

**IN UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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

Petitioners,

v.

MAXELL, LTD.,
Patent Owner

Case: IPR2024-00907

U.S. Patent No. 10,129,590

DECLARATION OF BRUCE MCNAIR

I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and/or imprisonment under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the patent which is under review in this proceeding.

Dated: **September 10, 2024**

By: _____



Bruce McNair

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	QUALIFICATIONS AND EXPERIENCE.....	1
III.	METHODOLOGY AND MATERIALS CONSIDERED	5
IV.	LEGAL UNDERSTANDING	7
	A. Claim Construction	7
	B. Obviousness	9
V.	OVERVIEW OF THE '590 PATENT	11
VI.	LEVEL OF ORDINARY SKILL IN THE ART	15
VII.	SUMMARY OF PETITIONER'S PROPOSED GROUNDS.....	17
	A. Dua	18
	B. Herle	19
	C. N93.....	19
	D. Rooyen	19
	E. Desai.....	20
	F. BT-Spec	20
	G. 3GPP-Spec	20
	H. Kao	20
VIII.	GROUNDS 1, 2, 4, AND 5: COMBINATION OF N93 AND DUA	21
IX.	GROUNDS 1-5: HERLE IN VIEW OF N93 OR DUA	30
X.	GROUNDS 1-5: STREAMING VIDEO OVER BLUETOOTH	36
XI.	CONCLUSION.....	38

I. INTRODUCTION

1. My name is Bruce McNair, and I have prepared this declaration at the request of Maxell, Ltd. (“Maxell”). This declaration provides my opinions with respect to various aspects of the Petition filed by Petitioner relating to U.S. Patent No. 10,129,590 (“the ’590 Patent”).

2. Depending on new information learned including positions taken by Petitioner or Petitioner’s expert, I reserve the rights to supplement my opinions included herein.

3. I am being compensated at my usual consulting rate of \$650 per hour for my time reviewing materials and preparing this declaration. My opinions expressed here are my own. My compensation is not dependent on the outcome of this case and I have no other financial interest in this matter or the parties thereto.

4. In forming my opinions, I have relied on my knowledge and experience, as well as the documents and information referenced in this report.

II. QUALIFICATIONS AND EXPERIENCE

5. A detailed description of my professional qualifications, including a listing of my specialties/expertise and professional activities, is contained in my curriculum vitae, a copy of which is attached as Appendix A. In what follows, I provide a short summary of my professional qualifications.

6. I have over 60 years of experience in the areas of electronic circuits and

wireless communications systems and equipment, starting as an amateur radio operator in 1963 and including seven years as a GS-0855 Electronic Engineer working for the US Army Electronics Command, one year at ITT Defense Communications Division, 24 years as a Member of Technical Staff at AT&T/Bell Laboratories, 15 years as a full-time faculty member of the Electrical and Computer Engineering Department at Stevens Institute of Technology and seven years as an adjunct on-line faculty member at Stevens.

7. While I was working for the US Army Electronics Command at Fort Monmouth, NJ, I was responsible for research and development for the data transmission, electronic countercounter measures (ECCM), and cryptographic aspects of SINCGARS, the Single Channel Ground/Airborne Radio System. As part of this work, I built speech compression hardware and software, microprocessor-based systems, digital hardware and analog circuits to accomplish my research. In addition, as part of this work, I studied speech compression techniques to allow high-quality secure voice transmission at low data rates. I also investigated antenna tuner technologies for operation over a large fraction of the VHF spectrum.

8. While I was at ITT Defense Communications Division, I designed digital hardware for a satellite communications system used by the White House. I also designed hardware and software to realize the first hardware implementation of a Linear Predictive Coder, a technology used extensively to this day for speech

communications and speech recognition in virtually all communication today.

