

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

ICASHE, INC.,
Patent Owner.

Case IPR2025-00645

Patent No. 11,270,174

DECLARATION OF MARC E. LEVITT, Ph.D.

I, Marc E. Levitt, Ph.D., of San Jose, California, declare that:

I. ASSIGNMENT

1. I have been retained by Robins Kaplan LLP on behalf of Patent Owner iCashe, Inc. (“iCashe”) as an expert with regard to this matter. I understand that Petitioners are requesting that the Patent Trial and Appeal Board (“Board”) institute inter partes review (IPR) of U.S. Pat. No. 11,270,174 (“’174 patent”) (Ex. 1001).

2. In my capacity as an expert, I have been asked to provide my independent analysis and opinions regarding the ’174 patent, the prosecution history of the ’174 patent and related applications as applicable, the alleged prior art relied upon by Petitioner, the meaning of various claim terms from the ’174 patent from the perspective of a person of ordinary skill in the art (“POSITA”), and the opinions offered by Petitioners’ expert, Mr. Henry N. Dreifus, in his declaration (“Dreifus Declaration”) (Ex. 1003). My opinions and conclusions are fully discussed in later sections of this declaration.

3. I am an independent consultant, and I am not, and have never been, an employee of iCashe or Samsung. I received no compensation for this declaration beyond my normal hourly compensation based on my time actually spent analyzing the ’174 patent, the prosecution history of the ’174 patent and related applications, the prior art publications relied upon by Petitioners, the Declaration

of Henry N. Dreifus, and other related materials. I will not receive any added compensation based on the outcome of any IPR or other proceedings involving the '174 patent.

II. BACKGROUND AND QUALIFICATIONS

4. I am an independent high technology consultant with over 30 years of experience in the areas of executive leadership, business development, technology, technology development, and intellectual property. I have extensive technical and business experience in computer architecture, networking, mobile, semiconductor design, semiconductor manufacturing, systems-on-a-chip, systems architecture, technical software, embedded software, enterprise software, algorithms, and computational finance.

5. I graduated from Lehigh University in 1986 with a Bachelor of Science degree with High Honors in Computer Engineering, and later obtained my Master's degree and PhD in Electrical Engineering from the University of Illinois in Urbana-Champaign, Illinois. I completed my studies in 1990, and wrote my doctoral thesis on time-based strategies for semiconductor manufacturing and test under the supervision of Dr. Jacob A. Abraham. During my education, I conducted VLSI testing research at Hewlett-Packard and EDA software development at Digital Equipment Corporation.

6. After receiving my PhD, I worked at Sun Microsystems (Sun) rising to the dual position of Senior Hardware Manager and Senior Staff Engineer. While at Sun I worked on multiprocessor server systems, high performance workstation systems, microprocessors and related chipsets/ASICs. At Sun I was responsible for, among other things, the test and design-for-test strategy for all SPARC microprocessors and related ASICs, JAVA processors, processor modules, and SPARC reference platform designs. I also worked with issues related to power management, clocking, reset, test, design-for-test, and debug issues throughout numerous departments at Sun Microsystems. I was a key member of the VLSI Design Review team, and reviewed and signed off on every circuit design used inside Sun's custom chips. Additionally, I developed or architected CAD tools to aid in the design, test, manufacture, and debug of integrated circuits and computer systems within Sun.

7. I later brought my extensive architecture expertise and expertise in circuit design, development, and manufacturing to positions I held at Sonics Inc. and Transmeta Corp. At Sonics Inc. I was the Director of Silicon Development, in which capacity I was in charge of in-house deep sub-micron design projects in 0.18um CMOS, and was also responsible for developing, planning and executing product ideas, system-on-chip platforms, and OEM silicon based on the Sonics Integration Architecture. At Sonics Inc. I also designed the OC-12 network

processor (MIPS based) and assisted in the design and development of two VoIP chipsets.

8. At Transmeta Corp., I was the Director of VLSI. In this position I managed and architected the Northbridge and Southbridge for the Efficeon TM8xxx and the TM6000 1GHz x86 Low Power System on a Chip project, for which I was responsible for the logic, verification, and circuit design teams on this unique project that integrated a 1GHz x86 processor, north bridge, south bridge, video processing, and graphics engine in 130nm/90nm technology. My responsibilities included all hardware product management, scheduling, resource planning, and lab prototype work, including managing interactions with software engineering (CMS, BIOS, and drivers), systems engineering, packaging, foundry, and operations requirements for the project. Additionally, I was a key interface with consumer electronics companies in developing solutions for set-top-boxes for smart video delivery and processing.

9. I later became a Vice President and General Manager at Cadence Design Systems, where I ran Cadence's Design for Manufacturing (DFM) Business Unit, which is responsible for enterprise class technical software used in semiconductor design, analysis, and manufacturing, including mixed signal and RF circuit design and analysis. I oversaw a \$130+ million per year business and approximately 240 worldwide employees in R&D, operations, marketing, sales,

and application engineering with teams in Japan, Taiwan, Russia, India and the United States.

10. Since my work at Cadence Design Systems, I have principally acted as a professional consultant in the areas of technology development, intellectual property, and business development in the areas of software, networking hardware, and semiconductors. My consulting clients included CNEX LABS where I helped develop the clocking, power management, and PCIe capabilities of their NVMe PCIe SSD controller ASIC.

11. As a result of my extensive industry experience, I have expertise in, among other things, computer architecture, VLSI design, VLSI manufacturing, software, and systems. This expertise and background extends to at least the following areas:

- Computer Architecture: RISC, CISC, DSP, memory hierarchies, memory systems, pipelining, clock design, power management, low power design, microcode, microarchitecture, multicore, 2d & 3d graphics, SPARC, x86, MIPS, ARM, USB, GPU, VGA, LPC, PCI, PCI-X, Hypertransport, PCIe, NVMe, SoCs, AGP, Ethernet, cache, FPU, TLB, DDR, DRAM, and SRAM;
- VLSI Design: All aspects of front to back design process and methodologies for digital, analog, and mixed signal designs, including RTL (Verilog &

VHDL), logic, circuit, physical design, layout, verification, PLL, RAM, TLB/CAM, IO, PHY, scan, DFT, BIST, LCDs;

- VLSI Manufacturing: CMOS, mask making, OPC, testing, packaging, yield enhancement, debug, failure analysis, and production ramp;
- Software: Computer aided design (CAD), drivers, BIOS, operating systems (Windows, Linux, Unix, Android, etc.), mobile software, embedded software, JSRs, client-server software, enterprise software, applications, large web based systems (Google, Facebook, AWS etc.), algorithms, and computational finance. I have expertise in the following exemplary languages: Fortran, C, C++, Perl, Python, Pascal, Java, and ASM; and
- Systems: Systems-on-a-Chip, VoIP, networking, multiprocessors, servers, PCs, parallel processing, distributed computing, mobile phone, tablets, settop-boxes, TV, digital camera/camcorders, encryption/security, power management, ACPI, LCD, OLED, GSM, EDGE, WCDMA, 3GPP, CDMA, IEEE 802.x/Ethernet, switching, routing, RFID, Bluetooth.

12. I am also a named inventor on at least 15 issued U.S. patents relating to, among other things, circuit design, logic design, memory design, hardware testing, software, diagnosis, and formal verification. I have published as author or co-author over 30 journal articles, conference publications, and book chapters.

13. I was also the recipient of the Sun Microelectronics Engineering Excellence Award in 1996. I am a member of Tau Beta Pi and Eta Kappa Nu Engineering Honor Societies and, from January to March of 1997, I was the guest editor of IEEE Design & Test of Computers magazine for a special issue on microprocessors.

14. My curriculum vitae, which is attached to this declaration as Appendix A, sets forth the details of my background and experience in the relevant field.

III. BASIS FOR OPINIONS

15. I believe that I am qualified to render opinions regarding the technology described and claimed in the '174 patent, based on my experience and education. Based on my expertise and qualifications, I believe that I am qualified to provide opinions as to the state of the art and what a POSITA would have understood, known, or concluded as of the conception of the inventions of the '174 patent. I was working in the integrated circuit and system design field in the 2005 timeframe, worked closely with many others in the field, companies designing RF circuits, and participated in various industry organizations.

