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 IPR2025-00640

Patent No. 9,483,722

DECLARATION OF MARC E. LEVITT

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. 9,483,722 ("'722 patent") (Ex. 1001).

2. In my capacity as an expert, I have been asked to provide my independent analysis and opinions regarding the '722 patent, the prosecution history of the '722 patent and related applications as applicable, the alleged prior art relied upon by Petitioner, the meaning of various claim terms from the '722 patent from the perspective of a person of ordinary skill in the art ("POSITA"), and the opinions offered by Petitioners' expert, Dr. Emmanouil Tentzeris, in his declaration ("Tentzeris 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 '722 patent, the prosecution history of the '722 patent and related applications, the prior art publications relied upon by Petitioners, the Declaration of Dr. Tentzeris,

and other related materials. I will not receive any added compensation based on the outcome of any IPR or other proceedings involving the ’722 patent.

II. BACKGROUND 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:

- <u>Computer Architecture</u>: 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;
- <u>VLSI Design</u>: 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 ’722 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 ’722 patent. I was working in the integrated circuit and system design field in the 2008 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;
- The ’722 patent (Ex. 1001);
- The prosecution history of the ’722 patent (Ex. 1002);

- The Tentzeris Declaration (Ex. 1003);
- Ex. 1004, U.S. Patent App. Pub. No. 2010/0112941 ("Bangs");
- Ex. 1005, U.S. Patent App. Pub. No. 2009/0040022 ("Finkenzeller");
- Ex. 1006, U.S. Patent App. Pub. No. 2009/0215489 ("Kerdraon");
- Ex. 1007, U.S. Patent App. Pub. No. 2008/0073426 ("Koh");
- Ex. 1008, U.S. Patent App. Pub. No. 2007/0156436 ("Fisher");
- Ex. 1009, File History for U.S. Patent Application No. 12/188,346 ("'346 Application File History");
- Ex.1011, File History for U.S. Patent No. 9,483,722 ("'722 File History");
- Ex. 1014, Plaintiff iCashe's Infringement Contentions, Including Exhibit B;
- Ex. 1015, Dachs, C., NFC — The Intuitive Contactless Technology Becomes Reality, 122 E&I Elektrotechnik und Informationstechnik 466 (Dec. 1, 2005) ("Dachs");
- Ex. 1017, U.S. Patent App. Pub. No. 2005/0224589 ("Park");
- Ex. 1018, U.S. Patent No. 8,260,199 ("Kowalski");
- Ex. 1023, U.S. Patent No. 5,943,624 ("Fox");
- Ex. 1026, U.S. Patent App. Pub. No. 2008/0235796 ("Buhr");
- Ex. 1027, Finkenzeller, K., RFID Handbook, First Edition ("Finkenzeller-RFID");

- Ex. 1028, Goldweber Declaration for Ex. 1027;
- Ex. 1031, U.S. Patent App. Pub. No. 2004/0133787 ("Doughty"); and
- Ex. 1036, Mayes, K. et al., Smart Cards, Tokens, Security and Applications (December 11, 2007).

IV. LEVEL OF SKILL IN THE ART AND BASIS FOR OPINIONS

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

- 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, ¶ 50;
- That "a person having ordinary skill in the art in this matter would have had a Bachelor's degree in computer science, computer engineering, electrical engineering, or a similar field, with 2-3 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, ¶ 51.

18. I disagree with Dr. Tentzeris that a POSITA in this matter necessarily must have specific experience in "smartcards and contactless communications"

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 ’722 patent’s priority date would be understood by a person who has the qualifications I list above, even without specific experiences with “smartcards and contactless communications.”

19. Based on my experience, and whether under Dr. Tentzeris’s definition or my own, I am qualified to render opinions regarding the technology claimed and described in the ’722 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 2008 timeframe.

V. RELEVANT LEGAL PRINCIPLES

20. 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

21. 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.

22. 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.

23. 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.

24. 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.

25. 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.

26. 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. Anticipation

27. I understand that under U.S. Patent Law, 35 U.S.C. § 102, a claim is invalid as anticipated only if each and every element as set forth in the claim is actually disclosed, either expressly or inherently, in a single prior art reference.

28. I am informed that a reference is anticipatory if it contains the claim elements in the same order as claimed, regardless of whether the prior art and the claimed invention are directed to achieving the same purpose.

29. I am informed that a prior art reference may anticipate a claim without expressly disclosing a feature of the claimed invention if that missing feature is necessarily present, or inherent, in the single anticipating reference.

30. I am informed that inherency requires more than the probability or possibility that a claimed feature is present in the prior art, but rather that the feature or characteristic is a necessary part of the prior art. I also am informed that recognition of the inherency by a POSITA— at the time— is not required.

C. Obviousness

31. 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.

32. 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.

33. 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 obvious analysis may take account of the inferences and creative steps that a POSITA would employ.

VI. BACKGROUND OF THE ’722 PATENT

A. State of the art at the time of invention

34. Devices that communicate using RF communications, such as near field communication (NFC) devices, traditionally operate in either a passive mode or an active mode. Ex. 1001 at 1:13-14.

35. A passive RF device is characterized by the fact that it does not generate its own RF field; it relies instead upon an interrogating RF field generated by an

active device. *Id.* at 1:22-24. To communicate with the active device, the passive device modulates and reflects back the signal received from the active device. *Id.* at 1:22-27. Passive devices are typically not powered. *Id.* at 1:22. Instead, the passive device builds a charge from the active device's signal in order to modulate and return the active device's signal. *Id.* at 1:22-27.

36. In contrast to passive devices, active devices are typically connected to a power source and generate an RF signal. *Id.* at 1:14-15. An active device communicates by transmitting its own generated signal to another device, rather than modulating a received signal. *Id.* at 1:15-17.

37. Active and passive RF device communicate differently. When a passive device communicates with an active device, the active device continuously generates an RF signal and the passive device modulates and reflects back the same signal. When two active devices communicate, the devices must alternate their transmissions, such that one device receives while the other device transmits. A device cannot both listen and transmit simultaneously.

B. Overview of the '722 patent

38. The inventors of the '722 patent claims created a new mechanism for contactless, secure payments that would interface with existing smartcard infrastructure and allow consumers to make smartcard payments using their mobile phones. Inventors Dr. Narendra, Mr. Tadepalli, and Mr. Chakraborty sought to

incorporate smartcard functionality into a mobile phone, thereby allowing users to make contactless radio frequency (RF)-based payments without the need to carry a separate smartcard. They achieved this by developing "performance enhancement circuits" that would allow the phone to operate as an active RF device, but to interface with existing smartcard point-of-sale infrastructure by appearing to the point-of-sale reader as a passive RF device.

39. The inventions claimed in the '722 patent improved the process of effectuating smartcard transactions by integrating a smartcard controller into a mobile device, together with a small form factor antenna, by using performance enhancement circuits coupled between the smartcard controller and the antenna. *See* Ex. 1001 at Abstract, 2:43-47, 19:40-20:6.

40. In developing this improvement, the '722 patent inventors sought to design a system that would interface with existing smartcard infrastructure. *E.g.*, Ex. 1001 at 2:43-47. Conventional point-of-sale smartcard readers are active devices that are configured to communicate with passive devices, such as conventional smartcards in the form of, e.g., credit cards. Therefore, the '722 patent inventors sought to incorporate smartcard circuitry into a mobile phone in a manner that could communicate in a passive mode with conventional smartcard readers. Ex. 1001 at 2:43-47.

41. The ’722 patent inventors faced unique challenges in implementing smartcard circuitry into a mobile phone. For example, mobile phones require a relatively small form factor, such that the antennas of traditional passive smartcards were too large. Ex. 1001 at 2:6-8. As the specification of the ’722 patent describes, prior to the ’722 patent, “[t]here ha[d] been attempts to implement passive [RFID] tags into smaller mobile devices,” such as mobile phones. *Id*. But those attempts were “met with limited success due in part to the size of the loop antenna” required. *Id.* at 2:6-13.

