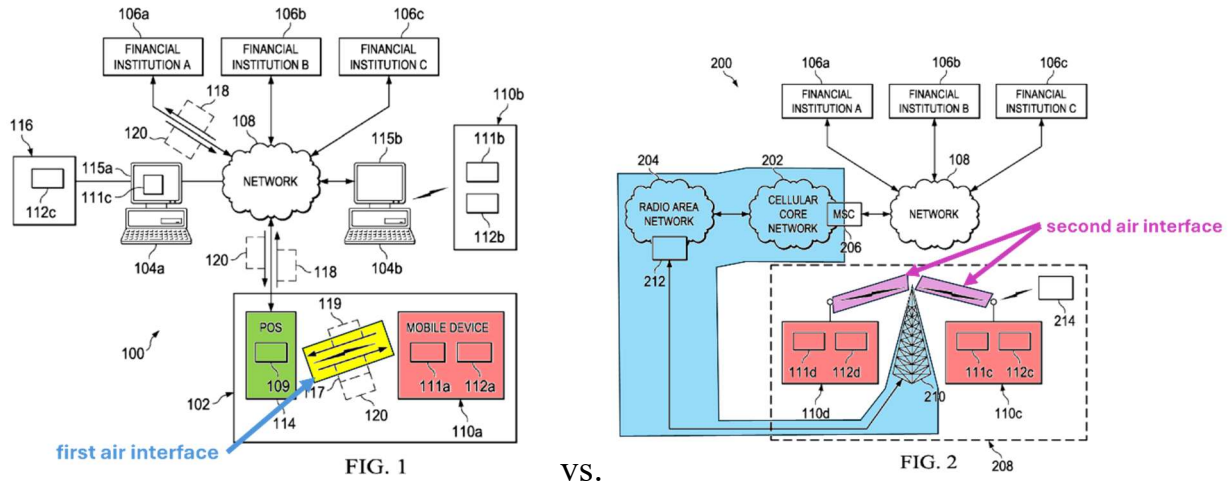
core network 202 (*communications service from a wireless network*) (blue box) using cellular radio (*second air interface*) (purple) to receive information from financial institutions. Jain ¶[0041]. Jain explains that the “cellular core network 202” includes equipment “for providing cellular service” and operates “[i]n accordance with the cellular standards... for processing voice calls and ... for supporting data transfers...” Jain ¶[0042]. In this manner, Jain directly “communicate[s] information between the financial institutions 106” and the mobile device to transmit “transaction information (e.g., transaction receipt, transaction history).” *Id.* ¶[0041], [0046].

67. The mobile devices 110a, 110c, and 110d in FIGs. 1 and 2 (red) are the same mobile device 110 having transaction card 112. Jain ¶[0017] (“Like reference symbols in the various drawings indicate like elements.”), ¶[0027] (discussing a mobile device that is in proximity-based communication with POS device 114 per FIG. 1, and stating “[i]n some implementations, the financial institution 106 may transmit the authorization response 120 to the mobile device through a cellular core network (FIG. 2)”).

68. The cellular radio (*second air interface*) that connects to base station 210, radio area network 204, and cellular core network 202 *differs from* the NFC interface (*first air interface*) that connects using a short-range protocol (*a second*

air interface that differs from the first air interface). Compare Jain ¶[0023] (Fig.

1) with Jain ¶[0041] (Fig. 2), as shown below:



compare FIG. 1 (NFC) (yellow box) with FIG. 2 (cellular network) (purple box).

69. As shown in Jain’s Figure 2, the mobile device receives cellular services from the base station 210, radio area network 204, and cellular core network 202 (*communications service*) without involving the POS (*absent involving the entity*) that communicates with the mobile device using short-range NFC, and there is no overlap between the cellular service and devices providing the same (Fig. 2) and the merchant and its POS device (Fig. 1) (*wherein the entity functions independently of the communications service*), neither of which is even shown in Figure 2. This allows the mobile device to communicate with financial institutions even when the mobile device “is not proximate a retail device, such as the POS device of FIG. 1.” *Id.* ¶[0041]. The financial institution transmits the information to the mobile device in response to a request from the smartphone or an event, which

“may include completing a transaction” or “determining a transaction card 112 is outside the operating range of a POS terminal.” *Id.* ¶[0046].

(iii) **1[a]: *detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity***;

70. In my opinion, Jain discloses this limitation. The transaction card and smartphone execute contactless payment transactions with a nearby POS device (*entity*) using short range signals, such as NFC or “proximity signals.” Jain ¶[0023]. The mobile device first “wirelessly receive[s] a request from the POS device 114 to execute a transaction and/or and provide a response.” *Id.* ¶[0023]. A POSITA would understand that Jain’s mobile device is only able to processes the “request” if sufficiently close to the POS to actually receive and decode the short-range signal corresponding to the request (*detecting by the smartphone that a proximity condition is satisfied*). *See, e.g.,* EX1047 at 11-12; *see also* EX1036 at 220. Specifically, Jain’s NFC and other short range wireless communication protocols are only effective if an underlying signal of sufficient strength is detected such that the device and the terminal can communicate using that protocol. *See* EX1035 at 4, 36; EX1037 at 3. That signal strength rapidly deteriorates as distance increase. *See* EX1035 at 4, 36; EX1037 at 3. Indeed, Jain itself recognizes that NFC communication requires proximity of “10 cm or less.” Jain ¶[0030]. Accordingly, for Jain’s mobile device to receive a request from the POS device received via NFC

and process it as such, the mobile device and POS device must be sufficiently close, which a POSITA would understand corresponds to *detecting that a proximity condition is satisfied* (e.g., the device is within a range of “10 cm or less” to the POS device, Jain ¶[0030]).

71. A POSITA would also understand that Jain renders this obvious. NFC and other short range wireless communication protocols require satisfying a proximity condition because such wireless communication protocols are only effective within a short range. The communication signals between the device and terminal must be strong enough to engage in communication with that protocol. The strength of the signal is dependent on distance between device and terminal, where signal strength increasingly attenuates as the distance gets greater.

72. Without a reaching a certain signal strength or otherwise satisfying a *proximity condition*, both devices are sending unnecessary communication signals guaranteed to be lost. This wastes time and processing. Especially for communications executing financial transactions, either device indiscriminately transmitting sensitive financial information without ensuring communication to the correct device is a security risk. Either device is sending communications that will likely to subject to errors, like packet loss, due to transmission past an effective range, increasing the risk of miscommunication. And devices trying to read wireless

communications with weak signal strength are also likely to misinterpret noise or other small unintended wireless signals as communications.

73. Implementing NFC to determine whether a proximity condition is satisfied and communicating based on that condition's satisfaction, were well-known to a POSITA. For example, EX1020 discloses using NFC to limit the range at which communication may take place. EX1020 ¶¶[0041] ("In certain embodiments, the communication may occur within a range of approximately 2 to 4 cm. The close range communication with the NFC device 44 may take place via magnetic field induction, allowing the NFC device 44 to communicate with other NFC devices or to retrieve information from tags having radio frequency identification (RFID) circuitry."), [0063] ("The device 10 may be configured to communicate with the transaction terminal 120 using a short range wireless communication protocol, when positioned over the box 124. ... In some embodiments, the wireless communication device 126 may be a near field communication (NFC) device and the device 10 may be configured to initiate NFC communications with the terminal 120."). Further, EX1020 discloses using other wireless signals to determine proximity. EX1020 ¶[0073] ("The [identifying information] may be used by the device 10 to indicate that the device is located within communication range of the hot spot 169."). This makes common sense. Where a particular wireless signal is restricted to a particular distance (e.g., "2 to 4

cm” or “10 cm or less” for NFC (Jain ¶[0030]; EX1020 ¶[0041])), a device receives messages at a certain signal strength and generally without errors when the transmitting device is within that distance. Thus, signal strength and received messages can be used to determine proximity. Receiving a weak signal and receiving incoherent messages—messages picking up errors from wireless transit—indicate that the transmitter is outside the effective range.

74. As such, it would have been obvious for a POSITA to configure the smartphone to first detect that it is proximate to Jain’s POS device prior to attempting short-range signal communication to reduce wasted time, wasted power, security risks, and miscommunication in transmission and reception.

75. Jain also discloses that device 110’s transaction card 112 may be “powered from an induction magnetic field generated by the POS 114,” which in my opinion discloses both the satisfaction of a proximity criterion and the detection by device 110 of that satisfaction. Jain ¶[0029].

76. ECMA 340 is a well-known communications standard that defined NFC communication. EX1047 is a true and correct copy of the 2nd edition of the ECMA 340 Interface and Protocol Standard for NFC (“ECMA-340”), which was publicly available and known to a POSITA as of its release in December 2004, and which was not updated again until June 2013. *See* <https://ecma-international.org/publications-and-standards/standards/ecma-340/>. This version was

also published as the “ISO 18092.” *Id.* In addition, the disclosures of ECMA-340 discussed below are found in both the 1st edition (released December 2002) and the 2nd edition. *Compare* EX1047 *with* EXEX1034.

77. ECMA-340 explains that an NFC “transaction” requires an “initialization” (described in ECMA-340 section 11) and then a “data exchange” (described in ECMA-340 section 12). EX1047 at §4.25, §10, Figure 5. ECMA-340 specifies two devices (“Initiator” and “Target”) and two communication modes (“Passive” and “Active”). EX1047 §1, §4.1, §4.16, §7.

78. Regardless of which of the two devices communicating via NFC is the “Initiator” and which is the “Target,” and regardless of what NFC communication mode they use, according to ECMA-340 both the Initiator and the Target detect that a proximity criterion is satisfied and, after they both perform that detecting, they then establish a short-range link that is used for subsequent communications. Specifically, in both modes, an “Initiator” device “shall activate its RF field” and a “Target” device then “shall be activated by the RF field of the Initiator.” EX1047 at §10. Then, the “Initiator” sends one or more commands (e.g., ALL_REQ, SENS_REQ, and/or ATR_REQ) and receives one or more responses (e.g., SENS_RES and/or ATR_RES). *See* EX1047 §§11.2.1.16-.17, §11.2.1.23, §11.3.2, §§12.2-.3 , Figure 13, Figures 24-25.

79. In even more detail, in Passive mode, an activated Target enters the SENSE state. EX1047 §11.2.1.8, §11.2.19. The “Initiator” then sends commands “to probe the field for Targets” (EX1047 § 11.2.1.16), receives a SENS-RES response from a Target in the SENSE state (EX1047 §11.2.1.17), and then selects that Target “for further communication” (EX1047 §11.2.1.23, Figure 13). *See also* EX1047 §12.2 and Figure 24. In Active mode, after the Target is activated by the RF field of the Initiator, it receives an ATR_REQ message from the Initiator, generates its own RF field, and uses that field to send an ATR_RES message to the Initiator. EX1047 §11.3.2. In response to that message, the Initiator sends a DEP_REQ “to start the data exchange protocol.” EX1047 §11.3.2. *See also* EX1047 §12.3 and Figure 25.

80. Thus, regardless of what mode is used and regardless of whether Jain’s mobile device is the Initiator or the Target, it detects that a ***proximity condition is satisfied***: if the Target, by activating in response to a sufficiently strong field from the Initiator and if the Initiator, by receiving a response to a command from the Target. In addition, this exchange of commands and responses results in the selection of a particular “Target” and attributes/parameters for further communication with the same, thereby establishing a ***short-range link***. *Id.* at §7, §§11.2.1.24-25, §12, §12.1, Figure 22, Figure 24-25. After this ***link*** is established, the Initiator and the Target communicate using ECMA 340’s data exchange protocol. EX1047 Figures

5, 23, and 24. This includes transmission of Jain's transaction request 117, transaction response 119, and authorization response 120.