16. In reaching my opinions and conclusions, I have relied upon my education, my work experience in the relevant field, and my training, and considered and relied upon my review and analysis of the following materials:

- The Petition;
- Ex. 1001, the '174 patent;
- Ex. 1002, the prosecution history of the '174 patent;
- Ex. 1003, Dreifus Declaration;
- Ex. 1004, U.S. Patent App. Pub. 2011/0240748 (“Doughty-CON”);
- Ex. 1005, U.S. Patent App. Pub. 2004/0133787 (“Doughty”);
- Ex. 1008, Redline Between Doughty and Doughty-CON;
- Ex. 1009, U.S. Patent No. 5,943,624 (“Fox”);
- Ex. 1010, U.S. Patent No. 7,917,444 (“Bursch”);
- Ex. 1011, U.S. Patent App. Pub. 2005/0086171 (“Abe”);
- Ex. 1012, U.S. Patent App. Pub. 2006/0165060 (“Dua”);
- Ex. 1013, U.S. Patent No. 6,636,833 (“Flitcroft”);
- Ex. 1014, Plaintiff iCashe’s Infringement Contentions, Including Appx. H-1;
- Ex. 1028, U.S. Patent App. Pub. 2006/0017626 (“Kannan”);
- Ex. 1029, U.S. Patent No. 6,400,965 (“Phillips”);
- Ex. 1030, U.S. Patent No. 4,877,947 (“Mori”);
- Ex. 1032, U.S. Patent No. 5,466,919 (“Hovakimian”);
- Ex. 1036, U.S. Patent No. 6,670,796 (“Mori”);

- Ex. 1041, U.S. Patent App. Pub. 2007/0236350 (“Nystrom”);
- Ex. 1042, Periodically, Merriam-Webster’s Collegiate Dictionary (11th ed., 2003);
- Ex. 1043, U.S. Patent App. Pub. 2006/0168418 (“Adusumilli”); and
- Ex. 1044, U.S. Patent App. Pub. 2003/0004811 (“Omori”).
- Ex. 2032, Silicon Labs, *AN148: Magnetic Stripe Reader*, Rev. 1.3 8/08 (2008)

IV. LEVEL OF ORDINARY SKILL IN THE ART

17. For purposes of this declaration, I do not dispute the following opinions of Mr. Dreifus:

- That the patent claims and prior art should be considered “through the eyes of a person of ordinary skill in the art at the time of the alleged invention,” and the various factors that contribute to that consideration as listed in Ex. 1003, ¶ 63;
- That the Challenged Claims are entitled to the benefit of the February 22, 2005 filing date of U.S. Patent Application No. 11/063,291 (“the ’291 Application”) (Ex. 1003, ¶ 64);
- That “person having ordinary skill in the art in this matter would have had at least a Bachelor’s degree in electrical engineering, computer engineering,

computer science, or the equivalent thereof and approximately two years of professional experience....,” where [a]dditional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education.” Ex. 1003, ¶ 65.

18. I disagree with Mr. Dreifus that a POSITA in this matter necessarily must have specific experience in “the field of electronic devices used for transactions” rather than electronic devices more generally. *Id.* The technology at issue in this matter and the state of the art at the time of the ’174 patent’s priority date would be understood by a person who has the qualifications I list above, even without specific experiences with “electronic devices used for transactions.”

19. Although I disagree with Mr. Dreifus, many of the electronic devices I have designed or contributed to as a team member were used for transactions including: powering every transaction at eBay during the 1990-2000’s, any transaction performed by Nokia phones 2005-2010, and transactions performed by Broadcom WiFi chips in the 2000-2010s.

20. Based on my experience, and whether under Mr. Dreifus’s definition or my own, I am qualified to render opinions regarding the technology claimed and described in the ’174 patent. Based on my expertise and qualifications, I am qualified to provide an opinion as to what a POSITA would have understood, known, or concluded as of the 2005 timeframe.

V. RELEVANT LEGAL PRINCIPLES

21. For the purposes of this declaration, I have been informed about certain aspects of the law that are relevant to my analysis and opinions. I have applied these legal principles in rendering my opinions below.

A. Claim Construction

22. I understand that the ordinary and customary meaning of a claim term is the meaning that the term would have to a POSITA at the time of the invention.

23. In the absence of an express intent on the part of the inventor to give a special meaning to the claim terms, the words are presumed to take on the ordinary and customary meanings attributed to them by a POSITA.

24. I understand that it is the use of the words in the context of the written description, and as customarily used by those skilled in the relevant art, that accurately reflects both the ordinary and the customary meaning of the terms in the claims.

25. I understand that the basis for a term's ordinary and customary meaning may be derived from a variety of sources, including the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art at the time of the invention.

26. I have been instructed that dictionary definitions or definitions from technical references can be used to inform or confirm the ordinary and customary meaning of words found in a claim, but that in construing claim terms, the general meanings gleaned from reference sources, such as dictionaries, must always be compared against the use of the terms in the context of the claim itself.

27. I understand that a patent applicant is entitled to be his or her own lexicographer (in other words, provide his or her own meaning to a word or phrase) and may rebut the presumption that claim terms are to be given their plain and ordinary meaning. To do so, the applicant must clearly set forth a definition of the term that is different from its ordinary and customary meaning. Where the applicant provides an explicit definition for a term, that definition will control interpretation of the term as it is used in the claim in which it appears. I understand that the specification can also be relied on for more than just explicit lexicography to determine the meaning of a claim term. For example, I understand that the meaning of a particular claim term may also be determined by implication, that is, according to the usage of the term in the context of the specification.

B. Obviousness

28. I understand that under U.S. Patent Law, 35 U.S.C. § 103, a claim is invalid as obvious if the differences sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains.

29. I am informed that an obviousness analysis requires an assessment of the scope and content of the prior art, the differences between the art and the claims at issue, and the level of ordinary skill in the art. I am told that it is against this backdrop that obviousness is assessed.

30. I am informed that a POSITA is a hypothetical person who is presumed to be aware of all the pertinent prior art. I am also informed that an obviousness analysis may take account of the inferences and creative steps that a POSITA would employ.

C. Enablement

31. I am informed that under U.S. patent law, a petitioner attempting to invalidate a patent for anticipation or obviousness, must establish enablement. I understand that without a showing of enablement, a petitioner cannot establish a reasonable likelihood of a patent being invalid for anticipation or obviousness.

32. I am informed that the test for enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the prior art, coupled with information known in the art without undue experimentation.

33. I am informed that the more that is known in the prior art about the nature of the invention, how to make, and how to use the invention, and the more

predictable the art is, the less information needs to be explicitly stated in the specification.

34. I am informed that what is known in the art at the time of invention can provide evidence as to the question of predictability.

VI. BACKGROUND OF THE '174 PATENT

35. At a high level, the '174 patent describes and claims a mobile device that utilizes time-varying magnetic fields to replicate the swipe of a credit card, or similar, in effectuating a transaction.

36. The inventors of the '174 patent developed an innovative technology that advanced the state of the art when filed. In 2005, with the prevalence of mobile phones growing rapidly across the world, inventors Dr. Narendra, Mr. Tadepalli, and Mr. Spitzer envisioned a future in which mobile phones would replace consumers' wallets. They set out to invent a mechanism for consumers to use their phones, instead of cash, checks, or credit cards, to complete point-of-sale transactions.

37. The '174 patent claims are directed to circuitry for high-performance communications between mobile devices and point-of-sale payment terminals to facilitate speedy mobile contactless payments—a technology that is today commonly referred to as “tap to” functionality.

38. The '174 patent inventors also recognized that their solution would need to interface with existing point-of-sale infrastructure in order to maximize adoption.

39. In 2005, point-of-sale terminals relied primarily on magnetic stripe readers through which consumers would physically swipe a credit card with a magnetic stripe. Ex 1001, 1:64-67.

40. At that time, while magnetic stripe cards and readers were prevalent, smartcards, i.e., those that were the shape and form of a magnetic stripe card, but were embedded with a small microprocessor that interacted with a different type of coordinating reader, were also becoming more common. *See, e.g.*, Ex. 1001, 4:16-27.

41. The inventors therefore sought to develop apparatuses, systems, and methods through which a mobile phone could securely communicate with a traditional magnetic stripe reader to affect a transaction in a contactless manner and without a physical card swipe. *E.g.*, Ex. 10013:45-48, 4:60-65, 5:39-44.

42. Claim 1 of the '174 patent recites:
[1.pre] A mobile phone comprising:

[1.a] a memory to hold transaction data for use in a plurality of transactions;

[1.b] a current carrying conductor capable of producing a time-varying magnetic field that represents the transaction data in the plurality of transactions;

[1.c] a network interface for connecting the mobile phone to a network, wherein one or more parts of the transaction data are downloadable to the mobile phone via the network;

[1.d] a driver to excite the current carrying conductor; and

[1.e] a processor coupled to control the driver.

Ex. 1001, 17:9-20.

VII. ANALYSIS OF THE COMBINATION OF DOUGHTY IN VIEW OF ABE

43. Mr. Dreifus opines that claims 1-9 of the '174 patent are rendered obvious by Doughty in view of Abe (Ground 1). I disagree with Mr. Dreifus's conclusions regarding Doughty and Abe, for the reasons discussed below.

A. Overview of Doughty

44. Doughty is directed to "authentication and processing of commercial and security related transactions and, more particularly, to a system, method and apparatus for enabling transactions using biometrically enabled programmable magnetic stripes." Ex. 1005, [0002].

45. As Doughty explains, “security of current magnetic stripe cards is suspect due to the ease of card theft and ‘skimming’ of card data for creating and using fake cards.” *Id.* at [0003]. Personal financial information was “typically stored in three data tracks within the magnetic stripe” of the credit card, which “are easily created, read, and damaged.” *Id.* As a result, security for these types of cards “is low and renders their use in applications involving highly sensitive information suspect.” *Id.*

46. Doughty further explains that smart cards, which “primarily rely on an integrated circuit,” are “a viable way to improve the effectiveness and security of a given card or device.” *Id.* at [0004]. But smart cards require a “special reader” and are not compatible with traditional magnetic stripe card readers. *Id.* As a result, adoption of smart cards without a magnetic stripe “has been slow.” *Id.* Thus, Doughty identified a need for a “practical and secure card”—one that was both usable with “magnetic stripe readers,” but also included “proper authentication ... to reduce the risk to the device holder in the event of loss or fraudulent capture” *Id.* at [0007].

47. Doughty purports to solve this problem with (1) a programmable magnetic stripe, and (2) on-card biometric authentication. *Id.* at [0008]-[0009], [0039].