42. To overcome this problem, the ’722 patent inventors created a device that modulates a received signal to communicate in a passive mode, but that does so by drawing upon an internal power source to *actively*, rather than *passively*, load modulate the received signal. Ex. 1001 at 9:8-10, 9:19-22, 10:24-28. By relying on an internal power source and using active load modulation, the ’722 patent device can operate with a smaller antenna than those of traditional passive smartcards.

43. The ’722 patent device achieves this using performance enhancement circuits arranged within the phone between the smartcard controller and the antenna. Ex. 1001 at 15:28-33. The performance enhancement circuits include an amplifier and load modulation circuitry, as shown for example in Figure 25, below. Ex. 1001 at 16:57-17:5, 17:30-36.

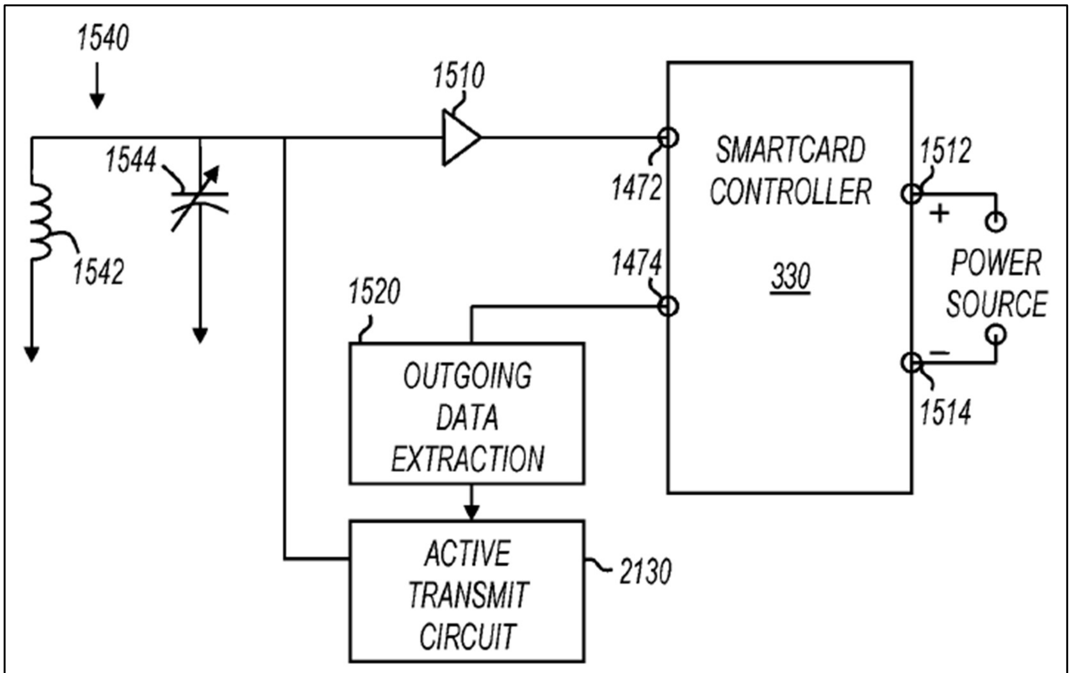


FIG. 21

Ex. 1001, Fig. 21.

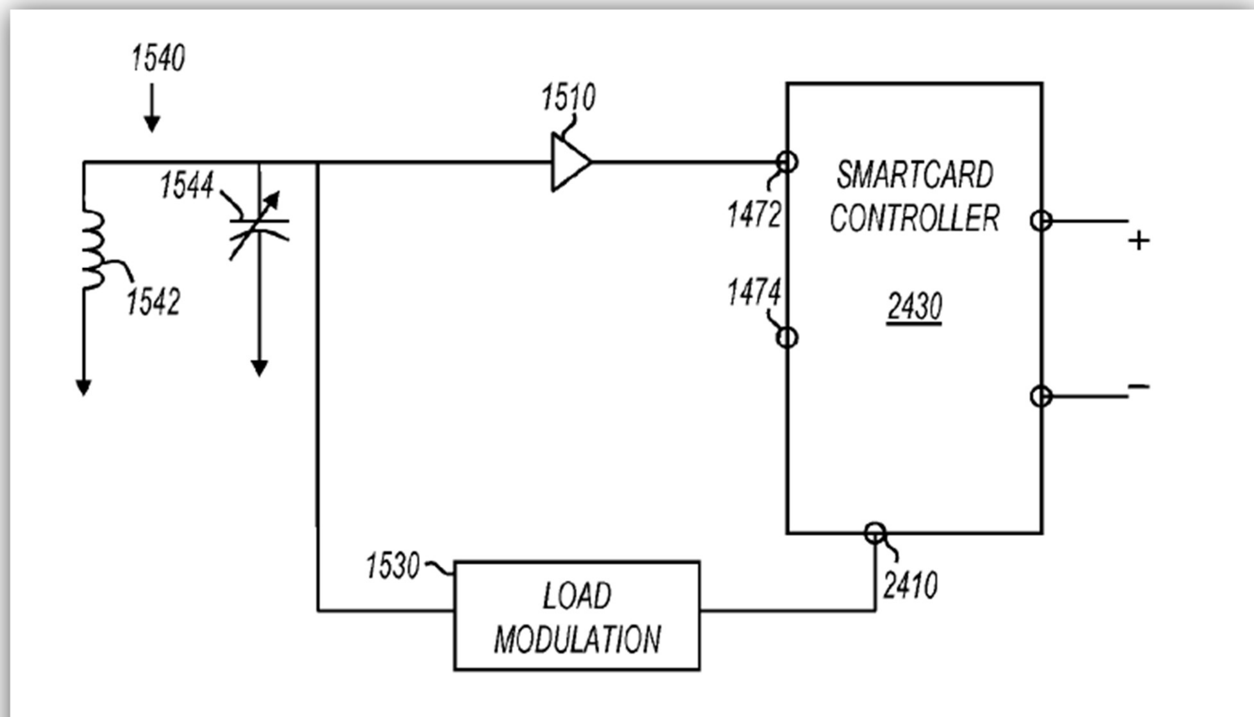


FIG. 25

Ex. 1001, Fig. 25.

44. The amplifier, such as amplifier 1510 shown above in Figure 25, "amplifies the voltage received at antenna 1542, and the amplified voltage is provided to the smartcard controller." *Id.* at 15:31-33. The amplifier thereby "increases the maximum distance at which the RFID card can operate while receiving data." *Id.* at 15:33-34.

45. Performance enhancement circuits also include an "active transmit driver circuit" or "active transmit circuit," as shown above in Figure 21, which

includes "circuits to actively transmit a signal rather than simply load modulate tuned circuit 1540." Ex. 1001 at 16:57-17:2.

46. Additionally, performance enhancement circuits include a load modulating circuit, such as load modulation driver circuit 1530 shown in Figure 25. Load modulation driver circuit 1530 "modulates the impedance of the tuned circuit 1540 to form the outgoing data path." *Id.* at 15:48-50.

47. Load modulation may be passive or active. As the '722 patent describes, passive load modulation is "generally well known, and may be as simple as a switched transistor that adds and removes a reactive element" from the tuned circuit. Ex. 1001 at 15:67-16:3. However, the '722 patent further discloses an active circuit for actively transmitting data. In particular, the '722 patent describes that performance enhancement circuits may include an active transmit driver circuit. *Id.* at 16:60-62, 20:46-49 (claim 11). "Active transmit driver circuit 2130 may include circuits to actively transmit a signal rather than simply load modulate" a tuned circuit. *Id.* at 16:63-65. That is, rather than responding passively by modulating a received signal, the active transmit driver circuit 2130 actively generates a signal for communicating with another device. *Id.* at 16:65-17:2.

48. For example, Figure 16 illustrates a waveform of an interrogating RF signal, such as a signal produced by a point-of-sale device. The waveform includes both a carrier frequency 1620 and two sidebands 1610 about the carrier frequency.

Id. at 15:52-55. The '722 patent describes that, in responding to an interrogating signal, such as that shown in Figure 16, rather than passively load modulating the received signal or actively generating a responsive signal, the active transmit driver circuit "***form[s] a signal that mimics the sidebands*** 1610" of the interrogating frequency "***as if the interrogating RF field experienced load modulation***." *Id.* at 16:65-17:2.