81. In my opinion, a POSITA reading Jain would have known the above. For example, Jain teaches that its NFC communication is based on the "ISO 18092/ECMA 340" standards. Jain ¶[0023]. *See also* Jain ¶[0018], ¶[0051]. But at a minimum, it would have been obvious to implement Jain's NFC communications in this manner, because that is the exchange taught by the NFC standard cited in Jain and because a POSITA would be motivated to implement the standard rather than define a proprietary approach to simplify design, to allow for use of commercially available NFC hardware and software, to minimize the need for trial and error, and to maximize interoperability with standard-compliant reader/POS systems and mobile devices.

82. Further confirming this limitation is met, Patent Owner alleges in its infringement contentions in district court litigation that the use of NFC is itself sufficient to show *detecting by the smartphone that a proximity condition is satisfied*. EX1016 at 8-10.

83. In addition, in my opinion it would be obvious to a POSITA that Jain's smartphone would first detect it is proximate to the POS terminal based on a signal from the POS device (*e.g.*, a "request," Jain ¶[0023], or earlier commands and responses exchanged as part of implementing ECMA 340) prior to communicating

with that POS. To ensure communications would be successful and not wasted signaling, and further to avoid the security risk of indiscriminately transmitting sensitive financial information, Jain's smartphone first needs to detect it is near the POS prior to proceeding with a payment transaction with the POS device. Indeed, such implementations were well-known to a POSITA. For example, EX1020 discloses and leverages NFC to limit the range at which communication may take place. EX1020 ¶¶[0041], [0063] [0041]. Indeed, in the context of Wi-Fi, EX1020 even more explicitly discloses using the ability to receive such signals as an indication of proximity. In my opinion, A POSITA would be motivated and able to use Jain's "request" or ECMA 340's commands and responses in the same manner.

(iv) 1[b][i]: *in response to at least the proximity condition having been satisfied between the smartphone and the entity, establishing a wireless short-range communications link between the smartphone and the entity*

84. In my opinion, Jain discloses this limitation. As set forth *supra* with respect to limitation 1[a], Jain discloses that before performing a financial transaction, the smartphone must be sufficiently close to POS 114 (*in response to at least the proximity condition having been satisfied*). If that condition is met, Jain's smartphone sends a transaction response 119 identifying information associated with a payment account to the nearby POS 114 (*entity*) using NFC. Jain ¶¶[0023], [0027], [0029]. Jain further discloses that communication using those protocols involves

first establishing a wireless connection (*wireless short-range communications link*) between the mobile device (*smartphone*) and the POS device (belonging to the *entity*). Jain ¶[0018], [0051].

85. Moreover, as addressed in more detail *supra* with respect to limitation 1[a], the NFC standard implemented by Jain teaches or at least renders obvious conducting a command/response exchange that concludes with the “Initiator” device selecting a “Target” device and attributes/parameters for communication (*establishing a wireless short-range communications link*) after the “Target” activates in response to a sufficiently strong RF field from the Initiator and after the Initiator receives certain responses to messages it send to the Target (*in response to at least the proximity condition having been satisfied*). EX1047 at 13, 23-24, 30, 38-40 (describing parameters).

86. In my opinion, at a minimum it would be obvious to a POSITA that Jain’s smartphone would first establish a NFC connection with the POS device (*establishing a wireless short-range communications link*) after detecting *the proximity condition having been satisfied* and prior to sending the transaction response 119 to POS 114 (*entity*) using NFC. To ensure communications would be successful Jain’s smartphone needs to detect proximity and then establish a short-range communications link with the POS prior to proceeding with a payment transaction with the POS device. Use of a *link* after detecting proximity further

improves reliability and security, because once a link is established, Jain's mobile device can receive confirmation of receipt of individual packets. Indeed, such implementations of devices communicating via NFC establishing a connection prior to transmitting information were well-known to a POSITA. EX1019 ¶¶[0011], [0124], [0182]. For example, "to facilitate the establishment of an NFC connection (e.g., typically 2-4 cm)" (*proximity condition having been satisfied*), an "RF field generated by the payee device [] may induce [] transition to an active mode of operation, thus establishing an NFC connection between the two devices." EX1019 ¶[0124]. "Accordingly, by way of this established NFC connection, the payment [information] may be transmitted to and received by the payor device." *Id.*

(v) 1[b][ii]: *to provide by the smartphone, using the first air interface, information to the entity;*

(vi) 1[b][iii]: *and to receive by the smartphone information from the entity;*

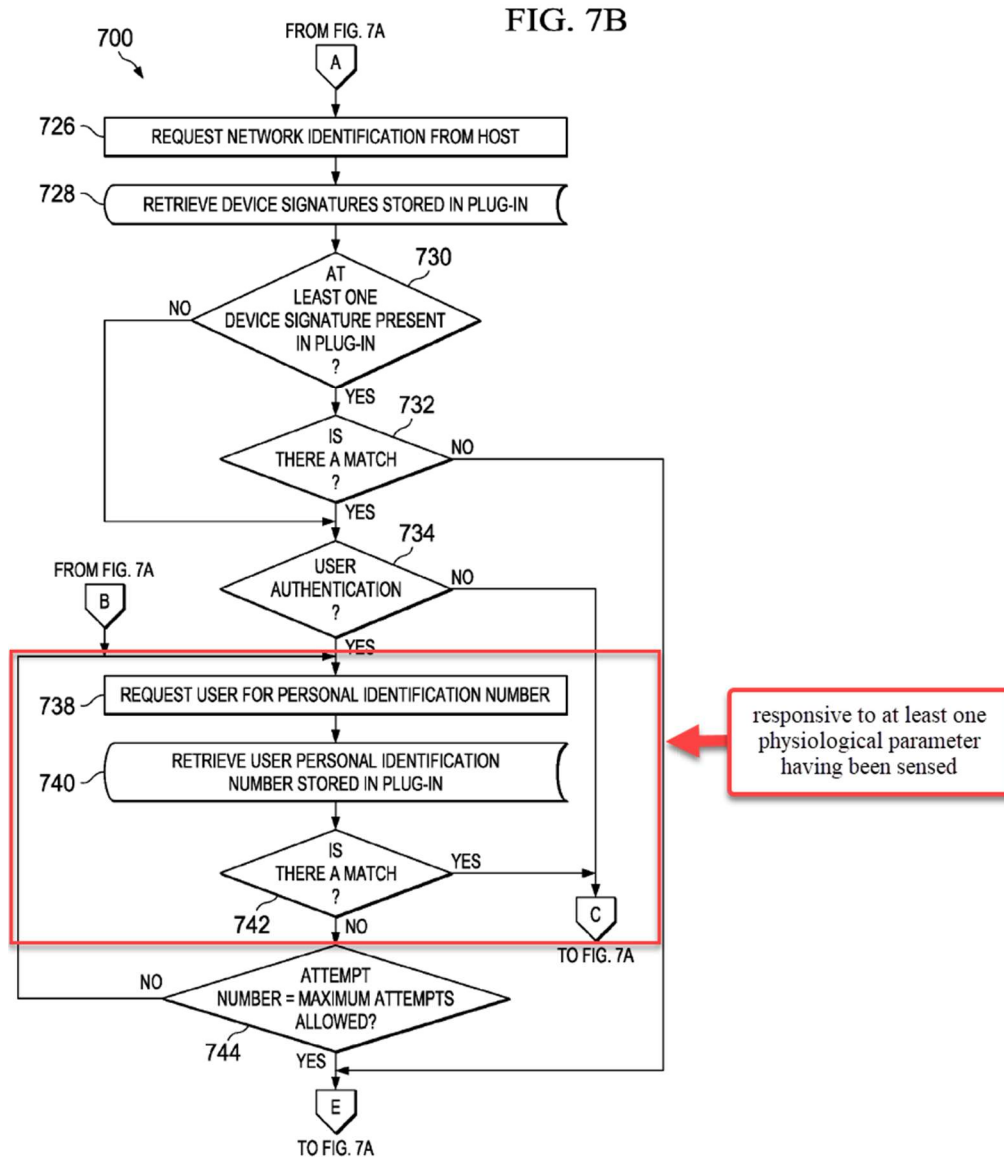
87. In my opinion, Jain discloses this limitation. As set forth *supra* with respect to limitation 1[a], Jain discloses that before performing a financial transaction, the smartphone must be sufficiently close to the POS (*entity*). Then, as set forth *supra* with respect to limitation 1[b][i], once in close proximity, the smartphone receives a transmitted transaction request 117 sent by the POS and establishes a NFC connection. Jain ¶¶[0027]. When the user authorizes the payment transaction, the mobile device then sends a transaction response 119 (*provide by the*

smartphone) containing identifying information associated with a payment account to the POS (*information to the entity*) using the established NFC connection (*using the first air interface*). Jain ¶¶[0027], [0029]. Once the POS authorizes the transaction with the financial institution, it transmits an authorization response 120 (*information from the entity*) to the mobile device (*receive by the smartphone*) using the NFC connection. Jain ¶[0027].

(vii) 1[c][i]: *in response to at least the proximity condition having been satisfied between the smartphone and the entity and in response to a physiological parameter,*

88. In my opinion, Jain discloses this limitation. As set forth *supra* with respect to limitation 1[a] and 1[b], before performing a financial transaction, the Jain smartphone must be sufficiently close to the POS device (*entity*) and that sufficient proximity is determined by detecting a “request” from a POS transmitted via NFC (*in response to at least the proximity condition having been satisfied*). Jain ¶[0029].

89. Jain also requires an authentication process for “automatically bootstrapping” transaction card 112 to mobile device 110 before the user is able to use the transaction card in any financial transaction, which includes authenticating a user using biometrics (e.g. fingerprint) (*at least one physiological*). Jain ¶¶[0072], [0075], Fig. 7B (annotated):



90. Jain first teaches that, at step 738, the smartphone receives a PIN via the smartphone's touch screen or keypad. Jain ¶¶[0022], [0075]. At step 740, the smartphone retrieves a locally stored PIN. Jain ¶[0075]. Then, at step 742 ("is there a match?"), the smartphone determines whether the user-inputted PIN matches the locally-stored PIN. Jain ¶[0075], Fig. 7B.

91. Jain also teaches, however, that rather than “entering a PIN,” “the user may be authenticated using... biometric information (e.g., fingerprint)”—*i.e. a physiological parameter*. Jain ¶[0075]. According to Patent Owner, the sensing of such a *physiological parameter* prior to attempting to performing a financial transaction satisfies this claim language. *Compare* Ex1016 at 18 (pointing to a “fingerprint unlock” and similar security functionality for this limitation).

92. In my opinion, even if the *physiological parameter* limitation has to be met in connection with a specific financial transaction, Jain discloses that during payment, the merchant terminal may “prompt the user to authorize a transaction such as by entering a PIN.” Jain ¶[0029]. It would be obvious for a POSITA to replace the disclosed PIN with user biometrics to authorize the transaction (*in response to a physiological parameter*). Jain already contemplates using biometrics (e.g., fingerprints) for its user authorization process (Jain ¶[0075], Figure 7), and reusing that software and hardware for individual transactions would not further complicate the system or incur material additional costs. In addition, a POSITA would recognize the advantages of biometrics over PINs, including that biometrics cannot be forgotten or obtained by a bad actor via, e.g., phishing, and that use of biometrics for authorizing individual transactions would thus improve security. A POSITA would also be familiar with two-factor authentication and would both (a) know how to retain PIN authentication while augmenting it with biometric authentication and

(b) appreciate that the cost of doing so is warranted because of the extra security it provides for financial transactions. *See* EX1028 Abstract; EX1029 Abstract; EX1030. Indeed, requiring biometric authentication before authorization of individual transactions was well known in the art. *See, e.g.,* EX1020 ¶¶[0083]-[0084], [0088], Fig. 14. EX1021 ¶[0052].