9. At AT&T Bell Labs, I worked on several projects involving public data networks, encryption, analog modems, network security and wireless systems. This included internal protocols and security for an X.25 pre-Internet public data network (Advanced Communications Service/Net-1000). I designed digital hardware and microprocessor-based systems to improve the operation of analog modems. I also initiated and led an IR&D (independent research and development) project to investigate and prototype a secure voice terminal based on newly evolving AT&T high-speed digital services. This involved analog and digital hardware design, microprocessor programming, and controlling systems through a signaling and control network. Part of this work involved interfacing with the analog telephone network, interfacing with audio input and output devices and digital speech and signal processing. I then led a group developing encryption add-ons for analog modems. I supervised a Bell Labs group investigating speech recognition and speaker verification. I led the Bell Labs Security Architecture Group, setting security and encryption standards for all AT&T products and services. This work led to several US patents.

10. From 1994 to 2002, my work at AT&T Bell Labs and AT&T Labs involved research into future wireless systems. I performed research into future wireless systems, including modulation techniques and voice coding to maximize

performance. This involved the design of digital and analog hardware, programming embedded systems, writing real-time digital signal processing (DSP) software and extensive testing of the system performance. In this role I studied, designed, and prototyped an OFDM communications system for application to wide-area cellular communications. This work led to several US Patents and IEEE publications.

11. Upon retirement from AT&T Labs in 2002, I founded a technology consulting company, Novidesic Communications, LLC. As part of this work, I have evaluated prototype MIMO appliques for Wi-Fi systems, have consulted with the US Government on signaling in cellular systems, and have consulted on intellectual property issues involving wireless, OFDM systems, and digital subscriber loop (DSL) systems, which use a technology called discrete multi-tone (DMT), a form of OFDM.

12. At Stevens Institute of Technology, I have taught undergraduate courses, including Electronic Circuits (EE359) dealing with analog and digital circuits. I was also responsible for the Capstone Senior Design Project in the Electrical and Computer Engineering Department. This project, a two-semester course required of all engineering seniors, requires the investigation, design, and prototyping of a complex electrical or computer system. Besides conducting the course, I was also responsible for directly advising a significant fraction of the projects.

13. Among the Senior Design projects I have supervised, some have included student projects to investigate the use of OFDM and other wireless communications techniques.

14. I have taught graduate courses at Stevens (EE584 – Wireless System Security and CpE691 – Information Systems Security) which have heavy emphasis on the application of cryptography, including challenge-response systems and public-key cryptography. I also taught Physical Design of Wireless Systems (EE585) which deals with the detailed design of wireless systems such as cellular phones and other wireless communications equipment. I also have taught a graduate course, EE517, Digital and Computer Systems Architecture and undergraduate courses, CpE450, Architecture, Design and Implementation of Embedded Systems for Real-Time Applications and CpE-359 Switching Theory and Logical Design, involving microprocessor design and interfacing.

15. As part of the amateur radio hobby I have practiced since 1963, I have designed, implemented tested and operated various electronic devices involving analog, digital, RF and system control circuitry. I have also investigated the use of OFDM and other techniques used in modern commercial wireless systems for digital communications over amateur radio high-frequency (HF) dispersive channels.

III. METHODOLOGY AND MATERIALS CONSIDERED

16. I have relied upon my education, knowledge, and experience, as well

as other materials discussed in this declaration in forming my opinions.

17. For this work, I have been asked to review the '590 Patent including the specification and claims, the '590 Patent's prosecution history (file history). In developing my opinions related to the '590 Patent, I have considered the materials cited herein, including those items itemized in the Exhibit Table below.