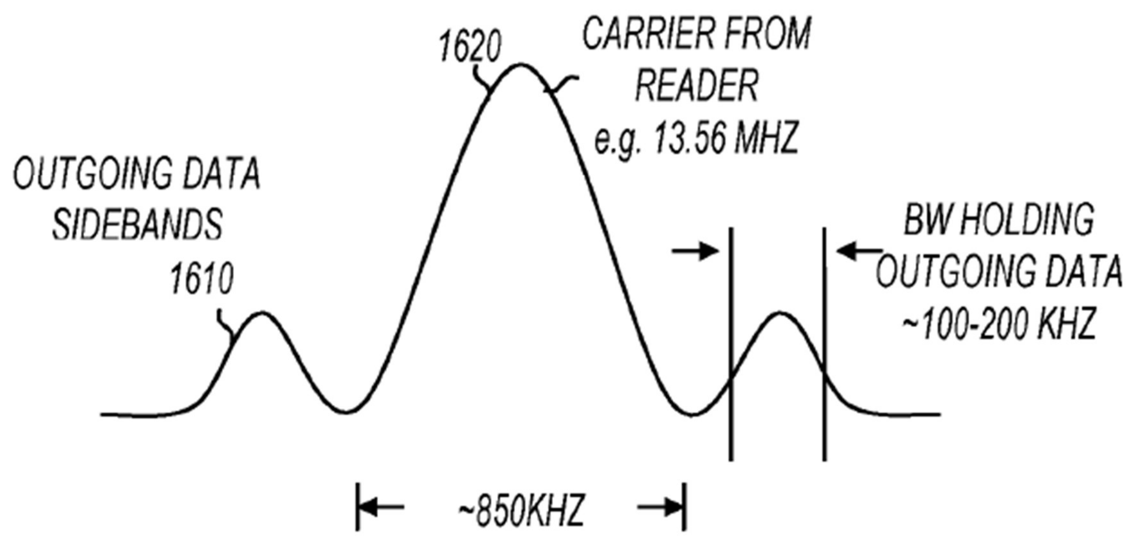


FIG. 16

Ex. 1001, Fig. 16.

49. Thus, the active transmit driver circuit performs an active transmission but, by ***mimicking the sidebands of the interrogating frequency***, the transmission

appears to other devices like a passive transmission. By mimicking the sidebands and appearing to operate as a passive smartcard, the claimed mobile device of the '722 patent could readily interface with then-existing smartcard reader infrastructure, such as point-of-sale devices.

50. The '722 patent further describes that the smartcard controller and performance enhancement circuits draw power directly from the device's own power source. Ex. 1001 at 9:8-10, 9:19-22, 10:24-28. By relying on an internal power source, the smartcard controller and performance enhancement circuits can operate without requiring a conventionally large loop antenna that would otherwise be needed to build a high enough charge to power the components. *Id.* And thus, the circuitry can be provided in a small enough form factor for use in a mobile phone. *Id.* at 9:33-39; *see also id.* at 17:2-5 ("Active transmission can make use of power available on the RFID card and can further increase the usable distance when smartcard controller 330 is transmitting.").

51. Claim 1 of the '722 patent recites:

1. [preamble] A mobile device comprising:

[1.a] a smartcard controller that includes load modulation circuitry for half duplex communication by creating at least one frequency sideband about a carrier frequency of an interrogating radio frequency (RF) field;

[1.b] an antenna tuned to operate at 13.56 MHz; and

[1.c.1] at least one active circuit coupled between the smartcard controller and the antenna,

[1.c.2] wherein the at least one active circuit includes an amplifier coupled to be powered by the mobile device, and wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller, and

[1.c.3] the at least one active circuit further includes a transmit circuit coupled between the smartcard controller and the antenna that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna.

Ex. 1001 at 19:40-56.

52. Claim 5 recites:

5. [preamble] A mobile device comprising:

[5.a] a smartcard controller that includes load modulation circuitry for half duplex communication by creating at least one frequency sideband about a carrier frequency of an interrogating radio frequency (RF) field;

[5.b] an antenna tuned to operate at 13.56 MHz;

[5.c] an amplifier coupled between the smartcard controller and the antenna, wherein the amplifier is coupled to be powered by the mobile device, and wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller; and

[5.d] a transmit circuit coupled between the smartcard controller and the antenna that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna.

Ex. 1001 at 20:7-22.

53. Claim 11 recites:

11. [preamble] A mobile device comprising:

[11.a] a smartcard controller that includes load modulation circuitry for half duplex communication by creating at least one frequency sideband about a carrier frequency of an interrogating radio frequency (RF) field;

[11.b] an antenna tuned to operate at 13.56 MHz;

[11.c] an amplifier coupled to be powered by the mobile device, wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller; and

[11.d] an active transmit driver circuit coupled between the smartcard controller and the antenna, wherein the active transmit driver circuit is coupled to be powered by the mobile device.

Ex. 1001 at 20:36-49.

VII. PRIORITY DATE OF THE ’722 PATENT

54. [insert argument]

VIII. ANALYSIS OF FINKENZELLER

55. Dr. Tentzeris opines that claim 1-14 of the ’722 patent are either anticipated by or rendered obvious by Finkenzeller (Ground 1). I disagree with Dr. Tentzeris’s conclusions regarding Finkenzeller, for the reasons discussed below.

A. Overview of Finkenzeller

56. Finkenzeller is directed to an RFID “transponder unit” with “means integrated therein for actively sending a signal” to a reading device. Ex. 1005 (Finkenzeller), Abstract. The transponder unit of Finkenzeller can operate in either of two modes, i.e., in an active mode or a passive mode: “The transponder unit 1 is operated in a ***first (active) operating mode*** as an actively sending transponder. In a ***second (passive) operating mode***, however, the transponder unit works like an ordinary passive transponder performing a load modulation on the field of the reading device.” Ex. 1005 at [0065] (emphasis added).

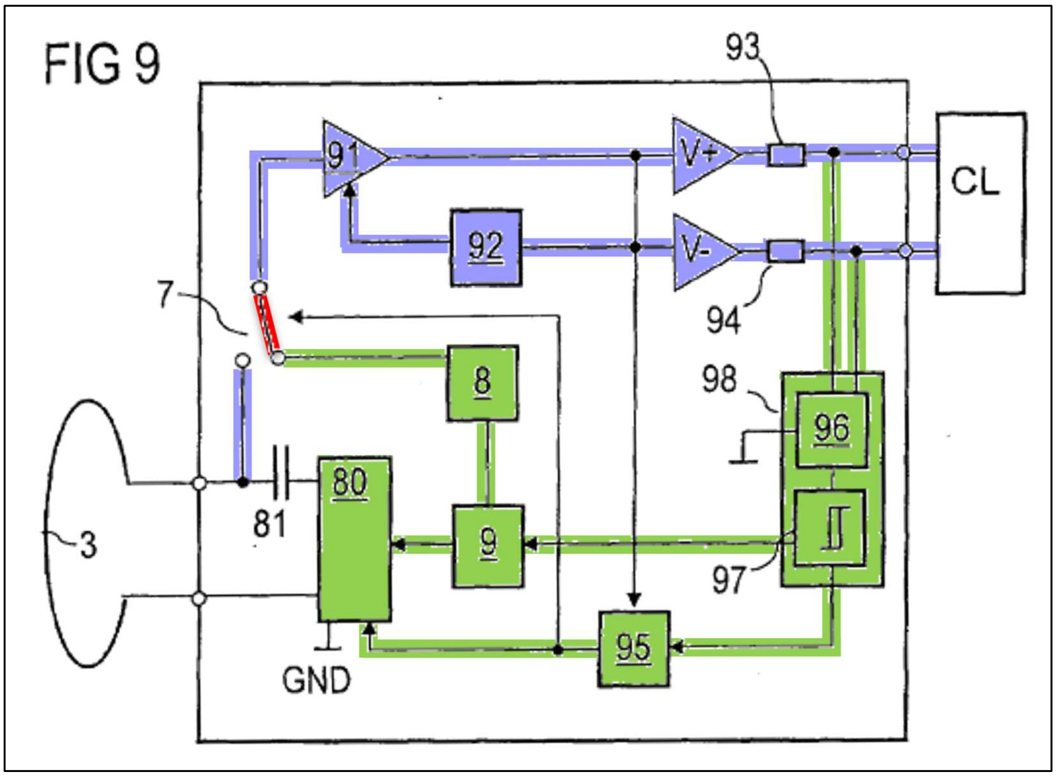
57. Recognizing the limitations of data transfer over increasing distances, “[e]ven with active transponders,” (Ex. 1005 at [0007]), the purported object of Finkenzeller is “to extend the range of data transfer in a system comprising a transponder reading device and a transponder unit compared to conventional systems with active or passive transponders.” *Id.* at [0008].