(viii) 1[c][ii]: *wirelessly providing by the smartphone, using the first air interface, information to the entity, and wirelessly receiving by the smartphone, using the first air interface, information from the entity*

93. In my opinion, Jain discloses this limitation. As set forth *supra* with respect to limitation 1[b][i] and 1[b][ii], Jain discloses wirelessly providing by the mobile device (*providing by the smartphone*), using NFC (*using the first air interface*), transaction response 119 containing payment account information to the POS (*information to the entity*) and wirelessly receiving by the mobile device (*wirelessly receiving by the smartphone*), using NFC (*using the first air interface*), authorization response 120 from POS (*information from the entity*). Jain ¶¶[0027], [0029]. This limitation adds no additional requirement.

(ix) 1[c][iii]: *independently of, and absent involving the entity in receiving by the smartphone the communications service from the wireless network using the second air interface; and;*

94. In my opinion, Jain discloses this limitation. There is no additional requirement of limitation 1[c][iii] beyond those set forth in claim 1[pre][ii].

95. As set forth *supra* with respect to limitation 1[pre][ii], Jain discloses its smartphone receives cellular services from base station 210, radio area network 204, and cellular core network 202 (***communications service from the wireless network***) to receive information directly from the financial institutions using the cellular radio (***second air interface***) of the mobile device. Jain ¶[0041]. Jain's financial institutions directly "communicate information between the financial institutions 106 and the transaction card 112" such as to transmit a transaction receipt and transaction history of transactions made by the financial institution. Jain ¶[0046].

96. Moreover, also as set forth *supra* with respect to limitation 1[pre][ii], the receiving by the smartphone payment transaction receipts sent by the financial institution via a cellular radio network is performed ***independently of, and absent involving*** the merchant POS (***entity***) when the smartphone "is not proximate a retail device, such as the POS device of FIG. 1." Jain ¶[0041]. The financial institution transmits the information to the mobile device in response to a request from the smartphone or an event, which "may include... determining a transaction card 112 is outside the operating range of a POS terminal." Jain ¶[0046].

- (x) 1[d]: ***wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network absent involving the entity, absent providing by the smartphone information to the entity, and absent receiving by the smartphone information from the entity,***

97. In my opinion, Jain discloses this limitation. The only additional requirement of claim 1[d] is that the “wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network absent involving the entity” of claim 1[pre][ii] and 1[c][iii] is ***absent providing by the smartphone information to the entity, and absent receiving by the smartphone information from the entity.***

98. As set forth *supra* with respect to limitation 1[pre][ii] and 1[c][iii], Jain explains that its mobile device receives transaction information (e.g., transaction receipts/history) (***wirelessly receiving by the smartphone***) between the smartphone and the financial institutions using the cellular radio technology (***second air interface***) of the mobile device. *Id.* ¶[0041]. Jain’s mobile device communicates directly with the financial institution using cellular services from base station 210, radio area network 204, and cellular core network 202 (***the communications service from the wireless network absent involving the entity***) when it detects that the smartphone “is not proximate a retail device, such as the POS device of FIG. 1.” *Id.* ¶¶[0041], [0046]. As shown in Fig. 1 and Fig. 2, the short-range NFC and the cellular radio communication paths are entirely separate:

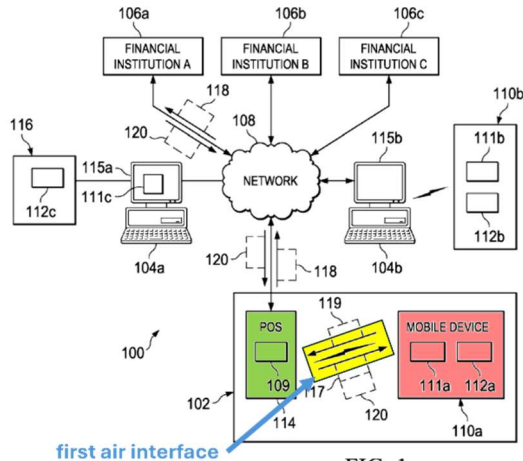


FIG. 1

VS.

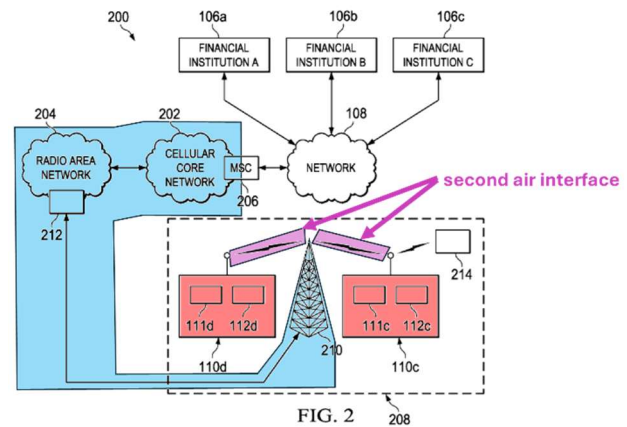


FIG. 2

compare FIG. 1 (NFC) (yellow label) with FIG. 2 (cellular network) (purple box).

When the smartphone is not proximate POS 114 (only in Fig. 1) (*id.* ¶[0041]), it cannot send or receive information using NFC (*absent providing by the smartphone information to the entity, and absent receiving by the smartphone information from the entity*).

99. In my opinion, a POSITA would understand that the mobile device operating using the short-range NFC protocol is not able to send information (*absent providing by the smartphone information to the entity*) and receive information (*absent receiving by the smartphone information from the entity*) to the POS when the POS and the mobile device are not proximate because short-range NFC signal communications are dependent on the proximity between the two communicating devices. As Jain explains, the smartphone only activates a “reader mode” of the transaction card “[i]n the event that the mobile device 110 is proximate (e.g., 10 cm or less) a transmitting terminal” to the POS and prompts the user though the GUI of

the smartphone for authorization to proceed with the transaction. *Id.* ¶[00300]; *see also supra re- 1[a]*. . On the other hand, in response to “determining the [smartphone] is outside the operating range of a POS terminal” the financial institution uses the cellular core network 202 and network 108 (and not NFC) to transmit the information to the mobile device directly. *Id.* ¶[0046].

(xi) 1[e]: *wherein the wireless short-range communications link used by the first air interface is based upon unlicensed frequencies,*

100. In my opinion, Jain discloses this limitation. The only additional requirement of limitation 1[e] is that the “wireless short-range communications link between the smartphone and the entity” of limitation 1[b][i] be based upon *unlicensed frequencies*. Jain meets this requirement by its mobile device communicating with the POS device (*entity*) “using short range signals such as NFC (*e.g.*, ISO 18092/ECMA 340)... proximity signals, and/or other signals compatible with retail payment terminals (*e.g.*, POS 114).” Jain ¶[0023].

101. NFC used the 13.56 MHz ISM band, which is unlicensed. *See* EX1031; EX1032 at 2. Bluetooth also used unlicensed frequencies. *See* EX1041. Patent Owner, in its infringement contentions, admits as much, alleging that “the wireless short-range communications link used by NFC is based upon the unlicensed 13.56 MHz frequency.” *See* EX1016 at 27. Bluetooth also used unlicensed frequencies. *See* EX1041.

(xii) 1[f]: *wherein the second air interface uses a wireless communications link that is based upon licensed frequencies;*

102. In my opinion, Jain discloses this limitation. The only additional requirement of limitation 1[f] is that the “communications service from the wireless network using the second air interface” of limitation 1[c][iii] and 1[d] be based upon *licensed frequencies*. As set forth *supra* in those limitations, Jain explains that its mobile device receives transaction information (e.g., transaction receipts/history) directly from the financial institutions using the cellular radio of the mobile device. *Id.* ¶[0041].

103. The cellular radio may use GSM, CDMA, UMTS, and other modes. Jain ¶[0041]. These use *licensed frequencies*. Patent Owner, in its infringement contentions, admits as much, alleging that “the cellular data network... (the second air interface) uses a wireless communication link that is based upon frequencies listed from the Federal Communications Commission.” EX1016 at 27-28.

(xiii) 1[g]: *wherein the first air interface is not involved in providing the communications service to the smartphone.*

104. In my opinion, Jain discloses this limitation. This limitation is duplicative of 1[pre][ii] and 1[d]. As set forth *supra* in those limitations, Jain explains that its mobile device receives transaction information (e.g., transaction receipt/history) directly from the financial institutions using cellular service from

base station 210, radio area network 204, and cellular core network 202 (*communications service*) via the cellular radio of the mobile device (*second air interface*) and without involving the POS that communicates with the mobile device using NFC (*first air interface*) when the smartphone is “proximate a retail device, such as the POS device of FIG. 1.” *Id.* ¶¶[0041], [0046].

(b) Claim 2

(i) 2[pre]

105. See Claim 1, *supra*.

(ii) 2[a]: *wherein said wirelessly providing by the smartphone, using the first air interface, information to the entity and wirelessly receiving by the smartphone, using the first air interface, information from the entity independently of, and absent involving the entity in, receiving by the smartphone the communications service from the wireless network using the second air interface is performed over a first time interval;*

106. In my opinion, Jain discloses this limitation. The only additional requirement of limitation 2[a] is that the “wirelessly receive information from the entity using the first air interface” of limitation pre[i] and 1[c][ii] *is performed over a first time interval*. Jain discloses that while performing a financial transaction to pay for one or more items (*a first time interval*) the mobile device must be sufficiently close to a POS device (*entity*).

(iii) 2[b]: *wherein said wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network*

absent involving the entity, absent providing by the smartphone information to the entity, and absent receiving by the smartphone information from the entity is performed over a second time interval; and wherein the first and second time intervals are non-overlapping with one another.

107. In my opinion, Jain discloses this limitation. The only additional requirements of limitation 2[b] is that the “wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network” of limitation pre[ii] and 1[d] ***is performed over a second time interval... wherein the first and second time intervals are non-overlapping with one another.***

108. As set forth *supra* in those limitations, Jain explains that *after* payment is complete (***a second time interval... non-overlapping***), the smartphone may also receive receipts sent by the financial institution via a cellular radio network. Jain ¶[0046]. The information may include, for example, transaction information (*e.g.*, transaction receipt/history). *Id.* Jain’s smartphone receives transaction information directly over cellular radio when the smartphone “is not proximate a retail device, such as the POS device of FIG. 1.” *Id.* ¶[0041]. The financial institution transmits the information to the mobile device in response to a request from the smartphone or an event, which “may include completing a transaction” (***the first and second time intervals are non-overlapping with one another***) or “determining a transaction card 112 is outside the operating range of a POS terminal.” *Id.* ¶[0046].

(c) **Claim 3**

(i) **3[pre]**

109. *See* Claim 1, *supra*.

(ii) **3[a]: *wherein the wireless short-range communications link that is based upon unlicensed frequencies is further based upon a Time Division Duplex (TDD) protocol, and***

110. In my opinion, Jain discloses this limitation. As discussed re 1[e], Jain explains that the contactless payment transaction is executed by transmitting information from the smartphone and transaction card to a POS device (***wireless short-range communications link***) using short range signals operating in ***unlicensed frequencies*** such as NFC, Bluetooth, Felica, MiFARE, UWB, and RFID. Jain ¶[0023]. Jain discloses this. In Jain, the claimed ***information*** is sent “using short range signals such as NFC...” Jain ¶[0023]. *See also* Jain ¶¶[00018], [0051], [0068]. NFC is a point-to-point short-range link between an Initiator and a Target, and it does so ***using a time division duplex protocol***. *See* EX1032 generally and at 21; EX1045 generally and §12.6.1.1.

111. According to Patent Owner, “NFC communications”—which includes the NFC communications disclosed in the prior art—use “***unlicensed frequencies... based upon a Time Division Duplex (TDD) protocol***.” EX1016 at 35-37 (emphasis added). Alternatively, Bluetooth also used ***unlicensed frequencies... based upon a***

Time Division Duplex (TDD) protocol for bidirectional communication such as the transactional communications at issue.