48. Doughty's solution and primary teaching was to add biometric authentication to enable physical card transactions. Doughty described that his solution "provides stringent protections for magnetic stripe cards and devices through the use of on-card/device biometric authentication of the user and programmable magnetic stripes such that the data within the tracks of the stripe can be spatially manipulated and managed by the logic within the processor/controller of the card or device." *Id.* at [0009]. The programmable stripe "allows magnetic stripe data to be modified or completely erased for protection," and the on-card biometric authentication allows features to be disabled until the owner of the card enables them," thus ensuring that the card "cannot be used if it is lost or stolen." *Id.*

49. Doughty's invention, which seeks to provide a secure card that "will interface with existing world-wide magnetic stripe readers without the use of adapters or bridges" (*id.* at [0008]), takes the same form as a traditional magnetic stripe card. *Id.* at [0048] ("shown in the form of a credit or debit card"). Likewise, Doughty explains that its invention is typically mounted on a substrate that "will be a semi-flexible material such as plastic, or a laminate material," where [t]he substrate can then be integrated into a card, such as an access card, a credit card, a debit card, an identification card, a mini-card, a security card, a stored value card and a vendor-specific card, etc." *Id.* at [0046]. When interacting with magnetic readers, the system of Doughty requires that secure card to be swiped through a

magnetic reader to effectuate a transaction. *Id.* at [0051]-[0052] (noting repeatedly that “the card is swiped through the reader”).

50. While Doughty does contain references to “contactless” operations, those relate to an alternative system reliant on RF communications and entirely separate from the time-varying magnetic field claimed in the ’156 patent. *See, e.g.*, Ex. 1005, [0056]-[0061] (“contactless” embodiments involving “RF field”); [0084]-[0085] (“contactless” embodiment involving card “placed into the RF field.”). A POSITA would not understand Doughty to disclose a “contactless” embodiment that generates a time-varying magnetic field or that interacts with a magnetic card reader in the manner claimed in the ’156 patent. Doughty requires contact (a card swipe) for its disclosures with respect to the time-varying magnetic field; otherwise, there would be no need for Doughty’s invention to include a programmable magnetic stripe itself if contactless RF were pervasive. *Id.* at [0007]-[0009].

51. Doughty also includes a laundry list of various devices that could allegedly house its invention, without explaining how it would be integrated or used, including “a travel credential, such as a passport, an immigration card and a visa, etc., ... a personal communication device, such as a personal data assistant (PDA), a telecommunications device, a pager, a computer and an electronic mail transceiver, etc., ... a personal device/belonging, such as a watch, a jewelry, a key

ring, a tag and eye glasses, etc.” *Id.* at [0046]. Despite identifying a variety of specific devices, Doughty does not explicitly identify a mobile phone.

B. Overview of Abe

52. U.S. Patent App. Pub. 2005/0086171 to Abe, et al. (Ex. 1011, or “Abe”) is entitled “Information processing system, information communication terminal and method, information processing device and method, recording medium, and program.”

53. Unlike the contactless point-of-sale transactions contemplated by the claims of the ’174 patent, Abe relates to remote transactions whereby merchandise is ordered for subsequent pickup. Abe proposes solutions for a particular type of commercial transaction: transactions in which merchandise is ordered in advance (for example, using the Internet) and subsequently picked up from the merchant. Ex. 1011, [0002] (describing “cases of a purchaser making a reservation in advance in order to purchase merchandise, or in cases where a purchaser receives merchandise purchased by an electronic commercial transaction via the internet at a shop such as their nearest convenience store . . .”). In such situations, “the shop assistant in the shop that is handing over the merchandise” must confirm that the individual who arrives to physically retrieve the purchased item is authorized to do so. *Id.* As such, Abe describes, the merchant may either “ask[] the purchaser to disclose personal information” to verify their identify or “distribut[e] prescribed

reservation tokens and exchange tokens to purchasers beforehand on the sales side.” *Id.* Neither the request for personal information nor the token exchange system is ideal, Abe describes, because personal information “may be misappropriated” and tokens “may be fraudulently made or may be copied.” *Id.* at [0002]-[0003].

54. Abe seeks to solve this problem by providing a system whereby a user can use a mobile phone 11 to “order merchandise” from a store 20 via a network 10 and an authentication service provider 40 manages “trustworthiness relating to the commercial transactions between the user of the mobile telephone 11 and the store 20.” *Id.* at [0091]-[0098], Fig. 1.

55. According to Abe, a user of a mobile phone orders merchandise over a network such as the Internet, which is received by a point-of-purchase server of a store. *Id.* at [0092]. “The point-of-purchase server 21 then carries out sales processing for the merchandise requested by the mobile phone 11, and charge processing is carried out with respect to the user of the mobile telephone 11. Purchase information for the requested merchandise is then provided to the point-of-receipt server 31.” *Id.* at [0094]. The point-of-receipt server 31 then “compares information relating to the commercial transaction acquired from the point-of-purchaser server 21 . . . and information provided by the mobile telephone 11” to determine whether the mobile phone user is a “legitimate purchaser of the

merchandise.” *Id.* at [0095]. Finally, the mobile phone user “visits the point of receipt 30 in order to receive the merchandise.” *Id.* at [0097].

C. A POSITA Would Have Neither a Reason to Combine Doughty and Abe nor an Expectation of Success from the Combination

56. Mr. Dreifus contends, that a POSITA would have been motivated to apply several of Abe’s teachings to Doughty: (1) “Abe’s teachings of a mobile phone to Doughty’s telecommunications device”; (2) “Abe’s teachings of downloading transaction data from an authentication server over a network to Doughty’s telecommunications device to advantageously improve the security of its financial transactions, as desired by Doughty”; and (3) “Abe’s teachings of downloading temporary rewriting keys to Doughty’s telecommunications device to advantageously limit unauthorized tampering or use of sensitive information.” Ex. 1003, ¶¶ 80-82.

57. I disagree. A POSITA would not look to combine Abe and Doughty for multiple reasons.

58. First, the remote authentication of Abe is not applicable to the point-of-sale, close-range system of Doughty and thus would not have been considered by a POSITA.

59. As described above, Doughty sought to fill a need for “a practical and secure card that has the advantages of a smart card and *will interface with*

magnetic stripe readers without the use of adapters.” Ex. 1005, [0007] (emphasis added). Doughty contemplates a close-range device that communicates while positioned near a traditional magnetic stripe reader. In fact, Doughty *requires a swipe* to trigger certain steps of its process. *See id.* at [0051] (“a time-varying signal can be transmitted to the heads of the magnetic card reader *as the card is swiped through the reader*”); *id.* (“The data rate is determined based on the minimum and maximum swipe speeds that standard readers can accommodate.”); *id.* at [0052] (“*Once the card is alerted that it is being swiped through the reader 330* (FIG. 3), it begins transmission of the emulated time-varying data from the device processor....”); *see also id.* at [0008] (“The present invention provides ... a practical and secure card or device that has the advantages of a smart card and will *interface with existing world-wide magnetic stripe readers* without the use of adapters or bridges”) (emphasis added).

60. In stark contrast, Abe relates to authentication for remote purchases. Abe contemplates remote transactions and addresses problems that are not present during a magnetic stripe reader point-of-sale transaction. Abe uses an authentication server to “calculate[] user trustworthiness and store trustworthiness” for a cellular phone user and a store. Ex. 1011, Abstract, [0092]. The calculated trustworthiness allows a purchaser to determine whether the store “where a commercial transaction is to be made is trustworthy” and further allows a merchant

to determine whether the “user of the mobile phone” is “trustworthy as a person.”
Id. at [0193], [0196], [0220].

61. These are determinations that would only need to be made in the context of the remote ordering of Abe and not the in-person point-of-sale purchasing of Doughty. A purchaser standing in a store and making a purchase via a magnetic stripe reader would have no reason to determine the trustworthiness of the store in which they are standing. Likewise, a merchant would have no reason to determine whether the user of the biometrically secured credit card of Doughty—standing in the store—is an authentic purchaser. Abe further contemplates a post-transaction determination of “whether or not the user coming to pick-up the merchandise is the rightful purchaser of the merchandise:” another problem not present during a magnetic stripe reader point-of-sale transaction. *Id.* at [0306].¹ Abe simply addresses an entirely different commercial and technical environment

¹ While Abe makes reference to some close-range point-of-receipt communications that *do* occur at a store, these communications are for purposes of authentication such that the purchaser can retrieve the previously purchased merchandise. *See, e.g.*, Ex. 1011, Fig. 20. Abe does not disclose, or even relate to, the type of in-person point-of-sale transactions contemplated by Doughty or those contemplated by the '174 claims.

than Doughty and, for this reason, a POSITA would not have thought to combine the references.

62. Second, a POSITA would not have combined Abe and Doughty in the manner proposed by Petitioners because such modification of Doughty would fundamentally change Doughty's principle of operation.

63. Doughty purports to provide a “*biometrically enabled*” programmable card whereby transaction data is transmitted to a reader “*upon valid biometric authentication* of the card user.” Ex. [Doughty], Title, [0002], [0052] (emphasis added). Petitioners' purported combination would fundamentally alter Doughty and, contrary to Doughty's stated purpose, would not permit a purchaser to *enable a transaction* through biometric authentication.

64. Instead, the modification that Petitioners assert would require the addition of “an authentication service provider 40 for managing trustworthiness relating to commercial transactions between the user of the mobile telephone 11 and the store 20,” as well as an “authentication server 41.” Ex. 1011, [0092]-[0093]. The combination would require a purchaser to “access the authentication server 41” to permit a transaction. *Id.* More, the purchaser would then, according to Petitioners' combination, be required to await the comparing of information, calculation of trustworthiness, and thus determination of “whether or not the user of the mobile telephone 11 is the legitimate purchaser of the merchandise.” *See,*

e.g., id. at [0095]. This added server-based authentication of Abe, in addition to the biometric authentication of Doughty, would fundamentally shift the principle of operation of Doughty. And would prevent a purchaser from the ability to ***enable a transaction*** through the user's own biometric information. A POSITA therefore would not have made the combination on which Petitioners rely.