58. Finkenzeller explains, for example, that "a commercially available ISO 14443 reading device which can communicate with an inductively coupled, contactless chip card according to the prior art over a distance of approx. 10 cm could communicate with an inventive transponder unit over many times this distance." Ex. 1005 at [0017].

59. To facilitate the goal of communication over greater distances, Finkenzeller's transponder unit includes an energy supply, i.e., a battery: "To supply the active components of the transponder unit at least partly with energy and to increase the energy range between the transponder unit 1 and the reading device 100, the inventive transponder unit has a battery 2." Ex. 1005 at [0060]; *see also id.* at [0048] ("The transponder unit 1 thus uses its own energy for the purpose of data transfer.").

60. Finkenzeller's transponder unit embodied in Figure 9, which is the embodiment the Petition focuses on, uses two branches of circuitry for providing receive and transmit functionality. "The inventive active transponder unit has a ***receive branch*** and a ***transmit branch***. The ***receive branch*** consists of an antenna 3, an input amplifier 91, an automatic gain control 92 and an amplifier which is preferably designed as a push-pull amplifier (V+, V-). Further, a transponder chip CL is connected via its antenna connections to the push-pull amplifier." Ex. 1005 at [0106] (emphasis added). "The ***transmit branch*** consists of a demodulation circuit

97 [*sic*, 98], a modulator circuit 9, an oscillator 8 (e.g. 13.56 MHz), a controller 95, and a transmitter amplifier 80 connected to the antenna 3. The demodulation circuit 98 can consist for example of a rectifier 96 and a threshold switch 97." Ex. 1005 at [0108] (emphasis added). The ***receive branch*** and the ***transmit branch***, and the subcomponents of each, are depicted in the colorized version of Figure 9 below.



Ex. 1005, Fig. 9 (color added)

61. Notably, however, as discussed below with regard to the challenged '722 claims, in Finkenzeller's transponder unit embodied in Figure 9, the two discrete receive and transmit branches of circuitry are switched, such that only one branch can be engaged at a time. .

62. The ***switch 7***, depicted above in Figure 9, is used to switch the Finkenzeller transponder unit between receive mode and transmit mode, as discussed below. Ex. 1005 at [0055] (stating, regarding the Figure 2 embodiment, "[a] switch 7 is used for switching the antenna 3 between the receiver 4 and the transmitter 6."). Specifically, receive mode and transmit mode are engaged by respectively toggling the switch between the antenna 3 (for receive mode) and the oscillator 8 (for transmit mode), as depicted in Figure 9 above. Ex. 1005 at [0114] (to switch to transmit mode, "the switch 7 is first switched from the antenna 3 to the oscillator 8 (13.56 MHz).").

63. Receive mode is the default mode of operation in Finkenzeller's transponder unit. Finkenzeller "provide[s] to switch the inventive circuit to the ***transmit mode only when a modulation signal (amplification modulation) can be detected exclusively on the connections of the RFID chip CL and not in the receive branch***, since only in this case is a load modulation involved." Ex. 1005 at [0118] (emphasis added). "If the controller 95 is no longer supplied a modulation signal for a defined time t, it is provided according to the invention that ***it automatically switches the inventive circuit back to the receive mode***." Ex. 1005 at [0116] (emphasis added).

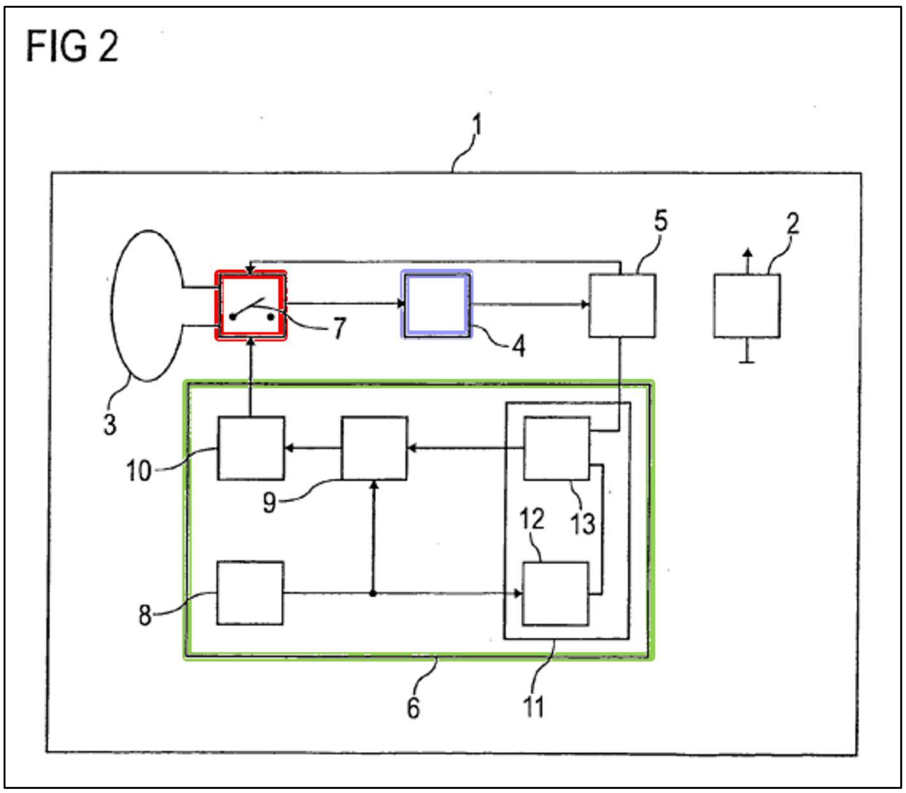
64. Receive mode is engaged by switching to the receive branch, via switch 7. "In the receive mode a voltage is induced in the antenna 3 by the magnetic field

of a remote RFID reading device. Together with the capacitor 81 the antenna 3 forms a parallel-resonant circuit whose resonant frequency corresponds approximately to the transmitting frequency of the RFID reading device. The voltage thus available on the resonant circuit is supplied to the input amplifier 91 ***via the switch 7***." Ex. 1005 at [0109] (emphasis added).

65. Regarding transmit mode, Finkenzeller's controller 95 "switches the inventive circuit with the first edge of the modulation signal to a ***transmit mode*** without delay if possible, so that the data generated by the RFID chip CL can also be transferred to the remote reading device. For this purpose, the ***switch 7 is first switched from the antenna 3 to the oscillator 8 (13.56 MHz)***. This is necessary to be able to keep supplying the RFID chip CL with an alternating voltage of the right frequency." Ex. 1005 at [0114] (emphasis added); *see also id.* at [0063] ("The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to transmit mode of the transponder unit by a signal of the controller 5.").

66. Consistent with the Figure 9 embodiment, the Figure 2 embodiment of Finkenzeller also includes fully switched receive and transmit paths. Ex. 1005 at Fig. 2. In Figure 2, "[t]he transponder unit [1] has a battery 2, an inductive antenna 3 and an electronic circuit 4, 5, 6, 7. The electronic circuit consists substantially of three

functional blocks, a ***receiver 4***, a controller 5 and a ***transmitter 6***. A ***switch 7*** is used for ***switching the antenna 3 between the receiver 4 and the transmitter 6***." Ex. 1005 at [0055] (emphasis added). In the Figure 2 embodiment, "controller 5 transmits a control signal to the ***switch 7 which switches between receive mode and transmit mode*** of the transponder unit." Ex. 1005 at [0056] (emphasis added).