- (iii) ***3[b]: wherein the second air interface that uses a wireless communications link that is based upon licensed frequencies is further based upon an Orthogonal Frequency Division Multiplexed (OFDM) and/or Orthogonal Frequency Division Multiple Access (OFDMA) protocol.***

112. In my opinion, Jain discloses this limitation. Limitation 3[b] lists specific protocols that need to be used for the “second air interface” of limitations 1[pre][ii] and 1[f]. In Jain, these steps involve communications with a financial institution using cellular radio technology (second air interface). Jain ¶[0081]. The cellular radio technology in Jain includes GSM, CDMA, UMTS, and other modes. Jain ¶[0041]. A POSITA would be motivated to use the most advanced and performant cellular radio technologies such as LTE and WiMAX (a competitor to LTE) (also known as 4G cellular technologies), well-known next generation technologies for cellular communications, in addition to the cellular radio technology explicitly mentioned in Jain to keep up with ever-evolving technologies that allow for higher data rates and that even as of the priority date of the ’199 patent were known to a POSITA to be in line to displace older technologies in the near future. See EX1045, EX1046. Wi-Max and LTE are both ***based upon an Orthogonal Frequency Division Multiplexed (OFDM) and/or Orthogonal Frequency Division Multiple Access (OFDMA) protocol.*** See EX1045, EX1046.

113. Jain also discloses “the mobile device 110 [can] transmit packet data using its own connection to the external world (e.g., SMS, cellular, **Wi-Fi**).” Jain ¶[0053] (emphasis added); *see also* Jain at claim 13, 14. Accordingly, Jain discloses Wi-Fi as an alternative to “cellular” for communications to/from a financial institution, as taught in Jain’s Fig. 9. **OFDM** is the digital modulation scheme employed by Wi-Fi.

(d) Claim 4

(i) 4[pre]

114. *See* Claim 1, *supra*.

(ii) 4[a]: *wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity is based, at least in part, on receiving a short-range signal from the entity over the first air interface.*

115. In my opinion, Jain discloses this limitation. As set forth *supra* with respect to limitation 1[a], Jain discloses that before performing a financial transaction, the smartphone must be sufficiently close to a POS device (*detecting by the smartphone that a proximity condition is satisfied*) and that sufficient proximity is determined by detecting a “request” from a POS device transmitted via NFC (*short-range signal that is transmitted ... over the first air interface*). Jain ¶[0029].

116. Further confirming this limitation is met, Patent Owner alleges in its infringement contentions in district court litigation that the use of NFC is itself

sufficient to show the claimed ***detecting*** based on a ***receiving a short-range signal***.

EX1016 at 39-41.

(e) **Claim 5**

(i) **5[pre]**

117. *See* Claim 4, *supra*.

(ii) **5[a]: wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity is based, at least in part, on a measurement of signal strength of the short-range signal.**

118. In my opinion, Jain discloses this limitation. The only additional element of claim 1[a] requiring “detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity” is that the detection is ***based, at least in part, on a measurement of signal strength of the short-range signal***.

119. As set forth *supra* with respect to limitation 1[a], Jain discloses that before performing a financial transaction, the smartphone must be sufficiently close to a POS (***detecting by the smartphone that a proximity condition is satisfied***) and that sufficient proximity is determined by detecting a “request” from a POS device transmitted via NFC. Jain ¶[0029]. As explained, the strength of short-range NFC signal communications is dependent on the proximity between the two devices communicating, and a POSITA would understand that Jain’s NFC and other short range wireless communication protocols are only effective if an underlying signal of

sufficient (*measurement of*) *signal strength* is detected such that the device and the terminal can communicate using that protocol. It would be obvious to a POSITA that the smartphone must perform a *measurement of signal strength* prior to acting on it. Signal strength attenuates with increasing distance and a *measurement of signal strength* must be recalculated by the receiving device because the signal rapidly deteriorates as distance increases. *See* EX1035 at 4, 36; EX1037 at 3. Indeed, the ECMA 340 standard implemented by Jain expressly defines an “External RF field threshold value,” and it would have been at least obvious to use this value as part of determining whether valid RF communication is being received. EX1047 at 6. Otherwise, the mobile device may switch to NFC communication or even send a response to baseline environment RF signals (i.e., noise).

120. Further confirming this limitation is met, Patent Owner alleges in its infringement contentions in district court litigation that the use of NFC is itself sufficient to show the claimed *detecting* based on a *measurement of signal strength of the short-range signal*. EX1016 at 41-42.

(f) **Claim 6**

(i) **6[pre]**

121. *See* Claim 1, *supra*.

(ii) **6[a]: *wherein a value of the physiological parameter is provided by using a sensor of the smartphone.***

122. In my opinion, Jain discloses this limitation. The only additional element of claim 1[c][i] requiring “a physiological parameter” is that *a value of the physiological parameter is provided by using a sensor of the smartphone*.

123. As set forth *supra* with respect to limitation 1[c][i], Jain discloses that establishing a NFC communications link to send payment information is performed in response to user authentication as part of an authentication process 700 required prior to being able to conduct financial transactions (Jain, Fig. 7) and also merchant terminal “prompt[ing] the user to authorize a transaction such as by entering a PIN” (Jain ¶[0029]) and that it would be obvious for a POSITA to replace the disclosed PIN with user biometrics (*physiological parameter*) to authorize the transaction.

124. Jain discloses using a biometric reader (*sensor*) (e.g., fingerprints) for its user authorization process as a good alternative to PINs, where step 738 includes sensing “biometric information” (*a value of the physiological parameter*). Jain ¶[0075], Figure 7. Thus, Jain discloses performing steps 738, 740, and 742 in the context of biometric verification, where step 738 includes sensing “biometric information” using a biometric reader (*at least one sensor of the smartphone*), step 740 includes retrieving locally stored biometric information, and step 742 includes determining if the sensed biometric information matches the stored biometric information.

125. Further confirming this limitation is met, Patent Owner alleges in its infringement contentions in the district court litigation that the use of biometric verification of a smartphone is itself sufficient to show claimed *sensor*. EX1016 at 43-47.

126. In my opinion, at a minimum it would be obvious to implement Jain's teaching of "authentication using... biometric information" in this manner for the reasons explained above in connection with Jain's disclosure of limitation 1[a][i].

(g) Claim 7

(i) 7[pre]

127. *See Claim 1, supra.*

(ii) 7[a]: *being proximate to a specific location within a store, then detecting a short-range signal being transmitted from said specific location within the store, and then performing a transaction to pay for one or more items.*

128. In my opinion, Jain discloses this limitation. As set forth *supra* with respect to limitation 1[a], Jain discloses that before performing a financial transaction, the smartphone must be sufficiently close to a POS (*being proximate to a specific location within a store*) and that sufficient proximity is determined by detecting a "request" from a POS device transmitted via NFC (*short-range signal that is transmitted ... over the first air interface*). In this scenario, Jain's POS device is a retail payment terminal located at a specific location in a retail store (*a specific location within a store*). Jain ¶¶[0023], [0029]. The user can make contactless

payments with the POS merchant terminal to *pay for one or more items* with merchants accepting Mastercard, Visa, Amex, Discover, and other payment programs. *Id.* ¶¶[0023], [0028], [0029].

(h) Claim 8

(i) 8

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[pre]
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129. See Claim 1, *supra*.

- (ii) 8[a]: *wherein the entity comprises a check-out counter in a store, and wherein said wirelessly providing by the smartphone, using the first air interface, information to the entity comprises: performing a financial transaction to pay for one or more items.*

130. In my opinion, Jain discloses this limitation. As set forth *supra* with respect to limitation 1[a], Jain discloses that before performing a financial transaction, the smartphone must be sufficiently close to a POS to communicate via NFC (*using the first air interface*). In this scenario, Jain's POS device is a retail payment terminal located in a retail store, with the location of the POS device being where you pay for goods (*check-out counter in a store*). Jain ¶¶[0023], [0029]. As explained, the user can make contactless payments by the smartphone with the POS merchant terminal by authorizing the payment transactions (*performing a financial transaction to pay for one or more items*) with the POS terminals of merchants accepting Mastercard, Visa, Amex, Discover, and other payment programs. *Id.* ¶¶[0023], [0028], [0029].

(i) Claim 9

(i) 9[pre]

131. See Claim 1, *supra*.

(ii) 9[a]: *wherein establishing the wireless short-range communications link between the smartphone and the entity is performed in response to the physiological parameter.*

132. In my opinion, Jain discloses this limitation. The only additional requirement here is that the “establishing a wireless short-range communications link between the smartphone and the entity” of claim 1[b][i] is also *performed in response to the physiological parameter*.

133. As set forth *supra* with respect to limitation 1[c][i], Jain also discloses that establishing a NFC communications link to send payment information is *performed in response to* user authentication as part of an authentication process 700 required prior to being able to conduct financial transactions (Jain, Fig. 7) and also merchant terminal “prompt[ing] the user to authorize a transaction such as by entering a PIN” (Jain ¶[0029]) and that it would be obvious for a POSITA to replace the disclosed PIN with user biometrics (*physiological parameter*) to authorize the transaction.

134. Further confirming this limitation is met, Patent Owner alleges in its infringement contentions in the district court litigation that the use of biometric

verification of the smartphone is itself sufficient to show claimed *in response to the physiological parameter*. EX1016 at 55-58.

(j) Claims 10-19

135. Claims 10-19 are substantively identical to claims 1-9.

B. Ground 2: Dua (EX1018)

1. Background

136. Dua is prior art under at least pre-AIA 35 U.S.C. § 102(b), having been published on July 27, 2006, and thus more than a year before the earliest effective filing date of the '199 patent. In my opinion, Dua discloses all limitations of the '199 patent claims, but I understand that Petitioner presents Dua as an obviousness reference in the event Patent Owner identifies any differences between Dua's disclosure and the '199 patent claims.

137. The '199 patent claim 1 requires a smartphone wirelessly providing and receiving information to/from an entity using a *first air interface* and wirelessly receiving a communication service from a network entity using a *second air interface*, in response to a *physiological parameter*.

138. In my opinion, Dua discloses the first and second air interfaces by (1) using a wallet application to perform contactless payments with a point-of-sale terminal using NFC or Bluetooth, and (2) separately using the wallet application with the cellular radio of the wireless device to receive digital transaction receipts from the Wireless Credential Manager ("WCM") of the credit card issuer using a

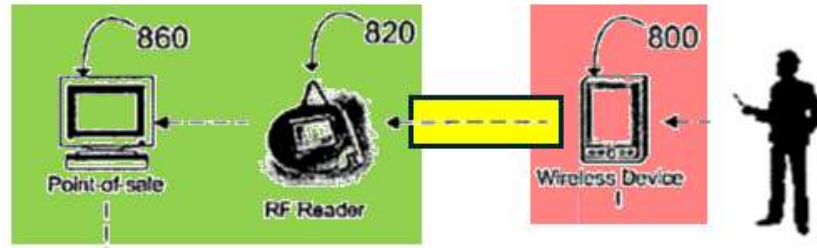
Session Initiation Protocol (“SIP”) communication session via a mobile cellular network. Dua also explains that it requires biometric authentication to open its wallet application.