65. Third, a POSITA would not have had a reasonable expectation of success in combining Abe and Doughty. Even if Doughty disclosed and enabled a mobile phone, which it does not (*see infra*), neither reference provides any guidance as to how a POSITA would have made such combination. In particular, neither reference provides any teaching regarding the integration of a biometrically secured card with a phone's networking capabilities. Indeed, there is no reason for Doughty or Abe to describe how a POSITA could make the purported combination, as they are each standalone secure systems that do not require such integration. The invention of Doughty provides for securely authenticated transactions and does not require the authentication of Abe.

66. The combination of the two references requires experimentation based on the physical form factors of both technologies – a credit card substrate and a phone. Additionally, it requires undue experimentation for the integration of the circuits of Doughty which are magnetic data emulation with minor processing and those required for Abe inside the phone including remote server communications

and significant data processing. This is especially true with respect to ensuring they work properly and do not interfere with each other which would cause failure during the transaction and render the combination useless.

D. Doughty in View of Abe Does Not Disclose Various '174 Patent Claim Limitations

a. “A mobile device comprising...”/“wherein the mobile device comprises a mobile phone”

67. All challenged claims of the '174 patent recite a mobile phone. *See* Ex. 1001, 17:1-20 (independent claim 1 reciting “A mobile phone comprising...”).

68. Indeed, it was the '174 patent inventors' goal to create a mechanism for completing consumer transactions using only the consumers' mobile phone. They set out to invent a mechanism for consumers to use their phones, instead of cash, checks, or credit cards, to complete point-of-sale transactions.

69. The '174 patent claims are directed to circuitry for high-performance communications between mobile devices and point-of-sale payment terminals to facilitate mobile contactless payments—a technology that is today commonly referred to as “tap to” functionality. *See, e.g.*, Ex. 1001, 17:1-20.

70. I understand that Mr. Dreifus opines that Doughty's “telecommunication device” discloses the mobile phone. Ex. 1003, ¶¶ 87-88. I disagree. It is my opinion that Doughty's disclosure of a “telecommunications

device” would not have enabled a person of ordinary skill in the art to make the claimed invention without undue experimentation.

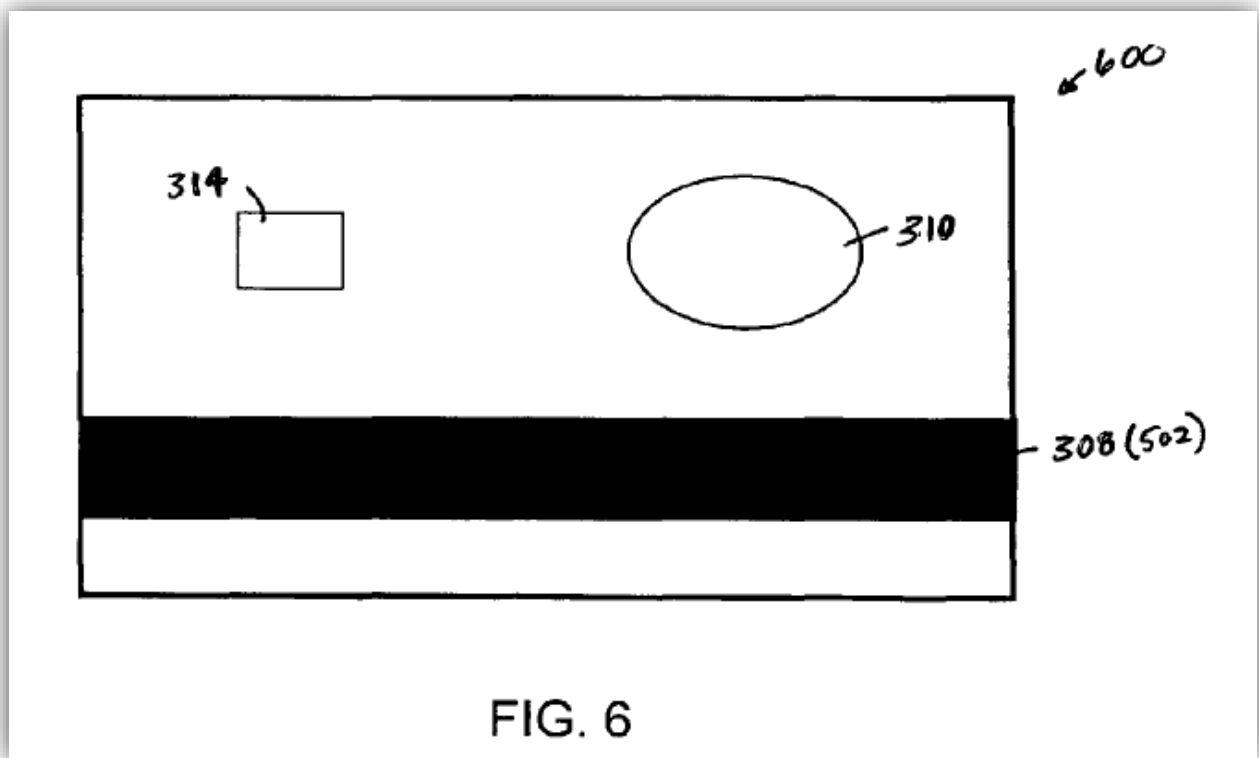
71. Doughty discloses a swipeable card with biometric authentication. *See, e.g.*, Ex. 1005, [009], [0051], [0052]. But, at most, Doughty discloses the mere idea—without explanation—of incorporating a swipeable card with biometric authentication into a variety of diverse devices, including “jewelry,” “eye glasses,” or “a passport.” Ex. 1005, [0046]. In fact, a POSITA would understand these devices to function, if at all, only with Doughty’s “contactless” embodiments that function with an RF-field, and not the time-varying magnetic field claimed in the ’174 patent. Ex. 1005, [0056]-[0061] (“contactless” embodiments involving “RF field”); [0084]-[0085] (“contactless” embodiment involving card “placed into the RF field.”).

72. Included in Doughty’s list of ideas is a “telecommunications device,” but it does not explicitly identify a mobile phone, even though other devices such as pagers are listed. *Id.* at [0046]. However, even assuming that a person of skill in the art would understand a telecommunications device to include a mobile phone, nothing in Doughty explains how to achieve the integration of its invention, which requires biometric authentication and a physical swipe, into a mobile phone such that it would be workable and, most important, swipeless.

73. A goal of the invention of Doughty is to “interface with existing world-wide magnetic stripe readers without the use of adapters or bridges.” *Id.* at [0008]. As acknowledged by Doughty, those commonplace magnetic stripe readers require a device “the size of a credit card so that the [device] can be swiped through the magnetic stripe reader.” *Id.* at [0005]. Indeed, the requirement to swipe through the reader is the reason Doughty can avoid the “adapters or bridges” required by smart cards while providing security, the main focus of Doughty. *Id.*

74. Rather than use an adapter, Doughty teaches a solution that incorporates security features into the format of a credit card that can be swiped through the reader, and where the functionality of Doughty *requires a swipe* to trigger certain steps of its process. *See id.* at [0051] (“a time-varying signal can be transmitted to the heads of the magnetic card reader ***as the card is swiped through the reader***”); *id.* (“The data rate is determined based on the minimum and maximum swipe speeds that standard readers can accommodate.”); *id.* at [0052] (“***Once the card is alerted that it is being swiped through the reader 330*** (FIG. 3), it begins transmission of the emulated time-varying data from the device processor....”); *see also id.* at [0008] (“The present invention provides ... a practical and secure card or device that has the advantages of a smart card and will interface with existing world-wide magnetic stripe readers without the use of adapters or bridges”).

75. Doughty discloses extensive detail to enable its invention in a credit card shaped format. For example, Doughty describes to a POSITA how to “transmit the time-varying signal from the card to the card reader” during the course of a swipe. *Id.* at [0051]; *see also, e.g., id.* at [0048]-[0049]; [0052]; [0064]-[0068]; Figs. 4A, 4B, 6, 11. Throughout its disclosure, Doughty consistently discloses and enables a thin, swipeable substrate, such as the programmable magnetic card 600 depicted in Figure 6.



Id. at Fig. 6. Programmable magnetic card 600 includes on-card biometrics sensor 310 on-card control processor 314, and critically, programmable magnetic stripe 308 (magnetic field generator 502). *Id.* at [0053].

76. Doughty does not explain at all how its programmable magnetic stripe 308(502) can function if it is integrated into a device that cannot be swiped through a magnetic card reader created to receive a credit card, such as “jewelry,” “eye glasses,” or a “telecommunications device.” Nor does Doughty explain how to incorporate the on-card biometrics sensor into such devices. As to these formats, Doughty does no more than name an idea, without having achieved it, and without explaining how to achieve the result, only suggesting that the swipeable substrate as disclosed is somehow used. *Id.* at [0046].

77. Because of this, a POSITA would not have sufficient information to implement the system of Doughty and its required swipe into any of these formats without extensive experimentation. There is no direction or guidance in Doughty as to how to force the invention of Doughty into a form that is not compatible with a conventional magnetic card reader, including no explanation in the text of the specification and no figures that illustrate non-card form factors. Moreover, there is a complete absence of working examples. In effect, a person of skill in the art would have to create an entirely new invention that worked in a different manner from that taught by Doughty.