Ex. 1005 (Finkenzeller), Fig. 2 (color added).

67. Finkenzeller does not disclose any embodiment in which the receive and transmit branches are not switched.

B. Finkenzeller Does Not Disclose Various ’722 Patent Claim Limitations

1. both [1.c.2] “wherein the at least one active circuit includes an amplifier . . . wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller” and [1.c.3] “the at least one active circuit further includes a transmit circuit coupled between the smartcard controller and the antenna . . . .”

68. Claim 1 recites, in relevant part:

> [1.c.1] at least one active circuit coupled between the smartcard controller and the antenna, [1.c.2] wherein the at least one active circuit includes an amplifier coupled to be powered by the mobile device, and wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller, and [1.c.3] the at least one active circuit further includes a transmit circuit coupled between the smartcard controller and the antenna that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna.

Ex. 1001 (’722), 19:46-56.

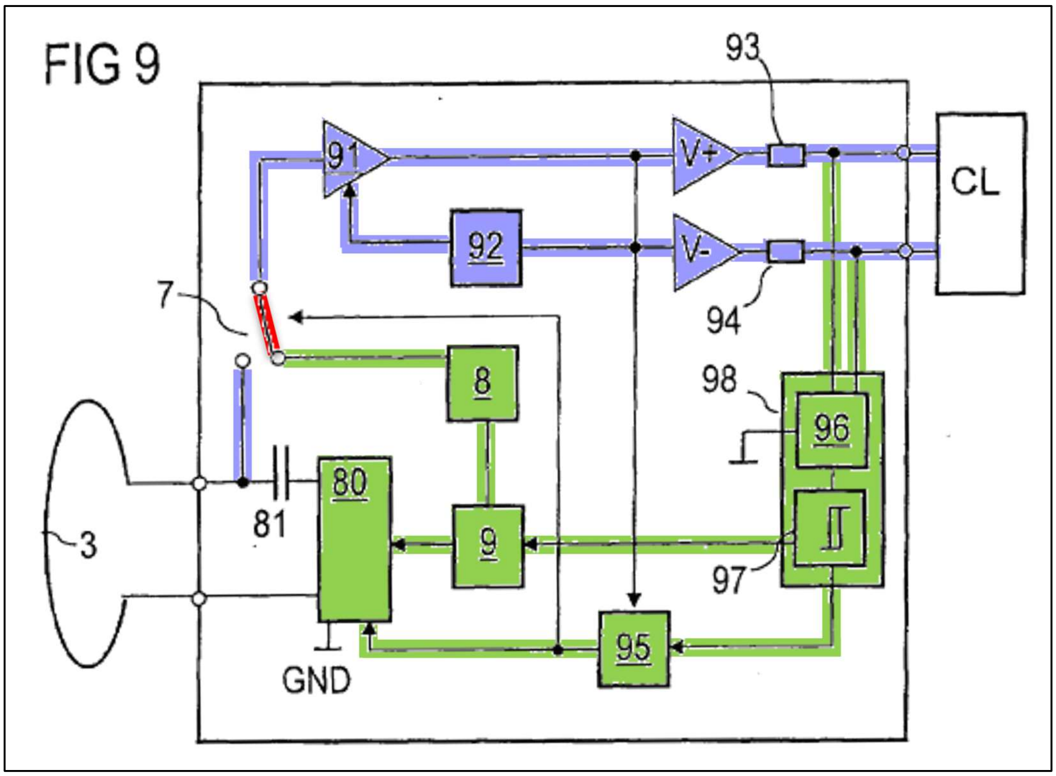
69. Claim 1 of the ’722 recites “at least one active circuit coupled between the smartcard controller and the antenna.” Ex. 1001 at 19:46-47. The “at least one active circuit” includes two subcomponents, an “amplifier” and a “transmit circuit,”

for each of which claim 1 recites specific configurations. The claimed ***amplifier*** (of the at least one active circuit) is (1) "coupled to be powered by the mobile device," (Ex. 1001 at 19:48-49), and (2) "coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller" (*id.* at 19:50-52). The claimed ***transmit circuit*** (of the at least one active circuit) is "coupled between the smartcard controller and the antenna that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna." Ex. 1001 at 19:53-56

70. Claim 1 thus recites a configuration wherein ***both*** the claimed amplifier ***and*** the transmit circuit are continuously coupled between the claimed smartcard controller and antenna. Because both the amplifier and transmit circuit are continuously coupled, the amplifier remains ready to amplify signals and pass them to the controller, and the transmit circuit remains ready to drive the antenna with signals that mimic sidebands.

71. In contrast, Finkenzeller does not disclose an embodiment that includes these two limitations, i.e., amplifier coupled as claimed ***and*** transmit circuit coupled as claimed, in a single configuration. Instead, because Finkenzeller discloses a ***receive branch*** and a ***transmit branch*** that are ***switched***, as illustrated in Figure 9 and as discussed above in Section VIII.A, at most, Finkenzeller can only disclose either the '722 patent claim 1's claimed amplifier (on the receive

branch) ***or*** the claimed transmit circuit (on the transmit branch)—but not both. Finkenzeller therefore does not "disclose a mobile device that includes the claimed arrangement of a smartcard controller, antenna, amplifier, and transmit circuit," as the Petition claims. Pet. at 21.



Ex. 1005 (Finkenzeller), Fig. 9 (color added).

72. Finkenzeller differs significantly from '722 in that Finkenzeller must be switched back and forth, via a ***physical switch 7***, between receive mode and transmit mode in order to receive and transmit data, respectively. Finkenzeller's amplifier 91 is engaged only when the switch connects it to the antenna during receive mode. Ex. 1005 at [0109]. It is explicitly disconnected when Finkenzeller's

transponder is in transmit mode, breaking the reception path. Ex. 1005 at [0109], [0114]. Furthermore, if the path is not disconnected then the RFID chip CL would be non-operative as it would not receive the necessary alternating voltage of the correct frequency, Ex. 1005 at [0114]. Likewise, when in receive mode, Finkenzeller's modulator 9 and the components of the transmit path are disconnected when the switch couples the receive path to the antenna. *Id.*.

73. Neither the Petition nor Dr. Tentzeris addresses this key distinction. Although the Petition acknowledges the distinct "receive branch" and "transmit branch," (*see, e.g.*, Pet. at 34 ("Finkenzeller discloses at least one active circuit (e.g., 'receive branch' and 'transmit branch' of 'active transponder unit') coupled between the smartcard controller and the antenna . . .")), Dr. Tentzeris does not in any way the significance of Finkenzeller's switch-coupled architecture, or explains why in spite of that architecture Finkenzeller discloses an amplifier and a transmit circuit coupled as claimed.

74. At most, the Petition acknowledges that Finkenzeller "discloses using a switch 7 for 'switch[ing] between the receive mode and transmit mode' according to whether received data is to be provided to the RFID chip CL or data from the RFID chip CL is to be transmitted." Pet. at 28 (citing Ex. 1005 (Finkenzeller), [0056], [0114]) (Petitioners' alterations); *see also* Pet. at 36 (citing Ex. 1005 at [0109]-[0110], Fig. 9; Tentzeris, ¶¶ 100-101). But the Petition and Dr. Tentzeris are

silent as to how Finkenzeller discloses all of the limitations of claim 1 despite Finkenzeller's switched receive/transmit architecture.

75. Finkenzeller simply discloses a different configuration, as discussed above, chosen based on a different set of design considerations and goals, from that of '722 claim 1.

2. **<u>both</u> [5.c] "an amplifier coupled between the smartcard controller and the antenna . . . wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller" <u>and</u> [5.d] "a transmit circuit coupled between the smartcard controller and the antenna . . . ."**

76. Claim 5 recites, in relevant part:

> [5.c] "an ***amplifier*** coupled between the smartcard controller and the antenna, wherein the amplifier is coupled to be powered by the mobile device, and wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller, and"
>
> [5.d] "a ***transmit circuit*** coupled between the smartcard controller and the antenna that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna."

Ex. 1001 ('722), 20:13-22 (emphasis added).