2. Analysis

(a) Claim 1

- (i) **1[pre][i]: A method of operating a smartphone; to wirelessly provide information to an entity using a first air interface, to wirelessly receive information from the entity using the first air interface;**

139. In my opinion, Dua discloses this limitation. Dua discloses a wireless device, which includes a *smartphone*. Dua Abstract, FIGS. 3, 5, 6(a)-8. The wireless device includes a “handheld device, such as a mobile telephone,” “capable of wirelessly connecting to the internet” and with applications like a “wallet application.” Dua Abstract, ¶¶[0041], [0049], [0050], [0051], [0287]-[0288], FIGS. 3, 5, 6(a)-8. The wallet application can “conduct[] financial... transactions” (*wirelessly provide information to an entity using a first air interface*) such as by “establishing peer-to-peer connectivity with a POS terminal [that] allows for a bi-directional exchange of data.” Dua Abstract, ¶¶[0041], [0312]-[0313], [0319], [0333]. This is shown in Fig. 8 (annotated):



140. Dua Figure 8 shows Dua’s wireless device 800 (*smartphone*) (red box) using short-range NFC (*first air interface*) (yellow box) to *wirelessly provide* electronic credentials (*information*) to point of sale terminal 860 via RF reader 820 (*entity*) (green box) to make payments. Dua ¶[0405]. “Credentials... may [be] use[d] [by] the handheld device to conduct... [a] transaction... via... a short range wireless link with a point-of-sale terminal.” Dua Abstract. The POS may be installed, for example, at a grocery store to receive credential information when the wireless device user selects an electronic credit card for use in a proximity transaction. Dua ¶[0417]. Dua explains that the POS establishes a “peer-to-peer” connection that “allows for a bi-directional exchange of data” (*wirelessly receive information from the entity using the first air interface*) and “where a user may be prompted on his wireless device for various types of preferences, questions, or other data input in sequence.” *Id.* ¶[0319]. Moreover, the peer-to-peer connection between Dua’s wireless device at the POS allows for a user to interact with his electronic wallet using the POS display and input. *Id.* The executed transaction results in paying for a product, such as groceries or train ticket. Dua ¶¶[0352]-[0353].

- (ii) **1[pre][ii]: *to wirelessly receive a communications service from a wireless network using a second air interface that differs from the first air interface, wherein the communications service is received by the smartphone from the wireless network absent involving the entity and wherein the entity functions independently of the communications service, the method comprising:***

141. In my opinion, Dua discloses this limitation. Dua's wireless device wallet application is also equipped to be used for remote transactions with servers connected to the internet via cellular radio (*second air interface*). Dua ¶[0423]. The wallet application is capable of receiving digital receipts from merchants via a Wireless Credential Manager (WCM) on the internet via cellular service of mobile operator network 880 (*wirelessly receive a communications service from a wireless network*), the receipts containing "information such as the transaction amount, date/time of the transaction, merchant name, payment method used, and sometimes details of what was purchased." Dua ¶[0430]. This is shown in Fig. 8 (annotated):

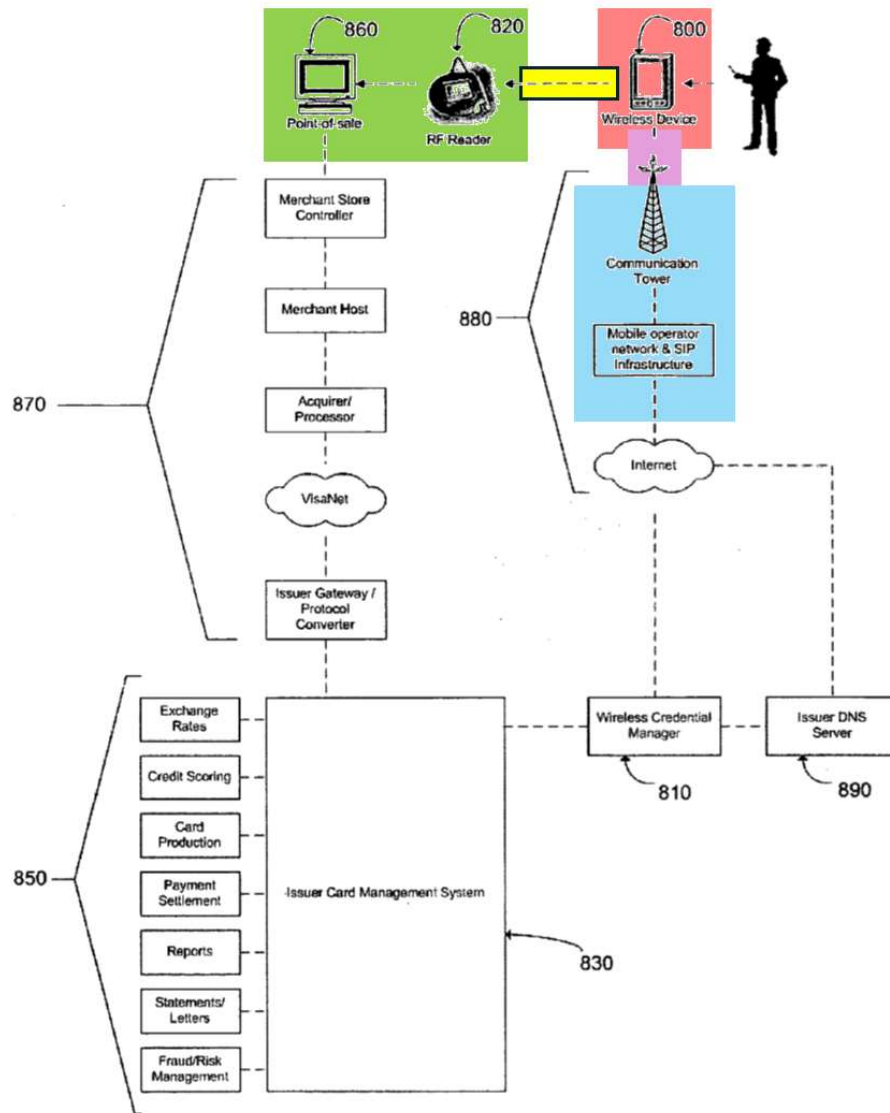
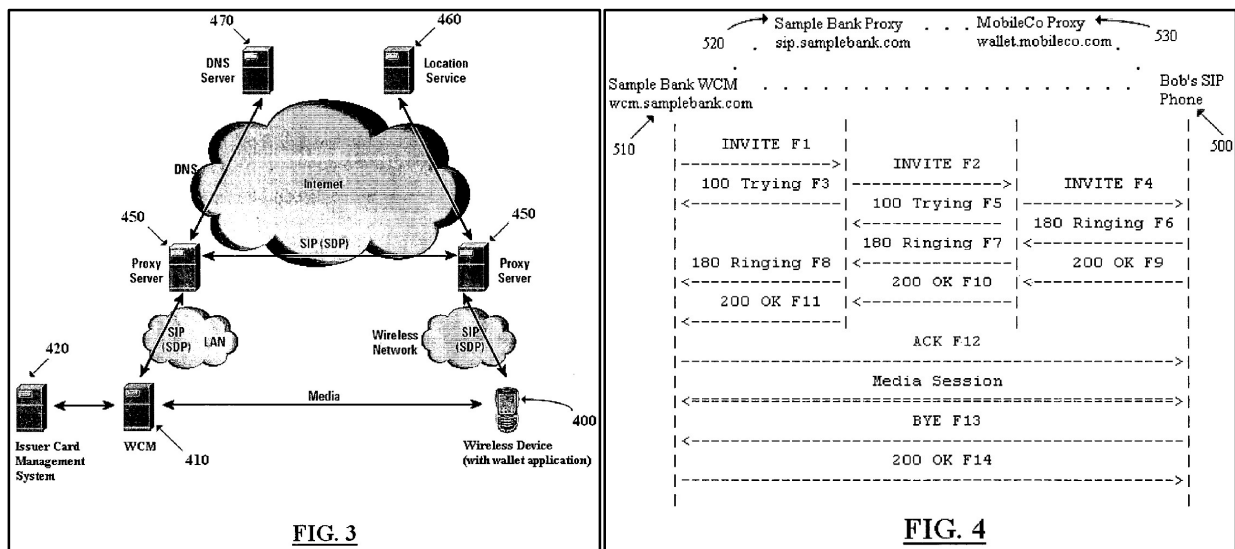


FIG. 8

142. This second transmission path as shown in FIG. 8 is via WCM 810 using the internet over cellular radio (purple) (*second air interface that differs from the first air interface*) via wireless mobile operator network 880 (blue) (*wireless network*) using a Session Initiation Protocol (“SIP”) infrastructure. Dua, ¶[0405]. Using “peer-to-peer SIP delivery for transmitting receipts to the wallet application” means the merchant is able to guarantee delivery of the receipt to the

user's wireless device. *Id.* ¶[0436]. If the wireless device is turned off or does not have network coverage at the time the WCM attempts to deliver a digital receipt, delivery can be scheduled to be delivered at a different time when the end-user device is available again. *Id.* ¶[0438].

143. “The... SIP architecture... establish[es] direct communication between... WCM and wallet application.” Dua ¶¶[0128], [0178], Figs. 3 and 4:



144. The SIP architecture is used to “locate a mobile end-user and to establish direct communication between the end-points (WCM and wallet application) for the purpose of transferring confidential information (e.g. credentials).” Dua ¶¶[0178]. This “direct connection between the end-points using SIP offers a secure method, without intermediary servers, by which to transmit confidential information.” *Id.*

(iii) **1[a]: *detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity;***

145. In my opinion, Dua discloses this limitation. After receiving/retrieving credentials, Dua discloses that the wireless device makes proximity transactions with a POS. “Credentials... may [be] use[d] [by] the handheld device to conduct... [a] transaction... via... a short range wireless link with a point-of-sale terminal.” See Dua Abstract.

146. Because the short range wireless link between the wireless device and POS reader includes NFC, the transaction occurs only if the wireless device is in “close proximity” to the POS and can thus detect its NFC communications, including the “reader key” (*detecting by the smartphone that a proximity condition is satisfied*). Dua Abstract, ¶¶[0016], [0318]. NFC and other short range wireless communication protocols are only effective if there is an underlying signal of sufficient strength such that the device and the terminal can communicate using that protocol. Signal strength attenuates with increasing distance. Thus, when Dua is able to communicate with the POS terminal using NFC, the wireless device has *detected that a proximity condition is satisfied* (e.g., Dua at Abstract, ¶¶[0041], [0314]-[0315], [0382], [0395]) by receiving and decoding a short-range NFC signal from the POS device.

147. A POSITA would also understand that Dua renders this obvious. NFC and other short range wireless communication protocols require satisfying a proximity condition because such wireless communication protocols are only effective within a short range. The communication signals between the device and terminal must be strong enough to engage in communication with that protocol. The strength of the signal is dependent on distance between device and terminal, where signal strength increasingly attenuates as the distance gets greater.

148. Without a reaching a certain signal strength or otherwise satisfying a *proximity condition*, both devices are sending unnecessary communication signals guaranteed to be lost. This wastes time and processing. Especially for communications executing financial transactions, either device indiscriminately transmitting sensitive financial information without ensuring communication to the correct device is a security risk. Either device is sending communications that will likely to subject to errors, like packet loss, due to transmission past an effective range, increasing the risk of miscommunication. And devices trying to read wireless communications with weak signal strength are also likely to misinterpret noise or other small unintended wireless signals as communications.

149. Implementing NFC to determine whether a proximity condition is satisfied and communicating based on that condition's satisfaction, were well-known to a POSITA. For example, EX1020 discloses using NFC to limit the range

at which communication may take place. EX1020 ¶¶[0041] (“In certain embodiments, the communication may occur within a range of approximately 2 to 4 cm. The close range communication with the NFC device 44 may take place via magnetic field induction, allowing the NFC device 44 to communicate with other NFC devices or to retrieve information from tags having radio frequency identification (RFID) circuitry.”), [0063] (“The device 10 may be configured to communicate with the transaction terminal 120 using a short range wireless communication protocol, when positioned over the box 124. ... In some embodiments, the wireless communication device 126 may be a near field communication (NFC) device and the device 10 may be configured to initiate NFC communications with the terminal 120.”). Further, EX1020 discloses using other wireless signals to determine proximity. EX1020 ¶[0073] (“The [identifying information] may be used by the device 10 to indicate that the device is located within communication range of the hot spot 169.”). This makes common sense. Where a particular wireless signal is restricted to a particular distance (*e.g.*, “2 to 4 cm” or “10 cm or less” for NFC (EX1017 ¶[0030]; EX1020 ¶[0041])), a device receives messages at a certain signal strength and generally without errors when the transmitting device is within that distance. Thus, signal strength and received messages can be used to determine proximity. Receiving a weak signal and receiving

incoherent messages—messages picking up errors from wireless transit—indicate that the transmitter is outside the effective range.