Exhibit	Description
1001	Reserved
1002	Declaration of Chuck Creusere
1003	File History of 11,445,241 (17/568,166)
1004	U.S. Pat. No. 10,129,590 (with reexamination certificate)
1005	File History of 10,129,590 (15/208,886)
1006	File History of the Reexamination of 10,129,590 (90/014,651)
1007	Declaration of Nathaniel E Frank-White, records request processor at the Internet Archive, attesting authenticity and public availability of EX1010, EX1014, EX1015, EX1018
1008	US 2006/0258289 ("Dua")
1009	US 7,149,508 ("Herle")
1010	Nokia N93 User Guide ("N93")
1011	US 2006/0128332 ("Rooyen")
1012	US 2006/0274704 ("Desai")
1013	US 2004/0264600 ("Kao")
1014	Bluetooth 2.0 + EDR ("BT-Spec")
1015	3GPP TS 36.211 V0.2.1 (2006-11) Technical Specification ("3GPP-Spec")
1016	Jan 11, 2024, Infringement Contentions for '241 Patent
1017	RM-55 (Nokia N93) SAR Compliance Test Report
1018	News article published on May 15, 2006, on www.mobiletracker.net
1019	WO 00/48373 ("Rinne")
1020	US 2005/0280471 ("Matsushita")
1021	US 2007/0116292 ("Kurita")
1022	Bluetooth Video Distribution Profile ("VDP")
1023	US 2007/0275704 ("Terai")
1024	March 7, 2024, Infringement Contentions for the '590 Patent

2001	1st Amended Docket Control Order from District Court Litigation
2002	Original Docket Control Order from District Court Litigation
2003	Maxell's Supplemental Preliminary Election of Asserted Claims
2004	Defendants' Preliminary Election of Prior Art
2005	U.S. Patent Publication No. US 2006/0203758 (Tee)
2006	U.S. Patent Publication No. US 2006/0135076 (Honkanen)
2007	Petitioner's invalidity contentions chart in District Court—Tee
2008	Petitioner's invalidity contentions chart in District Court—Honaken
2010	L2CAP-Based Prototype Media Streaming via Bluetooth Technology
2011	https://www.nytimes.com/2009/10/19/technology/companies/19nokia.html
2012	https://www.codeproject.com/Articles/9357/Symbian-OS-design-faults
2013	https://www.engadget.com/2010-10-21-nokia-refines-development-strategy-adopts-html5-in-qt-and-ends-s.html
2014	https://www.businessinsider.com/ios-5-over-the-air-updates-2011-7
2015	https://support.apple.com/en-us/102998

IV. LEGAL UNDERSTANDING

18. I am not an attorney. I have been informed about legal standards of patent law, which I have used in developing my opinions expressed herein.

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

A. Claim Construction

20. I understand that the claim construction exercise begins with the language of the claims themselves, and that the general rule is that claim terms are

given their plain and ordinary meaning to a person of ordinary skill in the art, in view of the specification of the patent, at the time of the invention. I also understand that the intrinsic evidence (i.e., the claims, written description, and prosecution history) are the primary sources used in interpreting claim language.

21. I understand that if disputed claim language is clear on its face, the intrinsic evidence should be consulted to determine whether some deviation from the ordinary meaning of the claim language is warranted.

22. When the disputed claim language is not clear on its face, I understand that the intrinsic evidence should be used to resolve, if possible, the lack of clarity. I also understand that the specification is the best evidence of what the patentee intended the term to mean when there is no clear meaning of a claim term, and that the prosecution history may also shed light on the meaning of ambiguous terms. However, I understand that it is improper to import limitations from the specification into a patent claim through claim construction.

23. I have been informed that sometimes the ordinary meaning of claim language as understood by a person of ordinary skill in the art may be readily apparent even to lay persons. I understand that claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words.

24. I further understand that a patentee may act as his own lexicographer

by giving a definition for a particular claim term. I understand that, in order for this principle to apply, the patentee must clearly set forth a definition and clearly express an intent to define that term. Simply disclosing a single embodiment is not sufficient.

25. I understand that if the intrinsic evidence fails to clearly disclose the meaning of a claim term, the court may look to extrinsic evidence outside the patent and prosecution history, such as expert testimony, treatises, and dictionaries.

B. Obviousness

26. I understand that when determining whether a claim is “obvious,” the analysis is based on underlying factual issues including the content of the prior art and the level of ordinary skill in the art. I further understand that for a single reference or a combination of references to render the claimed invention obvious, a POSITA must have been able to arrive at the claims by modifying or combining the references.

27. I have further been informed and understand that a claim is unpatentable as obvious if the difference between the subject matter 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 POSITA.