77. Like '722 claim 1, discussed above, claim 5 recites both an "amplifier" and a "transmit circuit," for each of which claim 5 recites a specific configuration. The claimed ***amplifier*** is (1) "***coupled between the smartcard controller and the antenna***," (*id.* at 20:13-14 (emphasis added)), (2) "wherein the amplifier is coupled to be powered by the mobile device" (*id.* at 20:14-15), (3) "wherein the ***amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller***" (*id.* at 20:15-18 (emphasis added)). The claimed ***transmit circuit*** is "***coupled between the smartcard controller and the antenna*** that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna." *Id.* at 20:19-22 (emphasis added).

78. Again like '722 claim 1, claim 5 thus recites a configuration wherein ***both*** the claimed amplifier ***and*** the transmit circuit are continuously coupled between the claimed smartcard controller and antenna. Because both the amplifier and transmit circuit are continuously coupled, the amplifier remains ready to amplify signals and pass them to the controller, and the transmit circuit remains ready to drive the antenna with signals that mimic sidebands.

79. As discussed above, Finkenzeller does not disclose an embodiment that includes these two limitations, i.e., amplifier coupled as claimed ***and*** transmit circuit coupled as claimed, in a single configuration. Instead, as discussed above with respect to claim 1, because Finkenzeller discloses ***switched*** receive and transmit

circuitry branches, at most, it can only disclose either the ’722 patent claim 5’s claimed amplifier (on the receive branch) ***or*** the claimed transmit circuit (on the transmit branch)—but not both. Finkenzeller therefore does not “disclose a mobile device that includes the claimed arrangement of a smartcard controller, antenna, amplifier, and transmit circuit,” as the Petition claims. Pet. at 21.

3. <u>both</u> [11.c] “an amplifier . . . wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller” <u>and</u> [11.d] “an active transmit driver circuit coupled between the smartcard controller and the antenna . . . .”

80. Claim 11 recites, in relevant part:

> [11.c] “***an amplifier*** coupled to be powered by the mobile device, wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller; and”
>
> [11.d] “***an active transmit driver circuit*** coupled between the smartcard controller and the antenna, wherein the active transmit driver circuit is coupled to be powered by the mobile device.”

Ex. 1001 (’722), 20:42-49 (emphasis added).

81. Like ’722 claims 1 and 5, discussed above, claim 11 recites both an “amplifier” and transmit circuitry (whereas claims 1 and 5 recite a “transmit circuit,”

claim 11 recites another, more specific term, "active transmit driver circuit"), for each of which claim 11 recites a specific configuration. The claimed ***amplifier*** is (1) "coupled to be powered by the mobile device," (*id.* at 20:42), and (2) "wherein the ***amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller***" (*id.* at 20:43-45 (emphasis added)). The claimed ***active transmit driver circuit*** is "***coupled between the smartcard controller and the antenna***, wherein the active transmit driver circuit is coupled to be powered by the mobile device." *Id.* at 20:46-49 (emphasis added).

82. Again like '722 claims 1 and 5, claim 11 thus recites a configuration wherein ***both*** the claimed amplifier ***and*** the transmit circuitry (i.e., "active transmit driver circuit") are continuously coupled between the claimed smartcard controller and antenna. Because both the amplifier and active transmit driver circuit are continuously coupled, the amplifier remains ready to amplify signals and pass them to the controller, and the active transmit driver circuit remains ready to drive the antenna with signals that mimic sidebands.

83. As discussed above, Finkenzeller does not disclose an embodiment that includes these two limitations, i.e., amplifier coupled as claimed ***and*** transmit circuit (i.e., "active transmit driver circuit") coupled as claimed, in a single configuration. Instead, as discussed above with respect to claim 1, because Finkenzeller discloses ***switched*** receive and transmit circuitry branches, at most, it can only disclose either

the ’722 patent claim 11’s claimed amplifier (on the receive branch) ***or*** the claimed active transmit driver circuit (on the transmit branch)—but not both. Finkenzeller therefore does not “disclose a mobile device that includes the claimed arrangement of a smartcard controller, antenna, amplifier, and transmit circuit,” as the Petition claims. Pet. at 21.

IX. ANALYSIS OF THE COMBINATION OF FINKENZELLER AND KERDRAON

84. Dr. Tentzeris opines that claim 1-14 of the ’722 patent are rendered obvious by Finkenzeller in view of Kerdraon (Ground 2). I disagree with Dr. Tentzeris’s conclusions regarding the combination of Finkenzeller and Kerdraon, for the reasons discussed below.

85. Ground 2 asserts that Kerdraon supplies only the “smartcard controller” limitation of all challenged claims: “To the extent it is argued that further disclosure of a smartcard controller is required, Kerdraon discloses a smartcard controller (e.g., “smart card controller”) as recited in each claim.” Pet. at 55 (citing Ex.1006 (Kerdraon), [0070]-[0071]).

86. Neither the Petition nor Dr. Tentzeris asserts that Kerdraon supplies any limitation from any ’722 challenged claim other than the “smartcard controller” limitation. *See* Pet. at 55-60; Ex. 1003 (Tentzeris), ¶¶ 169-179.

87. Thus, even as combined, the combination of Finkenzeller and Kerdraon does not disclose the limitations discussed above regarding Ground 1.

X. ANALYSIS OF THE COMBINATION OF FINKENZELLER AND KOH

88. Dr. Tentzeris opines that claim 1-14 of the ’722 patent are rendered obvious by Finkenzeller in view of Koh (Ground 3). I disagree with Dr. Tentzeris’s conclusions regarding the combination of Finkenzeller and Koh, for the reasons discussed below.

89. Similar to Ground 2 and the combination of Finkenzeller and Kerdraon, Ground 3 asserts that Koh supplies only the “smartcard controller” limitation of all challenged claims: “Koh discloses a smartcard controller (e.g., “Smart MX (SMX) module”) as recited in each claim.” Pet. at 60 (citing Ex.1007 (Koh), [0033]). Neither the Petition nor Dr. Tentzeris asserts that Koh supplies any limitation from any ’722 challenged claim other than the “smartcard controller” limitation. *See* Pet. at 60-63; Ex. 1003 (Tentzeris), ¶¶ 180-187.

90. Thus, even as combined, the combination of Finkenzeller and Koh does not disclose the limitations discussed above regarding Ground 1.

XI. ANALYSIS OF THE COMBINATION OF FINKENZELLER AND BANGS

91. Dr. Tentzeris opines that claim 8 of the ’722 patent is rendered obvious by Finkenzeller in view of Bangs (Ground 4). I disagree with Dr. Tentzeris’s

conclusions regarding the combination of Finkenzeller and Bangs, for the reasons discussed below.

92. Ground 4 applies only to '722 claim 8. *See* Pet. at 6 (summary chart), 63. Ground 4 asserts that Bangs supplies only claim 8's limitation "wherein the transmit circuit comprises a load modulation circuit": "[T]o the extent a load modulation circuit requires load modulating an interrogating field instead of generating a new signal, Bangs discloses a transmit circuit (*e.g.*, circuitry between 'antenna element 309' and 'controller 107') [*sic*] comprises a load modulation circuit (*e.g.*, 'switchable' 'resistor 301 . . . in parallel with capacitor 304')." Pet. at 63 (citing Ex.1004 (Bangs), [0051], [0057]-[0060], [0066]; Ex. 1003 (Tentzeris), ¶ 188). Neither the Petition nor Dr. Tentzeris asserts that Bangs supplies any limitation from '722 claim 8 other than the "load modulation circuit" limitation. *See* Pet. at 63-69; Ex. 1003 (Tentzeris), ¶¶ 188-195.

93. Thus, even as combined, the combination of Finkenzeller and Bangs does not disclose the limitations discussed above regarding Ground 1.

XII. ANALYSIS OF THE COMBINATION OF FINKENZELLER, KERDRAON, AND BANGS

94. Dr. Tentzeris opines that claim 8 of the '722 patent is rendered obvious by Finkenzeller in view of Kerdraon and Bangs (Ground 5). I disagree with Dr.

Tentzeris's conclusions regarding the combination of Finkenzeller, Kerdraon, and Bangs, for the reasons discussed below.