150. As such, it would have been obvious for a POSITA to configure the smartphone to first detect that it is proximate to Dua's wireless device prior to attempting short-range signal communication to reduce wasted time, wasted power, security risks, and miscommunication in transmission and reception. For example, a POSITA would know that the wireless device could use a reader/POS's transmission of a reader-key in this manner. *See, e.g.*, EX1017 ¶[0353] and ¶[0318].

151. ECMA 340 is a well-known communications standard that defined NFC communication. EX1047 is a true and correct copy of the 2nd edition of the ECMA 340 Interface and Protocol Standard for NFC ("ECMA-340"), which was publicly available and known to a POSITA as of its release in December 2004, and which was not updated again until June 2013. *See* <https://ecma-international.org/publications-and-standards/standards/ecma-340/>. This version was also published as the "ISO 18092." *Id.* In addition, the disclosures of ECMA-340 discussed below are found in both the 1st edition (released December 2002) and the 2nd edition. Dua, like Jain, was filed after publication of the 2nd edition of the ECMA standard and before release of the 3rd edition. A POSITA would thus understand that Dua's references to NFC refer to implementing the ECMA 340 standard, 2nd edition.

152. ECMA-340 explains that an NFC “transaction” requires an “initialization” (described in ECMA-340 section 11) and then a “data exchange” (described in ECMA-340 section 12). EX1047 at §4.25, §10, Figure 5. ECMA-340 specifies two devices (“Initiator” and “Target”) and two communication modes (“Passive” and “Active”). EX1047 §1, §4.1, §4.16, §7.

153. Regardless of which of the two devices communicating via NFC is the “Initiator” and which is the “Target,” and regardless of what NFC communication mode they use, according to ECMA-340 both the Initiator and the Target detect that a proximity criterion is satisfied and, after they both perform that detecting, they then establish a short-range link that is used for subsequent communications. Specifically, in both modes, an “Initiator” device “shall activate its RF field” and a “Target” device then “shall be activated by the RF field of the Initiator.” EX1047 at §10. Then, the “Initiator” sends one or more commands (e.g., ALL_REQ, SENS_REQ, and/or ATR_REQ) and receives one or more responses (e.g., SENS_RES and/or ATR_RES). *See* EX1047 §§11.2.1.16-.17, §11.2.1.23, §11.3.2, §§12.2-.3 , Figure 13, Figures 24-25.

154. In even more detail, in Passive mode, an activated Target enters the SENSE state. EX1047 §11.2.1.8, §11.2.19. The “Initiator” then sends commands “to probe the field for Targets” (EX1047 § 11.2.1.16), receives a SENS-RES response from a Target in the SENSE state (EX1047 §11.2.1.17), and then selects that Target

“for further communication” (EX1047 §11.2.1.23, Figure 13). *See also* EX1047 §12.2 and Figure 24. In Active mode, after the Target is activated by the RF field of the Initiator, it receives an ATR_REQ message from the Initiator, generates its own RF field, and uses that field to send an ATR_RES message to the Initiator. EX1047 §11.3.2. In response to that message, the Initiator sends a DEP_REQ “to start the data exchange protocol.” EX1047 §11.3.2. *See also* EX1047 §12.3 and Figure 25.

155. Thus, regardless of what mode is used and regardless of whether Dua’s wireless device is the Initiator or the Target, it detects that a *proximity criterion is satisfied*: if the Target, by activating in response to a sufficiently strong field from the Initiator and if the Initiator, by receiving a response to a command from the Target. In addition, this exchange of commands and responses results in the selection of a particular “Target” and attributes/parameters for further communication with the same, thereby establishing a *short-range link*. *Id.* at §7, §§11.2.1.24-25, §12, §12.1, Figure 22, Figure 24-25. After this *link* is established, the Initiator and the Target communicate using ECMA 340’s data exchange protocol. EX1047 Figures 5, 23, and 24. This includes Dua’s NFC communications between the wireless device and the reader/POS that I discuss herein.

156. In my opinion, a POSITA reading Dua would have known the above because of the public availability of ECMA-340 and the amounts of publicity around NFC. But at a minimum, it would have been obvious to implement Dua’s NFC

communications in this manner. Dua already tells a POSITA to look to the “ISO/IEC 14443” RF proximity standard (Dua ¶[0013]), which would motivate a POSITA to also look to the standard for NFC. A POSITA would be motivated to implement the standard rather than define a proprietary approach to simplify design, to allow for use of commercially available NFC hardware and software, to minimize the need for trial and error, and to maximize interoperability with standard-compliant reader/POS systems and mobile devices.

157. Patent Owner alleges in its district court infringement contentions that use of NFC is sufficient to show *detecting that a proximity criterion is satisfied*. EX1016 at 7-11.

158. In my opinion, it would be obvious to a POSITA that Dua’s wireless device would first detect it is proximate to the POS terminal based on a signal from the POS terminal (*e.g.*, “reader key,” Dua ¶[0318], or commands and responses exchanged as part of implementing ECMA 340) prior to communicating with that POS. Dua’s wireless device has to establish a peer-to-peer communication session with the POS terminal over NFC. Dua ¶[0016], Claims 33, 36, 50. Dua contemplates NFC communication sessions transferring a significant amount of data, such as encryption keys and several credentials, “requir[ing] the user to hold the wireless device in front of the reader for a longer period of time while the processing... takes place.” Dua ¶[0359]. As explained by Dua, the smartphone and POS communicate

using short range signals. Dua Abstract, ¶¶[0016], [0041], [0314]-[0315], [0382], [0395]. To ensure communications will be successful and not just wasted signaling, and further to avoid the security risk of indiscriminately transmitting sensitive financial information, Dua's wireless device first needs to detect it is near the POS prior to proceeding with a payment transaction with the POS. EX1002 ¶158. Otherwise, the NFC communication would fail. Indeed, such implementations were well-known to a POSITA. For example, EX1020 discloses and leverages NFC to limit the range at which communication may take place. EX1020 ¶[0041], [0063] [0041]. Indeed, in the context of Wi-Fi, EX1020 even more explicitly discloses using the ability to receive such signals as an indication of proximity. EX1020 ¶[0073] ("The [identifying information] may be used by the device 10 to indicate that the device is located within communication range of the hot spot 169."). A POSITA would be motivated and able to use Dua's "reader key" or ECMA 340's commands and responses in the same manner.

159. For all of the above reasons, it is my opinion that Dua discloses or renders obvious *detecting by the smartphone that a proximity criterion is satisfied between the smartphone and an entity*.

- (iv) 1[b][i]: *in response to at least the proximity condition having been satisfied between the smartphone and the entity, establishing a wireless short-range communications link between the smartphone and the entity*

160. In my opinion, Dua discloses this limitation. As set forth *supra* with respect to limitation 1[a], Dua discloses that the wireless device makes proximity transactions with point-of-sale readers via short range NFC with a POS after detecting that a proximity condition is satisfied. Dua Abstract, ¶¶[0016], [0318]. This limitation further requires that *in response* to that condition, *establishing a wireless short-range communications link between the smartphone and the entity*.

161. Dua discloses that “[i]n personal environment transactions, credential data is transmitted from the wireless device to a merchant/organization using the short-range communication protocols.” Dua ¶[0320]. The wallet application supports “peer-to-peer connectivity... between the wireless device and the reader/POS terminal” (*entity*) using the short-range communication RF protocols.” Dua ¶[0318]. Then, the POS (*entity*) will “establish secure connectivity with the user’s wireless device” (*establishing a wireless short-range communications link between the smartphone and the entity*) and poll it for a list of payment methods. Dua ¶[0317]. As Dua explains, “one advantage of establishing peer-to-peer connectivity with a POS terminal is that it allows for a bi-directional exchange of data.” Dua ¶[0319].

162. Moreover, as addressed in more detail *supra* with respect to limitation 1[a], the NFC standard implemented by Dua teaches or at least renders obvious conducting a command/response exchange that concludes with the “Initiator” device

selecting one or more “Target” devices and attributes/parameters for communication *(establishing a wireless short-range communications link)* after the “Initiator” and “Target” first detect a sufficiently strong RF field from each other *(in response to at least the proximity condition having been satisfied)*. EX1047 at 13, 23-24, 30, 38-40 (describing parameters).

163. In my opinion, at a minimum it would be obvious to a POSITA that Dua’s smartphone would first establish a NFC connection with the POS device *(establishing a wireless short-range communications link between the smartphone and the entity)* after detecting *the proximity condition having been satisfied* and prior to sending credentials to the POS terminal (*entity*) using NFC. To ensure communications would be successful Dua’s smartphone needs to detect proximity and then establish a short-range communications *link* with the POS prior to proceeding with a payment transaction with the POS device. Use of a link after detecting proximity further improves reliability and security, because once a link is established, Dua’s mobile device can receive confirmation of receipt of individual packets. Dua itself recognizes in the context of short-range communications the benefit of “establishing peer-to-peer connectivity” prior to communicating information. Dua ¶¶[0317]-[0319]. Indeed, such implementations of devices communicating via NFC establishing a connection prior to transmitting information were well-known to a POSITA. EX1019 ¶¶[0011], [0124], [0182]. For example, “to

facilitate the establishment of an NFC connection (e.g., typically 2-4 cm)” *(proximity condition having been satisfied)*, an “RF field generated by the payee device [] may induce [] transition to an active mode of operation, thus establishing an NFC connection between the two devices.” EX1019 ¶[0124]. “Accordingly, by way of this established NFC connection, the payment [information] may be transmitted to and received by the payor device.” *Id.*

(v) 1[b][ii]: *to provide by the smartphone, using the first air interface, information to the entity;*

(vi) 1[b][iii]: *and to receive by the smartphone information from the entity;*

164. In my opinion, Dua discloses this limitation. As set forth *supra* with respect to limitation 1[a], Dua discloses that before performing a financial transaction, the wireless device must be sufficiently close to a POS device (*entity*). Once in close proximity, the POS and wireless device will establish secure connectivity and poll it (*receive by the smartphone information from the entity*) for a list of user-defined payment methods that the user can select from using the user-interface of the POS system (*provide by the smartphone, using the first air interface, information to the entity*). Dua ¶[0317].

165. Dua’s “peer-to-peer connectivity” between the wireless device and POS “allow for a bi-directional exchange of data where a user may be prompted on his wireless device for various types of preferences, questions, or other data input in

sequence.” Dua ¶[0319]. This is advantageous as “payment transactions where there is a stream of data that goes in both directions can benefit from this type of peer-to-peer session using any number of protocols.” *Id.* Connectivity between the wireless device and the POS is made via short-range communications protocols such as NFC (Dua ¶[0016]), WiFi, Bluetooth, or other RF protocols. Dua ¶[0318].

(vii) 1[c][i]: *in response to at least the proximity condition having been satisfied between the smartphone and the entity and in response to a physiological parameter,*

166. In my opinion, Dua discloses this limitation. As set forth *supra* with respect to limitation 1[a] and 1[b][i], Dua discloses the transaction occurs only if (*in response to*) the wireless device is in “close proximity” to the POS and can detect its NFC communications, including the “reader key” (*detecting by the smartphone that a proximity condition is satisfied*). Dua Abstract, ¶[0016], [0318].