28. I understand that to obtain a patent, the claims must have, as of the effective filing date, been nonobvious in view of the prior art in the field. I understand that a claim is obvious when the differences between the subject matter

sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a POSITA at the time the invention was made.

29. I understand that obviousness can be established by combining multiple prior art references to meet each and every claim element, but I also understand that a proposed combination of references can be susceptible to hindsight bias. This means that even if all of the requirements of the claim cannot be found in a single prior art reference that would anticipate the claim, the claim can still be invalid.

30. As part of this inquiry, I have been asked to consider the level of ordinary skill in the field that someone would have had at the time the claimed invention was made. In determining the level of ordinary skill, I considered the following: (1) the levels of education and experience of persons working in the field; (2) the types of problems encountered in the field; and (3) the sophistication of the technology.

31. I understand that an invention is obvious when the differences between the subject matter 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 POSITA.

32. I understand that to prove that prior art or a combination of prior art renders a patent obvious, it is necessary to: (1) identify the particular references that, individually or in combination, make the patent obvious; (2) specifically identify

which elements of the patent claim appear in each of the asserted references; and (3) explain how the prior art references could have been combined or modified to create the invention claimed. I understand that, to support a conclusion of obviousness, there must be an apparent reason for a skilled artisan to combine or modify the prior art references as recited in the claims

V. OVERVIEW OF THE '590 PATENT

33. The '590 Patent has a priority date of November 28, 2007, issued on November 13, 2018 and is entitled, "Display Apparatus and Video Processing Apparatus." The '590 Patent is directed to multi circuit wireless communication and techniques to establish multiple wireless connections between a plurality of apparatuses and networks. '590 Patent at Abstract.

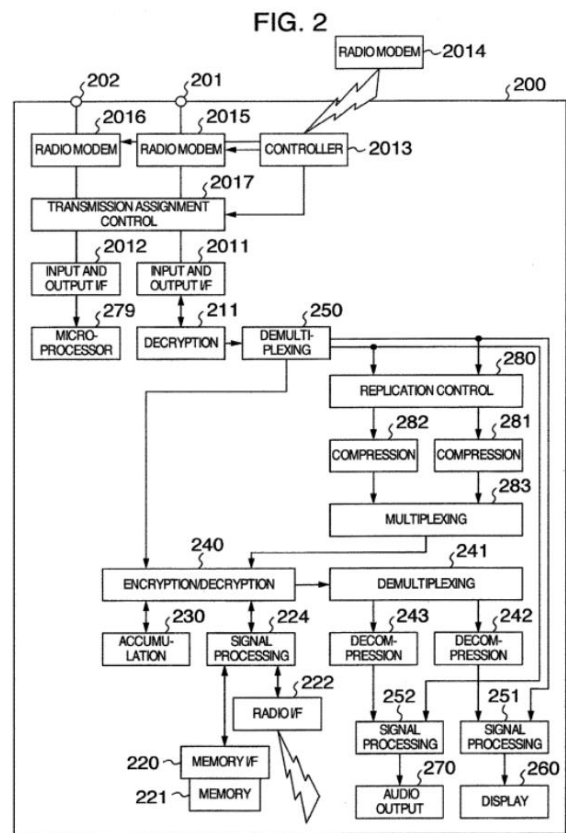
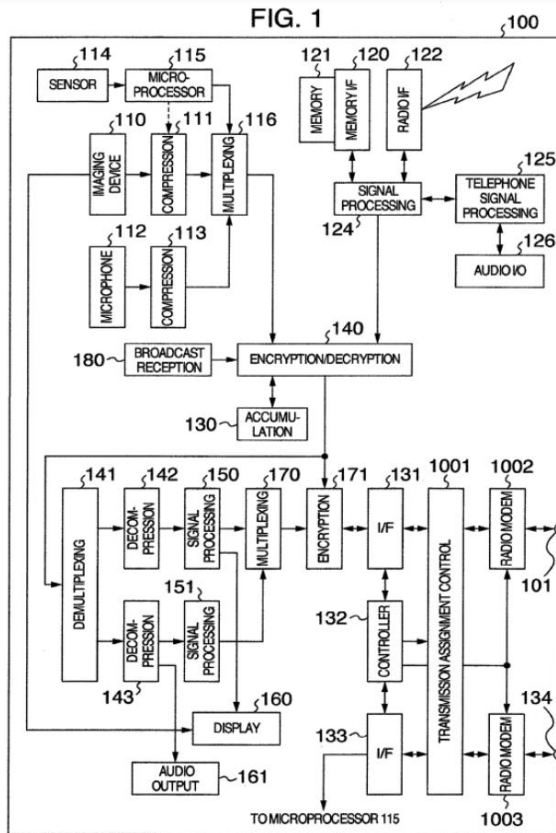
34. Specifically, the '590 Patent discloses an embodiment where a display apparatus and/or video processing apparatus with a first radio communication unit that can communicate video information with an external video processing apparatus, a second radio communication unit that can connect by radio to the internet or a home network, and a controller, which together allow the display apparatus and/or video processing apparatus to display of high quality videos while also communicating with a network. '590 Patent at 7:48-67.