95. Ground 5 asserts that Kerdraon supplies only the "smartcard controller" limitation of claim 1, from which challenged claim 8 depends, stating (in the context of Ground 2, but later applied to Ground 5): "To the extent it is argued that further disclosure of a smartcard controller is required, Kerdraon discloses a smartcard controller (e.g., "smart card controller") as recited in each claim." Pet. at 55 (citing Ex.1006 (Kerdraon), [0070]-[0071]); *see also* Pet. at 66-69 (discussing asserted combinations including Kerdraon in the context of Grounds 4-6). Neither the Petition nor Dr. Tentzeris asserts that Kerdraon supplies any limitation from '722 claim 8 other than the "smartcard controller" limitation of claim 5, from which claim 8 depends. *See* Pet. at 55-60, 66-69; Ex. 1003 (Tentzeris), ¶¶ 169-179, 188-195.

96. Further, as discussed above with respect to Ground 4, Ground 5 asserts that Bangs supplies only claim 8's limitation "wherein the transmit circuit comprises a load modulation circuit," stating: "[T]o the extent a load modulation circuit requires load modulating an interrogating field instead of generating a new signal, Bangs discloses a transmit circuit (e.g., circuitry between 'antenna element 309' and 'controller 107') [*sic*] comprises a load modulation circuit (e.g., 'switchable' 'resistor 301 . . . in parallel with capacitor 304')." Pet. at 63 (citing Ex.1004 (Bangs), [0051], [0057]-[0060], [0066]; Ex. 1003 (Tentzeris), ¶ 188). Neither the Petition nor

Dr. Tentzeris asserts that Bangs supplies any limitation from ’722 claim 8 other than the “load modulation circuit” limitation. *See* Pet. at 63-69; Ex. 1003 (Tentzeris), ¶¶ 188-195.

97. Thus, even as combined, the combination of Finkenzeller, Kerdraon, and Bangs does not disclose the limitations discussed above regarding Ground 1

XIII. ANALYSIS OF THE COMBINATION OF FINKENZELLER, KOH, AND BANGS

98. Dr. Tentzeris opines that claim 8 of the ’722 patent is rendered obvious by Finkenzeller in view of Koh and Bangs (Ground 6). I disagree with Dr. Tentzeris’s conclusions regarding the combination of Finkenzeller, Koh, and Bangs, for the reasons discussed below.

99. Ground 6 asserts that Koh supplies only the “smartcard controller” limitation of claim 1, from which challenged claim 8 depends, stating (in the context of Ground 3, but later applied to Ground 6): “Koh discloses a smartcard controller (e.g., “Smart MX (SMX) module”) as recited in each claim.” Pet. at 60 (citing Ex.1007 (Koh), [0033]); *see also* Pet. at 66-69 (discussing asserted combinations including Koh in the context of Grounds 4-6). Neither the Petition nor Dr. Tentzeris asserts that Koh supplies any limitation from ’722 claim 8 other than the “smartcard controller” limitation of claim 5, from which claim 8 depends. *See* Pet. at 60-63, 66-69; Ex. 1003 (Tentzeris), ¶¶ 180-195.

100. Further, as discussed above with respect to Ground 4, Ground 6 asserts that Bangs supplies only claim 8's limitation "wherein the transmit circuit comprises a load modulation circuit," stating: "[T]o the extent a load modulation circuit requires load modulating an interrogating field instead of generating a new signal, Bangs discloses a transmit circuit (e.g., circuitry between 'antenna element 309' and 'controller 107') [*sic*] comprises a load modulation circuit (e.g., 'switchable' 'resistor 301 . . . in parallel with capacitor 304')." Pet. at 63 (citing Ex.1004 (Bangs), [0051], [0057]-[0060], [0066]; Ex. 1003 (Tentzeris), ¶ 188). Neither the Petition nor Dr. Tentzeris asserts that Bangs supplies any limitation from '722 claim 8 other than the "load modulation circuit" limitation. *See* Pet. at 63-69; Ex. 1003 (Tentzeris), ¶¶ 188-195.

101. Thus, even as combined, the combination of Finkenzeller, Koh, and Bangs does not disclose the limitations discussed above regarding Ground 1.

XIV. ADDITIONAL REMARKS

102. 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 Petitioner's experts in this matter.

103. 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

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/Nimbic (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, rest, 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. "FXYI²: 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.

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.

Addendum to CV for Marc E Levitt, Ph.D.

The following is a list of consulting relationships not disclosed in my public CV.

Active Consulting Assignments – All Areas

Robins Kaplan / DivX

- Dates: September 2024 – present
- Area/activities: Technical expert supporting litigation in video streaming technologies – device, server, DRM, encode, & decode.
- Case: v. Amazon 3:22-cv-00687 Eastern District of Virginia
- Testimony: None.

Robins Kaplan / DivX

- Dates: September 2024 – present
- Area/activities: Technical expert supporting litigation in video streaming technologies – device, server, DRM, encode, & decode.
- Cases: v. Netflix 2:19-cv-1602 Central District California
- Testimony: None

Mintz Levin PC / Onesta

- Dates: July 2024 – present
- Area/activities: Technical expert in computer architecture, memory controllers, GPU, power management, SoC, and AI hardware.

Troutman Pepper / VideoLabs

- Dates: April 2024 – present
- Area/activities: Non-testifying technical expert supporting litigation in power management technologies.
- Cases:
    - v. ASUSTeK Computer, Inc. 6:22-cv-00720 Western District of Texas
    - v. HP Inc. 6:23-cv-00641 Western District of Texas
    - v. HP Inc. 6:22-cv-01086 Western District of Texas

Robins Kaplan LLP / iCashe

- Dates: December 2022 – present
- Area/activities: Technical expert regarding NFC technologies.
- Cases: v. Samsung 2:24-cv-00429 Eastern District of Texas
- Testimony: None

Keker, Van Nest, & Peters / Real Intent

- Dates: June 2020 - present

- Area/activities: Technical expert supporting copyright and patent infringement analysis in the EDA software space.
- Case: Synopsys v Real Intent 5:20-cv-02819-EJD N.D. Cal
- Testimony: Expert reports on invalidity, non-infringement, and copyright filed. Deposed on all reports. Declaration in support of opposition to permanent injunction.
- Favorable jury verdict to client.

Robins Kaplan LLP / Corel Software LLC

- Dates: June 2015 – present (stayed 2019 - mid 2023)
- Area/activities: Technical expert supporting litigation in office automation and productivity software.
- Case: v Microsoft Corp. 2:15-cv-00528-JNP Utah Central
- Testimony: Declaration on source code operation, deposed on source code operation. Expert report filed on source code operation. Deposed on source code operation expert report.

Closed Consulting Assignments – Litigation

Winstead / MOSAID Technologies

- Dates: June 2023 – November 2024
- Area/activities: Technical expert supporting litigation in power management technologies.
- Cases: v. MediaTek, Inc. et al. No. 2:23-cv-00129-JRG Eastern District of Texas
- Testimony: Declaration for claim construction and deposition. Infringement report submitted.
- Case settled

TensegrityLaw Group / DivX

- Dates: June 2022 – September 2024
- Area/activities: Technical expert supporting litigation in video streaming technologies – device, server, DRM, encode, & decode.
- Cases:
  - v. Amazon (3:22-cv-00687) Eastern District of Virginia
  - International Trade Commission (337-TA-1343)
- Testimony: Declarations for ITC petition and Markman. Expert reports on infringement and validity, testified at ITC hearing.

TensegrityLaw Group / DivX

- Dates: January 2022 – September 2024
- Area/activities: Technical expert supporting litigation in video streaming technologies – device, server, DRM, encode, & decode.
- Cases: v. Netflix 2:19-cv-1602 Central District California
- Testimony: None

BCLG / Universal Connectivity Technologies

- Dates: January 2024 – September 2024
- Area/activities: Technical expert supporting litigation in interconnect technologies.
- Cases:

- v. Dell Inc. 1:23-CV-01506-RP Western District of Texas
- v. HP Inc 1:23-CV-01177-RP Western District of Texas
- v. Lenovo Group Ltd. 2:23-cv-00449-JRG Eastern District of Texas

- Testimony: None

Mintz Levin PC / Daedalus

- Dates: January 2022 – January 2024
- Area/activities: SoC Power management technology
- Cases: International Trade Commission (337-TA-1355)
- Testimony: Rebuttal report on validity, deposed on expert report, testified at ITC hearing.