167. Dua further teaches that using the wallet application requires authentication because “[d]ata in the wallet application is encrypted and protected with a special wallet PIN code.” Dua ¶[0366], [0429]. Moreover, Dua teaches that PIN codes can be replaced with fingerprints (*physiological parameter*) scanned by the “wireless device’s embedded biometric technologies,” which involves biometric sensors. Dua ¶[0366], [0414]. Dua also contemplates other biometric data, including “iris, voiceprints, facial recognition, and hand geometry.” Dua ¶[0534]. A POSITA would understand that using biometric data, like a “fingerprint[,] in lieu of

a PIN code to authenticate a user to the wallet application,” involves determining if the scanned biometric data matches the biometric data stored on the wireless device or, as also disclosed by Dua, determining if the scanned biometric data can decrypt the wallet application’s data. Both entail “*in response to a physiological parameter.*” Dua ¶¶[0050], [0366], [0399], [0429].

168. Further confirming this limitation is met, Patent Owner alleges in its infringement contentions in the district court litigation that the use of biometric verification is itself sufficient to show claimed *in response to a physiological parameter*. EX1016 at 14-25.

(viii) 1[c][iii]: *wirelessly providing by the smartphone, using the first air interface, information to the entity, and wirelessly receiving by the smartphone, using the first air interface, information from the entity*

169. In my opinion, Dua discloses this limitation. As set forth *supra* with respect to limitation 1[a], Dua discloses that before performing a financial transaction, the wireless device must be sufficiently close to a POS (*entity*). Connectivity between the wireless device and the reader/POS terminal is be made via short-range communication (*using the first air interface*) such as NFC (Dua ¶[0016]), WiFi, Bluetooth, or other RF protocols. Dua ¶[0318].

170. Once in close proximity, the POS and wireless device will establish secure connectivity and poll it (*wirelessly receiving by the smartphone, using the*

first air interface, information from the entity) for a list of user-defined payment methods that the user can select from using the user-interface of the POS system (*wirelessly providing by the smartphone, using the first air interface, information to the entity*). Dua ¶[0317]. Dua’s “peer-to-peer connectivity” between the wireless device and POS “allow for a bi-directional exchange of data where a user may be prompted on his wireless device for various types of preferences, questions, or other data input in sequence.” *Id.* ¶[0319]. This is advantageous as “payment transactions where there is a stream of data that goes in both directions can benefit from this type of peer-to-peer session using any number of protocols.” *Id.*

(ix) 1[c][iii]: *independently of, and absent involving the entity in receiving by the smartphone the communications service from the wireless network using the second air interface; and;*

171. In my opinion, Dua discloses this limitation. As set forth *supra* with respect to limitation 1[c][ii], Dua discloses that the bi-directional exchange of data between the wireless device (*smartphone*) and the POS (*entity*) uses an established peer-to-peer short-range communication connection (*first air interface*). Dua ¶¶[0317]-[0319]. As set forth *supra* with respect to limitation 1[pre][ii], Dua also discloses that the wireless device receives digital receipts from merchants via an established peer-to-peer direct communication over the mobile operator network 880 via cellular radio (*second air interface*) using the SIP architecture. Dua ¶¶[0405], [0436], [0438], Fig. 8.

172. The wireless device receives digital receipts by SIP's secure method using a "direct connection between the end-points... without intermediary servers" (*independently of, and absent involving the entity*) so that it may securely transmit confidential information. sent by the merchant via the mobile operator network is performed *independently of, and absent involving* the POS. Dua ¶¶[0178].

- (x) 1[d]: *wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network absent involving the entity, absent providing by the smartphone information to the entity, and absent receiving by the smartphone information from the entity,*

173. In my opinion, Dua discloses this limitation. As discussed re 1[pre][ii], Dua discloses that the wireless device receives digital receipts from merchants via an established peer-to-peer direct communication over the mobile operator network 880 via cellular radio (*second air interface*) using the SIP architecture. Dua ¶¶[0405], [0436], [0438], Fig. 8. The wireless device receives digital receipts by SIP's secure method using a "direct connection between the end-points... without intermediary servers" (*absent providing by the smartphone information to the entity, and absent receiving by the smartphone information from the entity*) so that it may securely transmit confidential information. Dua ¶¶[0178].

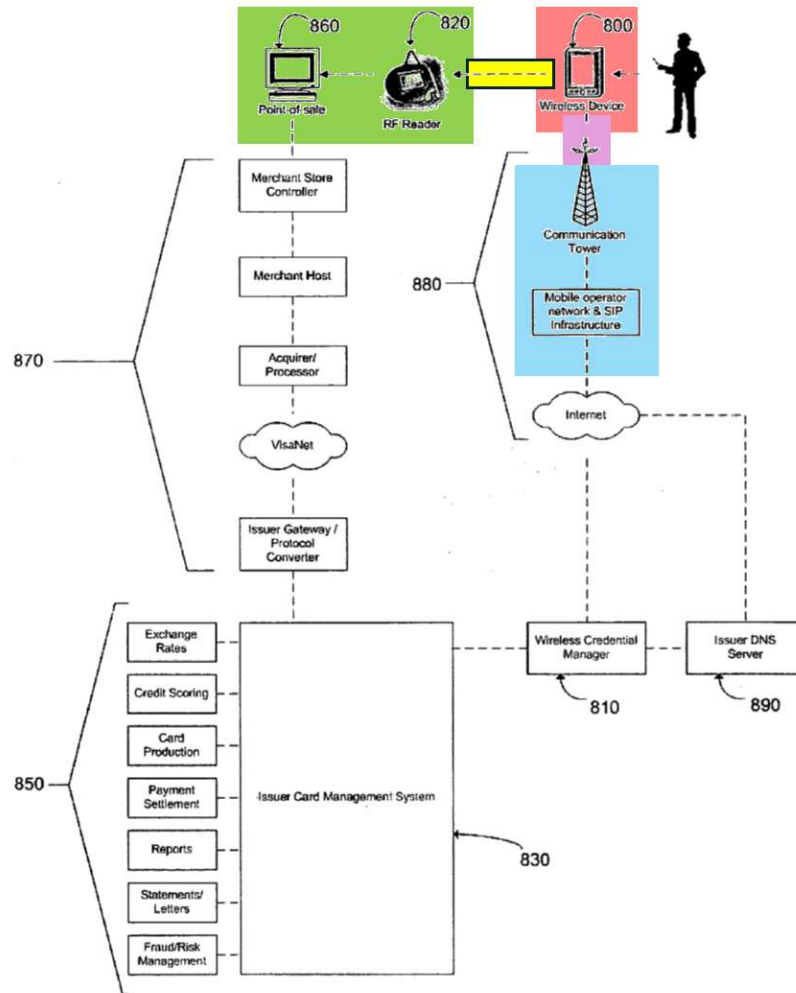


FIG. 8

Dua Fig. 8 (annotated) (*compare* NFC (*yellow*) with cellular services on wireless mobile operator network 880 (*blue*).

174. Moreover, after the merchant POS gives the entity to the WCM, it is no longer involved in delivering the digital receipt to the wireless device. For example, as Dua explains, if the wireless device is turned off or does not have network coverage at the time the WCM attempts to deliver a digital receipt, delivery can be re-scheduled for delivery at a different time when the end-user device is available

again. *Id.* ¶[0438]. A POSITA would understand that the future delivery of the digital receipts will take place without involving the POS as the wireless device will no longer be in the proximity of the POS to be able to communicate with it using short-range communications.

(xi) 1[e]: *wherein the wireless short-range communications link used by the first air interface is based upon unlicensed frequencies,*

175. In my opinion, Dua discloses this limitation. The only additional requirement of limitation 1[e] is that the “wireless short-range communications link between the smartphone and the entity” of limitation 1[b][i] be based upon *unlicensed frequencies*. Dua meets this requirement by transmitting credentials using NFC and Bluetooth (*using unlicensed frequencies*). See Dua Abstract, ¶¶[0016], [0318].

176. NFC uses unlicensed frequencies, such as the 13.56 MHz ISM band. See EX1031; EX1032 at 2. Patent Owner, in its infringement contentions, admits as much, alleging that “the wireless short-range communications link used by NFC is based upon the unlicensed 13.56 MHz frequency.” EX1016 at 27. Bluetooth also uses unlicensed frequencies. See EX1027.

(xii) 1[f]: *wherein the second air interface uses a wireless communications link that is based upon licensed frequencies;*

177. In my opinion, Dua discloses this limitation. The only additional requirement of limitation 1[f] is that the “communications service from the wireless network using the second air interface” of limitation 1[c][iii] and 1[d] be based upon *licensed frequencies*. As set forth *supra* in those limitations, Dua explains that its mobile device receives digital receipts directly using SIP on the internet via cellular radio. Dua ¶¶[0405], [0436], [0438], Fig. 8.

178. Dua’s wireless device is capable of wirelessly connecting to the Internet using cellular network protocols such as GSM/GPRS, CDMA2000, W-CDMA, EDGE, HDR, 1xRTT, UMTS, and IMT-2000. Dua ¶[0041]. These use *licensed frequencies*. Patent Owner, in its infringement contentions, admits as much, alleging that “the cellular data network... (the second air interface) uses a wireless communication link that is based upon frequencies listed from the Federal Communications Commission.” EX1016 at 27-28.

(xiii) 1[g]: wherein the first air interface is not involved in providing the communications service to the smartphone.

179. As discussed re 1[pre][ii], Dua discloses that the wireless device receives digital receipts from merchants via an established peer-to-peer direct communication over the mobile operator network 880 without involving NFC (*the first air interface is not involved in providing the communications service to the smartphone*) using the SIP architecture. Dua ¶¶[0405], [0436], [0438], Fig. 8. The

wireless device receives digital receipts by SIP's secure method using a "direct connection between the end-points... without intermediary servers" so that it may securely transmit confidential information. Dua ¶¶[0178].

(b) Claim 2

(i) 2[pre]

180. See Claim 1, *supra*.

- (ii) 2[a] *wherein said wirelessly providing by the smartphone, using the first air interface, information to the entity and wirelessly receiving by the smartphone, using the first air interface, information from the entity independently of, and absent involving the entity in, receiving by the smartphone the communications service from the wireless network using the second air interface is performed over a first time interval;*

181. In my opinion, Dua discloses this limitation. The only additional requirement of limitation 2[a] is that the "wirelessly receive information from the entity using the first air interface" of limitation pre[i] and 1[c][ii] *is performed over a first time interval*. As set forth *supra* in those limitations, Dua discloses that while performing a contactless payment transaction (*a first time interval*) the wireless device must be in close proximity and the user must authorize RF communications by opening the wallet application.

- (iii) 2[b] *wherein said wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network absent involving the entity, absent providing by the smartphone information to the entity, and absent*

receiving by the smartphone information from the entity is performed over a second time interval; and wherein the first and second time intervals are non-overlapping with one another.

182. In my opinion, Dua discloses this limitation. The only additional requirements of limitation 2[b] is that the “wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network” of limitation pre[ii] and 1[d] ***is performed over a second time interval... wherein the first and second time intervals are non-overlapping with one another.***

183. As set forth *supra* in those limitations, Dua explains that *after* payment is complete (***a second time interval... non-overlapping***), the smartphone may also receive digital receipts sent by the financial institution via cellular radio. Dua ¶¶[0178], [0405], [0436], [0438], Fig. 8. This digital receipt is received by the wireless device via a SIP secure method on the internet using a “direct connection between the end-points... without intermediary servers” via the mobile operator network 880 using the cellular radio technology after a transaction is completed (***second time interval... non-overlapping***) with “information such as the transaction amount, date/time of the transaction, merchant name, payment method used, and sometimes details of what was purchased.” Dua ¶[0430].

184. Dua also discloses that the delivery of digital receipts may be scheduled for future delivery (***second time interval***) if the wireless device is turned off or does not have network coverage at the time the WCM attempts to deliver a digital receipt.

Dua ¶[0438]. “[T]he WCM can use the SUBSCRIBE feature of the SIP protocol to be notified when the wireless device is available for communication” and then the “WCM can attempt to deliver the message when it receives notification that the end-user device is available again” (*id.*) (*the first and second time intervals are non-overlapping with one another*).