78. Overall, a POSITA would not understand Doughty to function in a mobile phone, or how to modify Doughty to do so. As relevant here, a person of skill in the art would be required to figure out how to swipe a mobile phone (of

2005 vintage) through a credit card reader after performing biometric authentication based on the same substrate. Alternatively, a person of skill in the art would have to determine how to recreate the invention of Doughty to achieve the same goals without using a physical swipe to activate the magnetic field generator or to trigger the transfer of data from the user device to the reader. Either of these would require extensive experimentation. The experimentation would involve phone form factors, useability, comfort, durability, and compatibility with a wide range of card readers due to their physical differences of the swipe mechanism. For example, I show for illustrative purposes two different POS terminal form factors (VeriFone Omni 3200SE and EverestPlus) and mobile phone form factors (Motorola Razr 3 and Nokia 6620) from the 2004-2005 timeframe.





79. Regarding full swipe emulation experimentation, this would involve removing all physical contact with the magnetic reader, something not contemplated by Doughty at all. Bringing the Doughty invention into proximity of a card reader would fail due to incompatible protocol of just the data, versus a swipe and significant non-physical contact electrical transmission obstacles that one would need to overcome regarding the phone and POS terminal due to differences in device shielding and the impact of shielding on wireless data transmission, position of the magnetic stripe reader (MSR) within the POS terminal, and the electronics and software making up the MSR of the POS terminal.

80. Mr. Dreifus does not address this issue, accepting Doughty's list of non-card shaped formats, including a "telecommunications device" and a "personal

communication device” as sufficiently informative for a POSITA to find it “would have understood that a telecommunications device used as a ‘personal communication device’ is a mobile phone.” *See* Ex. 1003, ¶ 88. But Mr. Dreifus does not explain how a POSITA would have understood to undertake the implementation of Doughty’s swipeable substrate without extensive experimentation. Nor has Mr. Dreifus explained how a complete swipe would be emulated, and not just the data for security purposes, as disclosed by Doughty.

b. “wherein the time-varying magnetic field emulates a swipe of a magnetic card.”

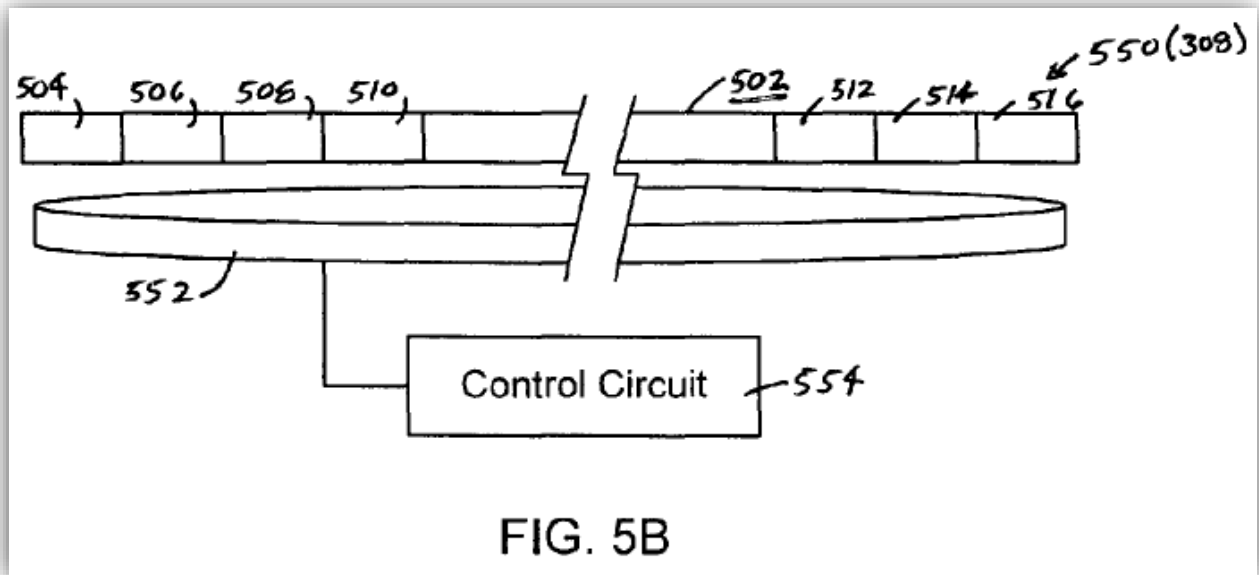
81. Claim 5 recites “[t]he mobile phone of claim 1 wherein the time-varying magnetic field emulates a swipe of a magnetic card.” Ex. 1001, 17:27-28.

82. A POSITA would not understand the system of Doughty to “emulate a swipe.” Rather, a POSITA would understand Doughty to *require an actual swipe*.

83. Doughty’s programmable magnetic stripe, which Doughty also calls a magnetic field generator,² operates by generating a magnetic field during a physical card swipe. The programmable magnetic stripe creates either “a spatial magnetic signal or a time-varying magnetic signal.” Ex. 1005, [0041]. Figure 5B of

² *See, e.g.*, Ex. 1005, [0053] (“programmable magnetic stripe 308 (magnetic field generator; see also 502 Figs. 5A and 5B)”; [0055] (“[T]he device outputs may include a magnetic field generator 308 (programmable magnetic stripe).”).

Doughty illustrates a programmable magnetic stripe 550 (308) for generating a time-varying magnetic field. *Id.* at [0020], [0051].



84. As Doughty explains, the programmable magnetic stripe 550 (308) operates to generate a time-varying magnetic signal while the card is physically swiped through a reader. The programmable magnetic stripe 550 (308) includes: a magnetic stripe 502 having one or more sets of magnetic data cells 504-516; a single inductive coil 552; and a control circuit 554. *Id.* at [0051]. “The long inductive coil 552 is mounted immediately beneath the entire length of the magnetic stripe 502 and its corresponding binary magnetic data cells 504-516 such that a time-varying signal can be transmitted to the heads of the magnetic card reader *as the card is swiped through the reader.*” *Id.* (emphasis added). “The data rate is determined based on the minimum and maximum swipe speeds that

standard readers can accommodate. In other words, the single inductive coil 552 is long enough for it to be in the *physical proximity of the card reader* heads for the entire time period required to transmit the time-varying signal from the card to the card reader.” *Id.*

85. Doughty describes that the individual data cells 504-516 are “normally empty of data,” e.g., for security purposes. *Id.* at [0052]. Transmission of the *time-varying* data may only begin upon “valid biometric authentication of the card user, followed by a detection of the card that *it is in the presence of the reader head and the reader* 330 (FIG. 3) has recognized the *start sentinel on the card.*” *Id.* (emphasis added) “*Once the card is alerted that it is being swiped* through the reader 330 (FIG. 3), it begins transmission of the emulated time-varying data from the device processor to the inductive coils 552, thereby generating an exact emulation and transmission to the reader 330 (FIG. 3) of the data that would have been produced by swiping the card through the reader 330 (FIG. 3) with *spatially varying* data included in the individual data cells 504-516.” *Id.* (emphasis added).

86. A POSITA would understand that Doughty’s programmable magnetic stripe only emulates time-varying magnetic data during a physical card swipe and does not, itself, emulate a swipe. Where there is an actual swipe required, there is no emulation. Doughty does not contemplate simulating or imitating a swipe. In

stark contrast, Doughty relies on the time and proximity of an actual, physical swipe.

87. At most, Doughty discloses *data* emulation, not *swipe* emulation, and uses the time varying field to protect the data before, during, and after the physical swipe, which is part of the primary teaching of security and authentication for Doughty. Doughty describes emulating card data, including “binary data to enable a transaction, such as a user name, user number, device expiration date, transaction approval/denial, etc.” using a time-varying magnetic field. Ex. 1005, [0041]. This is further evidenced throughout Doughty’s disclosure:

- Ex. 1005, [0010] (“The magnetic field generator can create a spatial magnetic signal using a magnetic stripe and one or more induction coils, or create a time-varying magnetic signal *for emulating data obtained from swiping a magnetic stripe card* through a magnetic card reader. As a result, the magnetic field generator emulates a programmable magnetic stripe.”).
- *Id.* at [0041] (“The magnetic field generator **308** emulates a programmable magnetic stripe by either creating a spatial magnetic signal or a time-varying magnetic signal *for emulating data obtained from swiping a magnetic stripe card* through a magnetic card reader (See FIG. 5B).”).

- *Id.* at [0051] (“Now referring to FIG. 5B, a block diagram of a programmable magnetic stripe **550** (**308** FIG. 3) using a single induction coil **552** for *sending emulated time-varying magnetic stripe data* to a magnetic card reader By establishing the configuration in this manner, the inductive coil **552** can be pulsed with varying currents and current directions so that *the time-varying data stream of a card being swiped through the reader is emulated, thus providing the same magnetic data stream to the reader heads of the magnetic stripe reader as would be seen if a card with binary data in multiple spatially distributed data cells 504-516 in the magnetic stripe 502 were swiped through the reader. This magnetic signal will, therefore, emulate the data that would be generated by the swipe of a magnetic stripe card* with the desired information embedded in the individual data cells **504-516** of the stripe **502**.”).
- *Id.* at [0020] (“FIG. 5B depicts a block diagram of a programmable magnetic stripe using a single induction coil for *sending emulated time-varying magnetic stripe data* to a magnetic card reader....”); *see also id.* at FIGS. 5A & 5B.