35. Prior to the inventions disclosed in the '590 Patent, conventional techniques, such as HDMI, connected video processing apparatuses with each other

by establishing analog connections to transmit video and audio signals. '590 Patent at 1:19-34. But as digital devices became more common, the inventors realized that there was a need for the ability to connect to the internet or home network while viewing high-quality videos where the video and audio signals are encrypted.

36. In sight of this need, the inventors came up with a solution to “provide a technique wherein while presenting on a display apparatus videos of high picture quality obtained from portable video processing apparatuses such as a camera and a cellular phone, it is possible to communicate with the internet and/or a home network.” '590 Patent at 1:47-52. In particular, the inventors recognized that a solution to this problem would be to create and configure devices with “a first radio communication unit capable of transmitting video information by radio to an external display apparatus” and “a second radio communication unit capable of connecting by radio to a network,” along with other requisite components for providing the functionality that they described. '590 Patent at 2:1-9.

37. Further, below are exemplary video processing apparatuses, as shown in Figure 1, and display apparatuses, as shown in Fig. 2, embodying the invention of the '590 Patent:



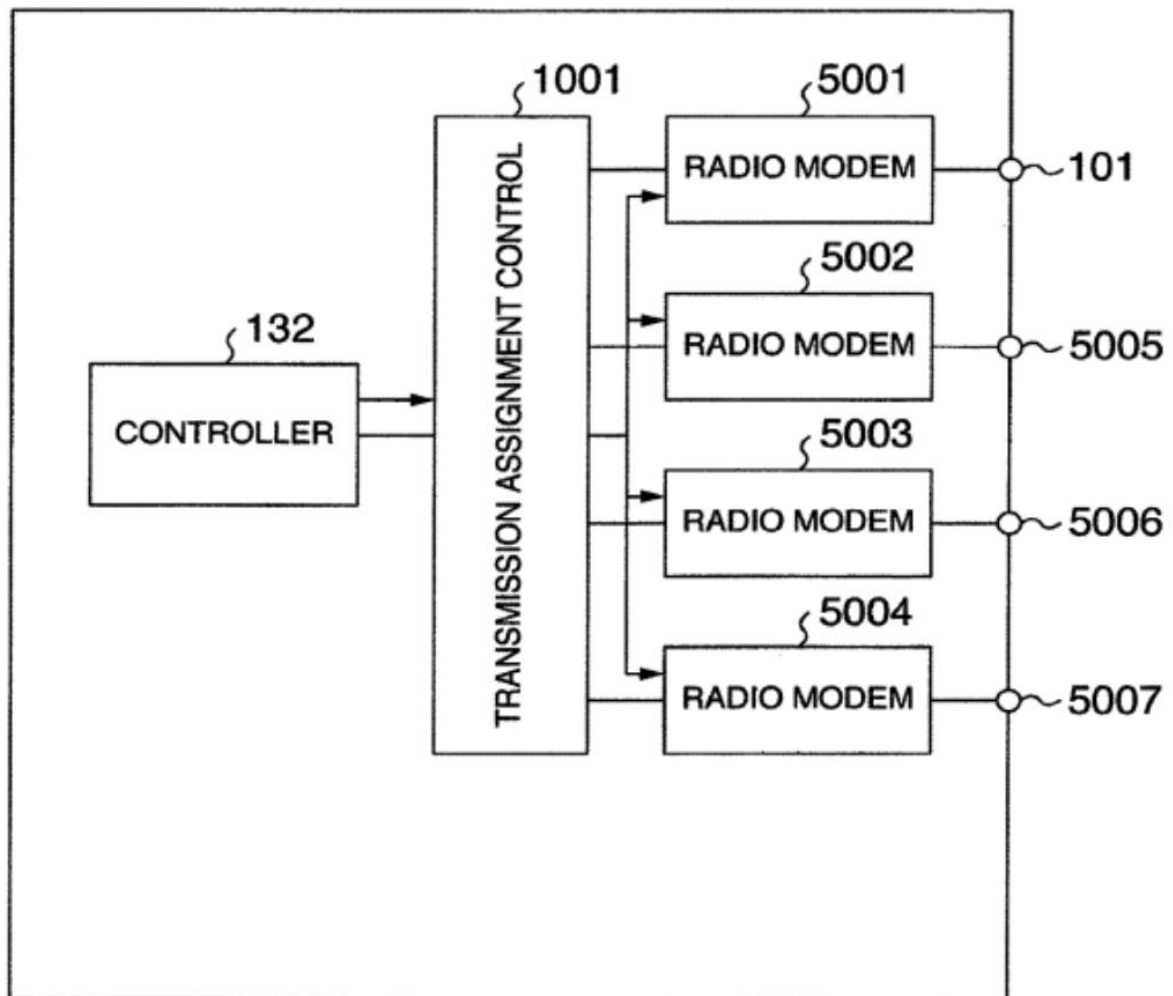
'590 Patent at Figs. 1 and 2.

38. Moreover, as shown in the above figures, “[t]he frequency bands used for the transmission between the terminals 134 and 202 are limited to predetermined frequency bands. This increases the radio wave resource efficiency and prevents the problem of interference with other apparatuses.” ’590 Patent at 3:38-42.