(c) Claim 3

(i) 3[pre]

185. See Claim 1, *supra*.

(ii) 3[a]: *wherein the wireless short-range communications link that is based upon unlicensed frequencies is further based upon a Time Division Duplex (TDD) protocol, and*

186. In my opinion, Dua discloses this limitation. Dua teaches the wireless short-range communications of limitation 1[pre][i] is done via NFC or Bluetooth. Dua Abstract, ¶¶[0016], [0318]. According to Patent Owner, “NFC communications”—which includes the NFC communications disclosed in Dua—use “*unlicensed frequencies... based upon a Time Division Duplex (TDD) protocol.*” EX1016 at 35-37 (emphasis added); EX1032 at 21 (describing NFC as a “half... duplex system”). Bluetooth—a half-duplex system (EX1038 at 1)—also used *unlicensed frequencies... based upon a Time Division Duplex (TDD) protocol* for bidirectional communication such as the transactional communications at issue. See EX1032 at 21.

- (iii) **3[b]: wherein the second air interface that uses a wireless communications link that is based upon licensed frequencies is further based upon an Orthogonal Frequency Division Multiplexed (OFDM) and/or Orthogonal Frequency Division Multiple Access (OFDMA) protocol.**

187. In my opinion, Dua discloses this limitation. Limitation 3[b] lists specific protocols that need to be used for the “second air interface” of limitations 1[pre][ii] and 1[f]. In Dua, its wireless device receives digital receipts from the WCP directly using SIP on the internet using the cellular radio technology (second air interface) of the wireless device. Dua ¶¶[0405], [0436], [0438], Fig. 8. These communications involve the transmission and reception of data, use wireless communication channels and protocols, including “GSM/GPRS, CDMA2000, W-CDMA, EDGE, HDR, 1xRTT, UMTS, IMT-2000, 802.11a, 802.11b, 802.11g, or BLUETOOTH or other relevant protocols developed hereinafter.” Dua ¶[0041]. A POSITA would be motivated to use the most advanced and performant cellular radio technologies such as LTE and WiMAX (a competitor to LTE) (also known as 4G cellular technologies), well-known next generation technologies for cellular communications, in addition to the cellular technologies and protocols explicitly mentioned in Dua to keep up with ever-evolving technologies that allow for higher data rates and that even as of the priority date of the ’199 patent were known to a POSITA to be in line to displace older technologies in the near future. *See* EX1045, EX1046. Wi-Max and LTE are both *based upon an Orthogonal Frequency*

Division Multiplexed (OFDM) and/or Orthogonal Frequency Division Multiple Access (OFDMA) protocol.

(d) Claim 4

(i) 4[pre]

188. See Claim 1, *supra*.

(ii) 4[a]: *wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity is based, at least in part, on receiving a short-range signal from the entity over the first air interface.*

189. In my opinion, Dua discloses this limitation. As set forth *supra* with respect to limitation 1[a], Dua discloses that before performing a financial transaction, the smartphone must be sufficiently close to a POS (***detecting by the smartphone that a proximity condition is satisfied***) and that sufficient proximity is determined by detecting proximate NFC communications, including a “reader key.” (***short-range signal that is transmitted ... over the first air interface***). Dua Abstract, ¶¶[0016], [0318].

190. Further confirming this limitation is met, Patent Owner alleges in its infringement contentions in district court litigation that the use of NFC is itself sufficient to show the claimed ***detecting*** based on a ***receiving a short-range signal***. See EX1016 at 39-41.

(e) Claim 5

(i) 5[pre]

191. *See* Claim 4, *supra*.

- (ii) **5[a]: wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity is based, at least in part, on a measurement of signal strength of the short-range signal.**

192. In my opinion, Dua discloses this limitation. The only additional element of claim 1[a] requiring “detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity” is that the detection is ***based, at least in part, on a measurement of signal strength of the short-range signal.***

193. As set forth *supra* with respect to limitation 1[a], Dua discloses that the wireless device establishes a NFC communications link to send payment credentials to POS readers after detecting proximate NFC communications, including a “reader key.” Dua Abstract, ¶¶[0016], [0318]. NFC and other short range wireless communication protocols are only effective if there is an underlying ***signal*** of sufficient ***strength*** such that the device and the terminal can communicate using that protocol. It would be obvious to a POSITA that the smartphone must perform a ***measurement of signal strength*** prior to acting upon it. Signal strength attenuates with increasing distance and ***measurement of signal strength*** must be recalculated by the receiving device as the signal rapidly deteriorates as distance increases. *See* EX1035 at 4, 36; EX1037 at 3. Indeed, the ECMA 340 standard implemented by

Dua expressly defines an “External RF field threshold value,” and it would have been at least obvious to use this value as part of determining whether valid RF communication is being received. EX1047 at 6. Otherwise, the mobile device (*smartphone*) may switch to NFC communication or even send a response to baseline environment RF signals (i.e., noise).

194. Further confirming this limitation is met, Patent Owner alleges in its infringement contentions in district court litigation that the use of NFC is itself sufficient to show the claimed *detecting* based on a *measurement of signal strength of the short-range signal*. See EX1016 at 41-42.

(f) Claim 6

(i) 6[pre]

195. See Claim 1, *supra*.

(ii) 6[a]: *wherein a value of the physiological parameter is provided by using a sensor of the smartphone.*

196. In my opinion, Dua discloses this limitation. The only additional element of claim 1[c][i] requiring “a physiological parameter” is that *a value of the physiological parameter is provided by using a sensor of the smartphone*.

197. As set forth *supra* with respect to limitation 1[c][i], Dua discloses that using the wallet application requires authentication because “[d]ata in the wallet application is encrypted and protected with a special wallet PIN code” (Dua ¶¶[0366], [0429]) and that it would be obvious for a POSITA to replace the disclosed

PIN with fingerprints (*physiological parameter*) scanned by the “wireless device’s embedded biometric technologies,” which involves using a biometric *sensor*.

198. Dua further teaches that PIN codes can be replaced with fingerprints (*physiological parameter*) scanned by the “wireless device’s embedded biometric technologies,” which involves biometric sensors (*provided by using a sensor of the smartphone*). Dua ¶¶[0366], [0414]. Dua also contemplates other biometric data, including “iris, voiceprints, facial recognition, and hand geometry.” Dua ¶[0534]. A POSITA would understand that using biometric data, like a “fingerprint[,] in lieu of a PIN code to authenticate a user to the wallet application,” involves determining if the scanned biometric data matches to the biometric data stored on the wireless device or, as also disclosed by Dua, determining if the scanned biometric data can decrypt the wallet application’s data. Dua ¶¶[0050], [0366], [0399], [0429].

199. Further confirming this limitation is met, Patent Owner alleges in its infringement contentions in the district court litigation that the use of biometric verification used to unlock the phone is itself sufficient to show claimed *sensor*. EX1016 at 43-47.

200. In my opinion, at a minimum it would be obvious to implement Dua’s teaching of “authentication using... biometric information” in this manner for the reasons explained above in connection with Dua’s disclosure of limitation 1[a][i].

(g) Claim 7

(i) 7[pre]

201. *See* Claim 1, *supra*.

- (ii) 7[a]: *being proximate to a specific location within a store, then detecting a short-range signal being transmitted from said specific location within the store, and then performing a transaction to pay for one or more items.***

202. As set forth *supra* with respect to limitation 1[a] and 4[a], Dua discloses the payment transaction occurs only if the wireless device is in “close proximity” to the POS at a merchant store (*being proximate to a specific location within a store*) and can thus detect its NFC communications, including the “reader key” (*detecting a short-range signal being transmitted from said specific location within the store*). *See* Dua Abstract, ¶¶[0016], [0318]. The executed transaction results in paying for a product, such as groceries or train ticket (*pay for one or more items*). *See* Dua ¶¶[0352]-[0353].

(h) Claim 8

(i) 8[pre]

203. *See* Claim 1, *supra*.

- (ii) 8[a]: *wherein the entity comprises a check-out counter in a store, and wherein said wirelessly providing by the smartphone, using the first air interface, information to the entity comprises: performing a financial transaction to pay for one or more items.***

204. In my opinion, Dua discloses this limitation. As set forth *supra* with respect to limitation 1[a] and 4[a], Dua discloses the payment transaction occurs via short-range communications using NFC (*first air interface*) with a POS. Dua Abstract, ¶¶[0016], [0318]. The POS may be installed at a grocery store or by a subway turnstile (*a check-out counter in a store*) to receive credential information from the wireless device (*providing by the smartphone... information*) when the user selects an electronic credit card for use in a transaction (*performing a financial transaction*). *Id.* ¶[0417]. The executed transaction results in paying for a product, such as groceries or train ticket (*pay for one or more items*). See Dua ¶¶[0352]-[0353]

(i) Claim 9

(i) 9[pre]

205. See Claim 1, *supra*.

(ii) 9[a]: *wherein establishing the wireless short-range communications link between the smartphone and the entity is performed in response to the physiological parameter.*

206. In my opinion, Dua discloses this limitation. The only additional requirement of claim 1[b][i] is that the “establishing a wireless short-range communications link between the smartphone and the entity” is also *performed in response to the physiological parameter*.

207. As set forth *supra* with respect to limitation 1[c][i], Dua discloses that establishing a NFC communications link to send payment information is ***performed in response to*** user authentication. Dua discloses that using the wallet application requires authentication because “[d]ata in the wallet application is encrypted and protected with a special wallet PIN code” (Dua ¶¶[0366], [0429]) and that it would be obvious for a POSITA to replace the disclosed PIN with fingerprints (***physiological parameter***) scanned by the “wireless device’s embedded biometric technologies” which involves using a biometric sensor. *Id.* ¶[0417]. After authenticating and opening the wallet application, the user may select an electronic credit card for use in a transaction and send credential information to a nearby POS to make payments. Dua ¶¶[0352]-[0353]. The wallet application can “conduct[] financial... transactions” by “establishing peer-to-peer connectivity” (***establishing the wireless short-range communications***) “with a POS terminal [that] allows for a bi-directional exchange of data.” Dua Abstract, ¶¶[0041], [0312]-[0313], [0319], [0333].

208. Further confirming this limitation is met, Patent Owner alleges in its infringement contentions in the district court litigation that the use of biometric verification used to unlock the phone is itself sufficient to show claimed ***in response to the physiological parameter***. EX1016 at 55-58.

(j) Claims 10-19

209. Claims 10-19 are substantively identical to claims 1-9.

VI. Secondary Considerations of Non-Obviousness

210. I understand that so-called “secondary considerations” are legally relevant to an obviousness analysis. It is my opinion that the secondary considerations I consider here further weigh in favor of obviousness.

211. In my opinion, there is a lack of commercial success for any product practicing the ’199 patent because the Patent Owner has not practiced the claimed invention (at any point in time) and because I am not aware of any other successful commercial deployments in the United States that are proven to embody the asserted claims. . Even if such evidence existed, it would not undermine the strong showing of invalidity. Moreover, any difference between the claims of the ’199 patent and the prior art is minimal, and any secondary considerations would have minimal impact on the invalidity analysis.

212. In my opinion, there was no long-felt, unresolved need met by the ’199 patent. It is my opinion that at the time of the alleged invention there were no technical barriers to wide-scale deployment of contactless payment with mobile devices, let alone technical barriers requiring disclosure of the alleged novelties of the ’199 patent. To the extent wide-scale deployment in the United States post-dated the ’199 patent, my understanding is that this was for reasons other than technical

feasibility, such as industry and market barriers. Further, a vast number of contactless payment systems and trials of those systems existed before the '199 priority date. *See, e.g.*, Section IV. In my opinion, this indicates that many within the market observed the desirability of such systems and were concurrently working towards implementing them. In sum, I'm not aware of any of the factors for secondary considerations being present, but even if they existed, it would not impact the invalidity analysis.

VII. Conclusion

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

* * *

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

Respectfully submitted,

Date: May 23, 2025



Kevin C. Almeroth, Ph.D.