88. A POSITA would understand that to “emulate a swipe,” one must emulate more than just *data obtained from that swipe*. The exchange that occurs

between a card and a reader during a swipe involves more than transmission of card data. Rather, a POSITA would also understand the following to be a part of a swipe: clocking zeros, start sentinel character, data characters, end sentinel character, and a longitudinal redundancy check character. *See* Ex. 2033 (Silicon Labs AN148 Magnetic Stripe Reader), § 2.2. Clearly, Doughty only addresses the data characters from a security perspective. Indeed, though ignored by Petitioners, Doughty acknowledges the difference between a swipe and emulated data: “All such transmission of emulated card data is contingent upon valid biometric authentication of the card user, followed by detection of the card that it is in the presence of the reader head and the reader 330 (FIG. 3) *has recognized the start sentinel on the card* so that the reader 330 (FIG. 3) is *ready to accept the stream of emulated data* provided by the device processor.” Ex. 1005, [0052] (emphasis added).

89. In contrast to Doughty, the '174 patent claims “a time-varying magnetic field that emulates a swipe” and that is not dependent upon biometric authentication. Ex. 1001, 17:27-28. As explained in the '174 patent specification, the “stripe” is not a visible magnetic stripe on the face of a card, like that of Doughty. *Id.* at 3:53-54 (“stripe 106 may not be visible”); 3:59-67. Rather, “circuitry may be included within electronic transaction card 106 to produce the

time-varying magnetic field and no visible indication may be present on an external face of electronic transaction card 104.” *Id.* at 3:54-58.

90. Indeed, a POSITA would understand the ’174 specification distinguishes between embodiments that produce a time-varying magnetic field by ***emulating*** a card swipe—and thus do not require physical swiping—and embodiments that instead rely on a physical swipe operation to produce a time-varying magnetic field. *Compare* Ex. 1001, 3:54-58 (“circuitry may be included within electronic transaction card 106 to produce the time-varying magnetic field and no visible indication may be present on an external face of electronic transaction card 104”) *with id.* at 8:57-59 (referring to FIG. 4, “[d]uring the swiping operation, electronic transaction card 420 produces one or more time-varying magnetic fields to emulate the swiping of a magnetic card.”).

91. Because Doughty discloses an utterly different process (emulating data from a swipe during a swipe after successful biometric authentication) from that claimed in the ’174 patent (mimicking the entirety of a swipe without performing a swipe), a POSITA would not understand Doughty to disclose a time-varying magnetic field that “mimics a swipe.”

VIII. ANALYSIS OF THE COMBINATION OF DOUGHTY IN VIEW OF ABE AND FOX

92. Mr. Dreifus opines that claims 1-9 of the '174 patent are obvious in view of the combination of Doughty in view of Abe and Fox (Ground 2). I disagree with Mr. Dreifus's conclusions regarding the combination of Doughty and Abe in view of Fox, for the reasons discussed below.

A. Overview of Fox

93. The invention of Fox incorporates electronics associated with a smartcard into the housing of a cellular telephone. Ex. 1009, Abstract.

94. Unlike Doughty and the '174 patent, Fox does not contemplate use with traditional magnetic stripe readers. *E.g.*, Ex. 1009, 1:50-52. Nor does Fox disclose magnetic stripe data emulation or swipe emulation. Rather, Fox merely contemplates passive smartcard circuitry housed within a phone and operable to communicate with a smartcard reader. *See, e.g.*, Ex. 1009, Abstract, 3:26-4:2.

95. Fox articulates a number of disadvantages associated with traditional plastic smartcards. As articulated in the Fox specification, it is disadvantageous to need to insert a smartcard into an external reader such as a point-of-sale system or an ATM. *Id.* at 1:9-30. Fox describes that smartcard functionality in a "plastic-type credit card presents additional problems." *Id.* at 1:31-45. For example, the

flexibility required to prevent breakage of the card in a wallet may lead to damage to incorporated electronics necessary for the smartcard functionality. *Id.*

96. Further, smartcards in the form of a credit card may be easily lost. A POSITA would therefore understand Fox to explain that its advantage is to “incorporate the electronics associated with a smartcard into an alternative housing arrangement so as to overcome problems and disadvantages associated with flexible plastic smartcards,” and that “[a]dditionally, it would be desirable to provide a smartcard that does not require contact with an external reader in order to perform a transaction.” *Id.* at 1:46-1:52.

97. Thus, Fox teaches standard smartcard functionality incorporated into a cellular phone that communicates with an RF-based point-of-sale system. In particular, Fox contemplates passive RF communication wherein the smartcard circuitry is powered by an RF signal received from a smartcard reader. *See id.* at 3:26-4:8; 5:1-25.

98. Fox’s smartcard system is limited to RF communications. Fox does not at all mention or address the creation of a time-varying magnetic field for communications via magnetic swipe or emulating a magnetic swipe. Smartcard RF communication technology and time-varying magnetic field generation are two completely different communication technologies and involve completely different circuit implementations, as a POSITA would know, and as evidenced by the

differences in Figures within the two patents. For example, Fig. 5A and 5B of Doughty bear no resemblance to Fig 3 of Fox, nor should it, given the differences in the technology, protocols, and standards followed by each type of card technology. Nor does Fox teach swiping its invention through a card reader, which is not needed, and a POSITA would in fact understand Fox to discourage card-based (or, substrate-based, using Doughty terminology) transactions, even given the security of the contact-based smartcard. *See id.* 2:16-29.

99. In particular, Fox says nothing about swiping the mobile phone of Fox through a card reader—something that would be physically impossible, given the form factor of the mobile phone contemplated by Fox. *See* Ex. 1009, Fig. 1 (depicting the “cellular phone 10” of Fox). The form factor of the mobile phone in Fox or others circa 2004-2005 does not allow swiping of the device through the various POS terminals in existence in that timeframe for a magnetic-based transaction. They are at a minimum too thick and there are no disclosures by Fox, Doughty, nor Mr. Dreifus that remedy this fundamental incompatibility.

B. A POSITA Would Have Neither a Reason to Combine Doughty and Fox nor an Expectation of Success from the Combination.

100. Mr. Dreifus contends, “A person of ordinary skill in the art would have found it straightforward and advantageous to apply Fox’s teachings of a transmitter driver to drive current to an inductor and a processor to control the

driver to Doughty's telecommunications device (as modified by Abe's teachings) to implement the functionality described in Doughty." Ex. 1003, ¶167.

101. A POSITA would not look to combine Fox and Doughty as both address significantly different issues within electronic transactions and propose solutions that are contrary to the other. Further, the two references operate using incompatible technologies and protocols.

102. Doughty's aim was to "provide[] a system, method and apparatus for a practical and secure card or device that has the advantages of a smart card and will interface with existing world-wide magnetic stripe readers without the use of adapters or bridges." Ex. 1005, [0008]. In other words, Doughty aimed to provide a more secure physical swipe of a magnetic card.

103. Fox's aim is the opposite: to "incorporate the electronics associated with a smart card into an alternative housing arrangement so as to overcome problems and disadvantages associated with flexible plastic smartcards" and "to provide a smartcard that does not require contact with an external reader in order to perform a transaction." Ex. 1009 at 1:46-1:52. Fox represented a change in form factor of current smartcard technology.

104. The two problems addressed by Doughty and Fox, respectively, would not be considered the same or even similar by a POSITA. In fact, the problems

addressed—and the solutions proposed—by Fox and Doughty are the opposite of each other.

105. Doughty addresses the need for security in magnetic card transactions, and seeks to avoid fraud in the use of a typical magnetic card when a smart card reader is not present via biometric authentication. Ex. 1005, [0007]-[0009]. Fox addresses the physical limitations of a plastic smart card, including needing to be inserted into a reader and that smartcards may be physically damaged in a wallet or easily lost, and so proposes a manner of avoiding use of a typical smartcard by incorporating the RF-based smartcard functionality into a mobile phone and avoiding use of traditional cards and physical readers. Ex. 1009, 1:9-45.

106. A POSITA would recognize that combining Fox and Doughty would defeat the goals of each reference, and that each reference is in fact critical of the other's solution, discouraging that use. Fox identifies the specific goal of avoiding use of a typical card reader's physical transaction (insertion) and the physical disadvantages of a card including loss or damage. Ex. 1009, 1:9-52. This goal would be defeated by accomplishing Doughty's goal of "interfac[ing] with existing world-wide magnetic stripe readers," including via a required swipe through those existing readers. Ex. 1005, [0008]. Meanwhile, Doughty's specific goal of providing a card that can interface with existing readers in their current use model

(a swipe) is directly contrary to Fox's goal of avoiding those same readers and even the physical insertion (no swipe) of the more secure smartcard readers.

107. Additionally, Doughty and Fox are not compatible with each other, and in fact, would be inoperable together. Fox is a passive RF system utilizing standard protocols, technologies, and interfaces to effectuate communication between a point of sale system and a smartcard housed within a cellular phone, and which explicitly discourages contact between the cellular phone and a card reader. Ex. 1009, 1:31-52; 3:26-4:8; 5:1-25. Doughty teaches magnetic stripe data emulation to effectuate a transaction, where all enabled embodiments take the form of a credit card that is required to physically swipe a magnetic card reader. A POSITA would understand that these different protocols and technologies are fundamentally incompatible, to be combined into one technology or solution, both because the communication of information is done through different technologies, different protocols, and different physical interaction. At best, the combination of Fox and Doughty technologies leads one back to the standard, well-known passive smartcard where to use a magnetic stripe that is present on such a card one needs to physically swipe the card or one can physically insert or contactless tap the card to use the embedded smartcard chip. The only addition based on the disclosed technologies would be to add biometric authentication prior to the physical card interaction. The form factors of Fox and Doughty are incompatible.