39. The ’590 Patent also discloses a controller that the user can direct to “variably control the radio transmission assignment” to communication devices. In one embodiment, this facilitates communications “in a situation wherein the user issues an indication to transmit video information by radio...while acquiring

information from the Internet.” ’590 Patent at 8:38-41. For example, as show in Figure 4 below, the controller assigns connections to four different radio modems that have specific characteristics such as different transmission frequency bands and modulation schemes enabling multiple communications to occur without interference:

FIG. 4



'590 Patent at Fig. 4.

40. Moreover, as shown below in Figure 9, the '590 Patent discloses different communication schemes for the video information transmission and connection to the internet:

FIG. 9

SCHEME	SCHEME 1	SCHEME 2
BANDWIDTH	6MHz	6MHz
CARRIER MODULATION SCHEME	64QAM	QPSK
CONVOLUTION CODE	3/4	2/3
GUARD INTERVAL	1/8	1/8
TRANSMISSION CAPACITY	17Mbps	5Mbps

'590 Patent at Fig. 9.

41. Hence, the '590 Patent discloses a novel display apparatus and/or video processing apparatus which includes multiple radio communication circuits, where one of the circuits can be controlled to transfer video to another apparatus while a second circuit can be used to connect to the internet or home network.

VI. LEVEL OF ORDINARY SKILL IN THE ART

42. I understand that claim construction and definiteness are examined

through the eyes of a person of ordinary skill in the art (POSITA). I am informed that the factors to be considered in determining the level of ordinary skill in the art are: (1) the education level of active workers in the field, (2) the type of problems encountered in the art, (3) prior art solutions to those problems, (4) the speed with which innovations are made; and (5) the sophistication of the technology in the art.