Mintz Levin PC / AMD

- Dates: August 2021 – July 2023.
- Area/activities: Technical expert supporting litigation involving SoCs and graphics capabilities.
- Case: Certain Graphics Systems, Components Thereof, and Digital Televisions Containing the Same (Inv. No. 337-TA-1318)
- Testimony: Initial export report on domestic industry and infringement, rebuttal expert report, deposed on expert reports, testified at ITC hearing.

Nixon Peabody / Network Systems Technologies

- Dates: July 2022 – June 2023
- Area/activities: SoC interconnect technology
- Cases:
    - v Lenovo, Samsung Electronics Co et. al. (2:22-cv-00481) ED Texas
    - v Texas Instruments et al (2:22-cv-00482) ED Texas
    - v Arteris, Qualcomm (1:22-cv-01331) WD Texas
- Testimony: None

Carter Arnett / Bench Walk Lighting

- Dates: October 2019 – June 2023
- Area/activities: LED design and packaging.
- Case: v. Everlight Electronics Co Ltd (1:20-cv-00049) D. Del.
- Testimony: Claim Construction Declaration

Kilpatrick Townsend / DivX

- Dates: October 2021 – December 2022
- Area/activities: Technical expert supporting arbitration involving video playback devices that are DivX capable.
- Case: DivX LLC v Konka Group Co, Ltd, Arbitration before JAMS
- Testimony: Initial expert report

Robins Kaplan LLP / ACQIS

- Dates: September 2020 – September 2022
- Area/activities: Technical expert supporting litigation involving high performance serial interfaces including PCI Express and USB.
- Cases:

- v. Samsung Electronics Co., Ltd., et al. (2:20-cv-00295) Eastern District of Texas
  - v. Acer Inc. (2:21-cv-275) Eastern District of Texas
- Testimony
  - Samsung: Numerous Declarations, Expert Report Infringement, Rebuttal Expert Report Validity, Deposed on both reports.
  - Acer: Expert Report Infringement, Rebuttal Expert Report Validity, Deposed on both reports.

DiMuro Ginsberg / Heavy Duty Lighting

- Dates: April 2021 – August 2022
- Area/activities: LED design and packaging.
- Case: v. Acuity Brands Lighting (1:20-cv-03648-SCJ) Northern District of Georgia
- Testimony: Claim Construction Declaration, Deposed on Declaration

Mintz Levin PC / DivX

- Dates: December 2021 – April 2022
- Area/activities: Technical expert supporting litigation involving smart TV devices.
- Case: Certain Video Processing Devices, Components Thereof, and Digital Smart Televisions Containing the Same II (Inv. No. 337-TA-1297)

Mintz Levin PC / DivX

- Dates: June 2019 – April 2022
- Area/activities: Technical expert supporting litigation involving smart TV devices.
- Case: Certain Video Processing Devices, Components Thereof, and Digital Smart Televisions Containing the Same (Inv. No. 337-TA-1222)
- Testimony: Filed Expert Report, Deposed on Expert Report, ITC Hearing.

Robins Kaplan LLP / DivX

- Dates: June 2018 – December 2021
- Area/activities: Technical expert supporting litigation in video streaming technologies – device, server, DRM, encode, & decode.
- Cases: DivX v.
  - Hulu (2:19-cv-1606) Central District California
  - Netflix (2:19-cv-1602) Central District California

Hill, Kertscher, & Wharton LLP / Light Speed Microelectronics LLC

- Dates: January 2020 – October 2021
- Area/activities: Technical expert supporting litigation in hardware based fast pattern matching technologies.
- Cases: Light Speed Microelectronics v. NXP Semiconductors (6:21-cv-00066) Western District Texas

Jeffry W. Salmon Law LLC / Sockeye Licensing TX LLC

- Dates: July 2021 – August 2021
- Area/activities: Technical expert on the operation of Goggle Cast technology based on publicly available documents.

- Cases: v. Skyworth Group Limited (6:21-cv-00220) Western District Texas

Robins Kaplan LLP / ACQIS

- Dates: June 2021 – August 2021
- Area/activities: Technical expert supporting POPR with respect to the following IPRs
    - IPR2021-00666 US9,529,768
    - IPR2021-00667 US8,977,797
    - IPR2021-00668 US9,703,750
    - IPR2021-00669 USRE44,654
    - IPR2021-00670 USRE45,140
- Testimony: Declaration for the POPR for each IPR.

Mintz Levin PC / Philips

- Dates: August 2020 – March 2021
- Area/activities: Technical expert supporting litigation in video content protection and authentication.
- Cases: Certain Digital Video-Capable Devices and Components Thereof (Inv. No. 337-TA-1224)

DiNovo Price / Infinity Computer Products

- Dates: August 2018 – June 2021
- Area/activities: Technical expert supporting litigation in the multifunction peripheral product space.
- Case: Infintiy Computer Products v
    - Toshiba American Business Solutions (2:12-cv-6796-NIQA, lead case)
    - Oki Data (18-463 (LPS))
    - Lexmark International (5:18-cv-198-JMH-REW)
- Venue: Eastern District Pennsylvania, Delaware, New York, Kentucky
- Testimony: Declaration in support of claim construction brief, deposed numerous times.

Mintz Levin PC / Netlist

- Dates: December 2016 – February 2021
- Area/activities: Technical expert supporting litigation in the semiconductor and memory systems space. Patents involve Registered and Load Reduced DIMM architecture and testing.
- Cases:
    - Certain Memory Modules and Components Thereof (Inv. No. 337-TA-1089)
    - Certain Memory Modules and Components Thereof, and Products Containing Same (Inv. No. 337-TA-1023)
    - Netlist Inc v. SK Hynix Inc. et al (8:17-cv-01030) California Central District
- Testimony: Expert report filed, deposed for ITC case, witness statement, & testified at ITC hearing.

Lee Sullivan Shea & Smith LLP/ Sonos

- Dates: March 2020 – December 2020
- Area/activities: Technical expert supporting litigation audio players and music streaming.
- Case: CERTAIN AUDIO PLAYERS AND CONTROLLERS, COMPONENTS THEREOF, AND PRODUCTS CONTAINING THE SAME (Inv. No. 337-TA-1191)
- Testimony: None – was an alternate / backup expert due to Covid 19 concerns.

Matrox Graphics Inc.

- Dates: January 2017 – September 2019
- Area/activities: Technical expert supporting litigation in the EEPROM semiconductor memory space. Involves determining if part was properly designed and manufactured to specification and industry standards. Additionally, did STMicro withhold information regarding the quality level of the part before withdrawing the design from the market.
- Cases: Matrox Graphics Inc. c. STMicroelectronics Inc (500-05-070786-023 and 500-17-015647-038)
- Venue: Quebec Superior Court
- Testimony: First expert report filed.

Closed Consulting Assignments – Non-Litigation

Robins Kaplan LLP

- Dates: November 2021 – present
- Area/activities: Technical expert regarding VLIW compilers.
- Cases: None

Robins Kaplan LLP / DivX

- Dates: February 2022 – June 2022
- Area/activities: Technical expert in video streaming technologies – device, server, DRM, encode, & decode.

Mintz Levin PC / IV

- Dates: February 2022 – April 2022
- Area/activities: Patent consulting.

Mintz Levin PC / Philips

- Dates: August 2021 – July 2022
- Area/activities: Patent consulting.

Mintz Levin PC / Global Foundries

- Dates: February 2020 – September 2020
- Area/activities: Technical expert supporting patent consulting.

Mintz Levin PC / Philips

- Dates: November 2019
- Area/activities: Technical expert supporting patent consulting.

Robins Kaplan LLP / AMD

- Dates: September 2019 – October 2019
- Area/activities: Technical expert in dynamic binary translation and compilation techniques for x86 and ARM ISA.