108. Additionally, a POSITA would not be motivated to combine Fox and Doughty because the cellular phone of Fox cannot be swiped through the magnetic card reader required by Doughty. In fact, Doughty teaches the opposite of Fox. Doughty encourages “a semi-flexible material such as plastic, or a laminate material” taking the form of a credit card that “will interface with existing world-wide magnetic stripe readers without the use of adapters or bridges.” Ex. 1005, [0008], [0046]. This semi-flexible plastic card then must be swiped through a typical magnetic stripe reader. *Id.* at [0051] (“a time-varying signal can be transmitted to the heads of the magnetic card reader ***as the card is swiped through the reader***”); [0052] (“Once the card is alerted that it is being swiped through the reader....”). This “substrate” is always present in Doughty’s disclosures. Fox, on the other hand, teaches the exact opposite. Fox is a system directed to an “alternate housing arrangement so as to overcome problems and disadvantages associated with flexible plastic smartcards” both by avoiding the plastic card format and by instituting a contactless, swipeless protocol to avoid interaction with an “external reader.” Ex 1009, 1:46-52. A POSITA would not be motivated to combine a system seeking to improve a card and its swipe through typical machinery and a system seeking to avoid the card form and the associated physical interaction with their smartcard readers entirely.

109. I therefore disagree with Mr. Dreifus' conclusion that "In my opinion, a person of ordinary skill in the art would have known that the combination [of Doughty, Abe, and Fox] (yielding the claimed limitations) would predictably work and provide the expected functionality." Ex. 1003, ¶ 167. I see no basis for this expectation, and rather believe that a POSITA would be discouraged from this combination, and in fact would have an expectation that this combination, if contemplated, would be inoperable, and therefore unsuccessful.

IX. ANALYSIS OF GROUNDS 3-8

110. Mr. Dreifus opines that various other combinations of additional references, including Dua (Ex. 1012), Flitcroft (Ex. 1013), and Bursch (Ex. 1010), render claims 7-9 of the '174 patent obvious. Claims 7-9 are dependent claims that depend from claim 1. Ex. 1001, 16:27-39. Because Doughty does not disclose claim 1, it cannot disclose the more specific claims 7-9. Additionally, none of Dua (Ex. 1012), Flitcroft (Ex. 1013), or Bursch (Ex. 1010) cure the fundamental disclosure deficiencies discussed above with respect to Doughty, Abe, and Fox. Therefore, none of these further grounds render claims 7-9 of the '174 patent obvious.

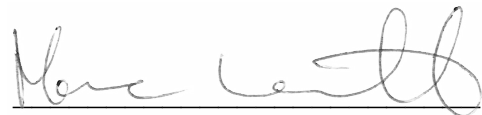
X. ADDITIONAL REMARKS

111. I reserve any right that I may have to supplement this declaration if further information becomes available or if I am asked to consider additional

information or to submit an additional declaration if inter partes review is instituted. Furthermore, I reserve any right that I may have to consider and comment on any additional expert statements and testimony of Petitioners' experts in this matter.

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

Dated: July 16, 2025

A handwritten signature in black ink, appearing to read "Marc Levitt", written over a horizontal line.

Marc E. Levitt, Ph.D.

APPENDIX A

MARC E. LEVITT, PH.D.

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Technology Development ■ Patent/IP Consulting ■ Business Development Startup Ventures, Hardware, Software and Systems

Independent consultant with 30+ years of experience in the areas of executive leadership, business development, technology, technology development, and intellectual property. Broad technical and business depth in computer architecture, networking, mobile, semiconductor design, semiconductor manufacturing, systems-on-a-chip, systems architecture, technical software, embedded software, enterprise software, algorithms, and computational finance. Experience in negotiating IP/patent related issues as part of technology sharing agreements, licensing, and M&A. Strong track record in turn around management and developing new strategic markets through internal development, start-ups, and M&A.

AREAS OF EXPERTISE

Computer Architecture: RISC, CISC, DSP, GPU, memory hierarchies, pipelining, clock design, power management, low power design, microcode, microarchitecture, multicore, memory controllers, 2d & 3d graphics, interconnects/NoC, PCI, PCIe, USB2, USB3, UFS, SDIO, MIPI DSI.

VLSI Design: All aspects of front to back design process and methodologies for digital, analog, and mixed signal designs. Includes RTL (Verilog & VHDL), logic, circuit, physical design, layout, verification. Tapeouts to: IBM, TSMC, UMC, TI, NEC, LSI Logic, & Mitsubishi.

VLSI Manufacturing: CMOS, mask making, OPC, testing, packaging, yield enhancement, debug, failure analysis, and production ramp.

Software: Computer aided design (CAD), drivers, BIOS, operating systems (Windows, Linux, Unix, Android, etc), mobile software, embedded software, JSRs, client-server software, enterprise software, applications, large web based systems (Google, Facebook, AWS etc), algorithms, video streaming, and computational finance.

Systems: Systems-on-a-Chip, VoIP, networking, multiprocessors, servers, PCs, parallel processing, distributed computing, mobile phone, tablets, set-top-boxes, DTV, digital camera/camcorders, automotive, encryption/security, power management, video streaming, MPEG, H264, H265, IEEE 802.x/Ethernet, switching, routing, Bluetooth.

Video: DASH, HLS, Dash.js, ExoPlayer, PlayReady DRM, Widevine DRM, MPEG, H264, H265, VP9, AV1, ffmpeg, GStreamer, CAMF, CENC, BMFF, encoding pipelines, decoding, packaging, all SoC hardware.

Business Development. Product development teams, software product lines, and semiconductor product development projects. Includes strategy, execution, division P&L, margin improvement, and cost management. New product introduction in both large companies and start-ups. Market and technology roadmap development and execution.

PROFESSIONAL EXPERIENCE

Consultant Levitt Technologies

2007 - Present

Independent consultant in the areas of: technology development, intellectual property, and business development/strategy.

Clients in business strategy and technology development include start-ups, VCs, Private Equity firms, and public companies in areas of software, networking hardware, and semiconductors. Partial list of former clients: PhysWare/Nimble (sold to Mentor Graphics Q2'14), PwrLite Software (sold to Xilinx Q3'09), Proficient Design, and Credence Test Systems.

Intellectual property consulting clients are IP investors, patent brokers, public & private corporations, law firms and their clients in the semiconductor, communications, software, and systems areas. Experience at District Court, ITC, and PTAB including expert reports and being deposed.

Complete list available upon request.

- Girasole Imports LLC** **2014 – Present**
Managing Member
 Italian wine importer and distributor for California.
- Commodity Trading Advisor** **1999 – Present**
 Registered Commodity Trading Advisor with NFA ID 0311607
- LongRun Technologies LLC** **2010 – 2022**
MEMBER
 LongRun Technologies LLC owns and administers former Transmeta LongRun Technology licensing agreements with five (5) major semiconductor and systems companies.
- Video Over Cellular Innovations LLC** **2010 – 2011**
CHIEF TECHNICAL OFFICER
 Responsible for technical positioning and analysis to support the sale of this Emmy Award winning mobile video technology, IP, and associated patents. Worked with potential purchasers and bankers on due diligence. Helped successfully support sale to Samsung October 2011. Patents were part of Apple-Samsung litigation.
- Cadence Design Systems, San Jose, California** **2002 – 2007**
VICE PRESIDENT & GENERAL MANAGER
 Ran Cadence's Design for Manufacturing (DFM) Business Unit. This unit is responsible for enterprise class technical software used in semiconductor design, analysis, and manufacturing. Profit/loss responsibility for ~\$130M/year business worldwide and ~240 worldwide employees in R&D, operations, marketing, sales, and AE teams. Locations in Taiwan, Japan, Russia, India, along with three primary locations in the United States (CA, NJ, NC).
- Lead business partner in creating the corporate partnerships between Cadence and ASML, Cadence and Applied Materials, Cadence and Hitachi HiTech, and Cadence and IBM. Included all IP rights and patent issues.
 - Initiated and negotiated M&A activity in support of business unit and company's strategic objectives. Drove the purchase of two start-ups by Cadence for DFM BU. Experience in evaluating and developing business models, financial models, sources of value calculations, synergies, due diligence.
 - Present at IEEE conferences such as DAC and ISQED. Participation ranges from technical papers, panel sessions, to keynote addresses.
 - Analyst Day team member. Help represent Cadence to Wall Street by presenting Yield and DFM strategy to analysts and fund managers during the event.
 - Turned around business unit and drove margins from negative territory to top quartile companywide. Maintained and improved morale, expanded product line, technically overtook competition in key sectors, and improved customer relationships.
- Transmeta Corp, Santa Clara, CA** **2000 – 2002**
DIRECTOR VLSI
 Product manager and architect in charge of running the TM6000 1GHz x86 Low Power System on a Chip project. Responsible for the logic, verification, and circuit design teams on this unique project that integrated a 1GHz x86 processor, north bridge, south bridge, and graphics engine in 130nm/90nm technology. Duties include all hardware product management responsibilities, scheduling, resource planning, and lab prototype work. Interaction with software engineering (CMS, BIOS, and drivers), systems engineering, packaging, foundry, and operations. Coordinate and drive all teams (hw, sw, system) to deliver on commitments.
- Sonics Inc, Mountain View, CA** **1998 – 2000**
DIRECTOR SILICON DEVELOPMENT
 In charge of in-house deep sub-micron design projects in 0.18um CMOS. Responsible for developing, planning and executing product ideas, SoC platforms, and OEM silicon based on the Sonics' Integration Architecture. Ownership encompassed product definition, project planning, resource development, resource allocation, packaging, and test. Designed OC-12 network processor (MIPS based) and assisted in two VoIP chipsets for clients.

Independent**1997 – 1998****CONSULTANT**

Clients included Transmeta and Raycer Graphics (now Apple). Worked in the areas of clocks, reset, design-for-test, design-for-debug, and power management. Consulted with management, design teams and product engineering teams on foundry, debug, yield, quality and test issues.

High Frequency Finance, Sunnyvale, CA**1996 – 1998****FOUNDER**

Company started to develop and deliver a new generation of decision support tools to professional traders and treasury professionals with emphasis on FX. Extensive work in nonlinear statistics, quantitative finance, and real-time software. Realtime streaming software development for Reuters and Bloomberg. Worked with leading money managers and hedge funds.

Sun Microsystems, Mountain View, CA**1990 – 1997****SR HW MANAGER & SR STAFF ENGINEER**

- Significant operational experience performing design, management, and product ramp related tasks.
- Responsible for the test and design-for-test strategy for all SPARC microprocessors and related ASICs, JAVA processors, processor modules, and SPARC reference platform designs.
- Corporate wide consultant on power management, clocking, reset, test, design-for-test, and debug issues.
- Key member of VLSI Design Review team – reviewed and signed off on every circuit design used inside Sun's custom chips.
- Member of ATE selection committee and key interface to test and product engineering organization both inside and outside of Sun.
- Staff Engineer working on the UltraSPARC-I processor. Developed the power management, clocking, test strategy and methodology used for the project at the chip, module, and system level. This strategy and methodology was adopted as a division wide standard used by UltraSPARC-I+, UltraSPARC-II, UltraSPARC-IIi, and UltraSPARC-III.
- Responsible for the evaluation CAD tools. Worked closely with tool vendors to specify new features and functionality. Responsible for specification and some implementation of in-house CAD tools that were directly tied to our advanced design practices.
- Developed, specified, and patented a methodology for fast synchronous SRAM testing that was adopted as a JEDEC standard.

ADDITIONAL EMPLOYMENT

VLSI Testing Research, Hewlett-Packard, 1989

EDA Software Development, Digital Equipment Corporation 1988

PUBLICATIONS, HONORS, AWARDS

Sixteen patents awarded in the areas of circuit design, logic design, hardware testing, software, diagnosis, and formal verification

Over 30 journal, conference publications, and book chapters

Sun Microelectronics Engineering Excellence Award 1996.

Member of Tau Beta Pi and Eta Kappa Nu Engineering Honor Societies

Guest editor of *IEEE Design & Test of Computers* magazine for a special issue on microprocessors January-March 1997.

EDUCATION

MS and PhD in Electrical Engineering, University of Illinois, Urbana, IL, 1986-1990

BS with High Honors Computer Engineering, Lehigh University, Bethlehem, PA, 1982-1986

PUBLICATIONS LIST

JOURNALS AND CONFERENCES

1. "Moving Manufacturing More Effectively Into Design," *DesignCon* 2007.
2. "The Impact of DFM in the Design Phase below 90 Nanometers," *DesignCon* 2006
3. "Making the (Yield) Difference: DFY/DFM," *Proceedings 24th VLSI Test Symposium*, 2006.
4. "Using yield-focused design methodologies to speed time-to-market," *Proceedings of the SPIE Design and Process Integration for Microelectronic Manufacturing III*, 2005.
5. "What Is Design for Yield, and How Do We Get There?" *DesignCon* 2005.
6. "Collaborating Effectively on the Rocky Road to DFM" *FSA Suppliers Expo & Conference* 2005
7. "Using Yield-Focused Design Methodologies to Speed Time-to-Market," *DesignCon* 2005.
8. "Design for manufacturing? Design for yield!!!," *Proceedings 5th International Symposium on Quality Electronic Design*, 2004.
9. "When IC yield misses the target, who is at fault?," *Proceedings 41st Design Automation Conference*, 2004
10. "SOC Testing - Throwing the Baby out with the Bath Water!" *IEEE BAST Workshop*, 2000.
11. "FXYYI?: A Foreign Exchange Yield Investing Index," *Proceedings of Forecasting Financial Markets and Computational Finance*, 2000.
12. "System-on-Chip Debug and Test," *IEEE BAST Workshop*, 1999
13. "Market Time Data™ Improving Technical Analysis and Technical Trading," *Proceedings of Forecasting Financial Markets*, 1998.
14. "Microprocessors Lead The Way In Complex Design," *IEEE Design & Test of Computers*, vol.14, no.1, Jan-Mar 1997
15. "Designing UltraSparc for testability," *IEEE Design & Test of Computers*, vol.14, no.1, Jan-Mar 1997
16. "A fault diagnosis methodology for the UltraSPARC-I microprocessor," *Proceedings European Design and Test Conference*, 1997.
17. "Formal verification of the UltraSPARC family of Processors via ATPG Methods," *International Test Conference*, 1996.
18. "Market Time and Short-Term Forecasting of Foreign Exchange Rates", *Proceedings of Neural Networks in the Capital Markets*, 1996.
19. "A 64-b microprocessor with multimedia support," *IEEE Journal of Solid-State Circuits*, Nov 1995
20. "Testability, debuggability, and manufacturability features of the UltraSPARC-I microprocessor," *Proceedings International Test Conference*, 1995.
21. "A 64b microprocessor with multimedia support," *Digest of Technical Papers IEEE International Solid-State Circuits Conference*, 1995.
22. "UltraSPARC: The next generation superscalar 64-bit SPARC," *Digest of Papers Compcon '95. Technologies for the Information Superhighway*, 1995
23. "Practicing DFT: The Good, The Bad, and The Ugly" *IEEE BAST Workshop*, 1995
24. "Exploitation of Market Inefficiencies via Nonlinear Prediction," *Proceedings of Neural Networks in the Capital Markets*, 1994.
25. "BiCMOS logic testing," *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, Jun 1994
26. "Microprocessor Testing: Which technique is best?" *Proceedings 31st Design Automation Conference*, 1994.
27. "SPARCcenter 2000: Multiprocessing for the 90's," *Digest of Papers Compcon Spring '93*, 1993
28. "Economic and productivity considerations in ASIC test and design-for-test," *Digest of Papers Compcon Spring '92*, 1992
29. "ASIC testing upgraded," *IEEE Spectrum*, vol.29, no.5, May 1992
30. "The effect of multiple charge-discharge paths on testing of BiCMOS logic circuits," *Proceedings 3rd European Conference on Design Automation*, 1992.
31. "Test considerations for BiCMOS logic families," *Proceedings of the Custom Integrated Circuits Conference*, 1991
32. "Physical design of testable VLSI: Techniques and experiments," *IEEE Journal of Solid-State Circuits*, Apr 1990
33. "BiCMOS fault models: Is stuck-at adequate?," *Proceedings International Conference on Computer Design: VLSI in Computers and Processors*, 1990.
34. "Just-in-time methods for semiconductor manufacturing," *Proceedings Advanced Semiconductor Manufacturing Conference and Workshop*, 1990.
35. "Physical design of testable VLSI: Techniques and experiments," *Proceedings of the IEEE Custom Integrated Circuits Conference*, 1989.

36. "The economics of scan design," *Proceedings International Test Conference*, 1989.

BOOK CHAPTERS

1. *Market Time and Short-Term Forecasting of Foreign Exchange Rates*, in **Decision Technologies for Financial Engineering**, A. Weigend, Y. Abu-Mostafa, and P. Refenes eds., World Scientific, Singapore, 1997.
 2. *Machine Learning for Foreign Exchange Trading*, in **Neural Networks in the Capital Markets**, P. Refenes ed., John Wiley & Sons, Chichester, UK, 1995.
 3. *BiCMOS Testing*, in **BiCMOS Technology and Applications 2nd Edition**, A.R. Alvarez ed., Kluwer Academic Publishers, Boston, MA, 1993.
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PATENT LIST

1. US5341382 "Method and apparatus for improving fault coverage of system logic of an integrated circuit with embedded memory arrays", 1994
2. US5379303 "Maximizing improvement to fault coverage of system logic of an integrated circuit with embedded memory arrays", 1995
3. US5513186 "Method and apparatus for interconnect testing without speed degradation", 1996
4. US5528165 "Logic signal validity verification apparatus", 1996
5. US5570376 "Method and apparatus for identifying faults within a system", 1996
6. US5774474 "Pipelined scan enable for fast scan testing", 1998
7. US5787012 "Integrated circuit with identification signal writing circuitry distributed on multiple metal layers", 1998
8. US5850150 "Final stage clock buffer in a clock distribution network", 1998.
9. US5864564 "Control circuit for deterministic stopping of an integrated circuit internal clock", 1999
10. US5870408 "Method and apparatus for on die testing", 1999
11. US5872796 "Method for interfacing boundary-scan circuitry with linearized impedance control type output drivers", 1999
12. US5892778 "Boundary-scan circuit for use with linearized impedance control type output drivers", 1999
13. US5898702 "Mutual exclusivity circuit for use in test pattern application scan architecture circuits", 1999
14. US5900757 "Clock stopping schemes for data buffer", 1999
15. US6081913 "Method for ensuring mutual exclusivity of selected signals during application of test patterns", 2000
16. US8549339 "Processor core communication in multi-core processor", 2013.