43. I have also been asked to assume that the relevant time period for determining the level of skill in the art for the '590 Patent is its earliest claimed priority date, November 28, 2007.

44. In my opinion, at the time of the '590 Patent, a POSITA would have a Bachelor of Science degree in Electrical Engineering, Computer Engineering, Computer Networking or a related technical field, with at least one year of experience working in the field of wireless communications. More education (e.g., a Master's degree) or work experience may compensate for a deficit in one of the relevant qualifications stated above.

45. As a result of my education and experience, I was at least a POSITA at the time of the invention of the '590 Patent, and am still a person of at least ordinary skill in the art and have applied the perspective of a POSITA in my analysis. Before the priority dates of the subject patents, I recruited and supervised employees with the skill level and experience of a POSITA and taught students with this skill and experience level, as well.

VII. SUMMARY OF PETITIONER’S PROPOSED GROUNDS

46. The Petition raises five grounds of alleged obviousness based on the following eight references. U.S. Patent Publication No. 2006/0258289 (“Dua”) (EX1008), U.S. Patent No. 7,149,508 (“Herle”) (EX1009), Nokia N93 User Guide (“N93”) (EX1010), U.S. Patent Publication No. 2006/0128332 (“Rooyen”) (EX1011), U.S. Patent Publication No. 2006/0274704 (“Desai”) (EX1012), Bluetooth 2.0 + EDR Specification (“BT-Spec”) (EX1014), 3GPP TS 36.211 Technical Specification Group Radio Access Network; Physical Channels and Modulation (“3GPP-Spec”) (EX1015), and U.S. Patent Publication No. 2004/0264600 (“Kao”) (EX1013).

Ground	'590 Patent Claim(s)	Type of Challenge	Primary Reference	Secondary Reference(s)
1	1, 4-5, 8-12, 14-25	§ 103	N93	(1) Dua (2) Herle
2	1, 4-5, 8-12, 14-25	§ 103	N93	(1) Dua (2) Herle (3) Rooyen (4) Desai (5) BT-Spec (6) 3GPP-Spec (7) Kao
3	1, 4-5, 8-12, 14-25	§ 103	Dua	(1) Herle
4	1, 4-5, 8-12, 14-25	§ 103	Dua	(1) Herle (2) N93
5	1, 4-5, 8-12, 14-25	§ 103	Dua	(1) Herle (2) N93 (3) Rooyen (4) Desai

				(5) BT-Spec (6) 3GPP-Spec (7) Kao
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47. My opinions in this declaration are focused on the motivation to combine the references as well as what a POSITA would understand at the time with respect to those proposed combinations. My opinions are also focused on capabilities of Bluetooth at the relevant time. As such, I have not considered other issues for purposes of this declaration.

A. Dua

Dua, titled “Wireless Media System and Player and Method of Operation” was published November 16, 2006, based on a filing date of May 12, 2005. Dua discloses “A wireless media player and a related system and methodology are disclosed. One aspect of the wireless media player system pertains to a virtual connector system, apparatus, and method for the automatic establishment of wireless connectivity with other electronic devices. In one embodiment, the media player device employs the use of integrated Radio Frequency Identification (“RFID”) technology to exchange communication settings, media capability, and other parameters with an external device that also has integrated RFID technology. EX1008, Abstract.

B. Herle

48. Herle, titled “System and Method for Delta-Based Over-the-Air Software Upgrades for a Wireless Mobile Station,” was filed on February 5, 2003, and issued December 12, 2006. Herle discloses a mobile station capable of being upgraded based on receiving a delta file from a software upgrade server via a wireless network. The mobile station comprises: 1) a memory for storing an original image file and the delta file, wherein the delta file is suitable for upgrading the original image file; and 2) a controller for modifying the original image file according to instructions stored in the delta file to thereby generate an upgraded image file. EX1009, Abstract.

C. N93

49. N93, titled “Nokia N93 User Guide,” is a user guide for the Nokia N93 phone. N93 discloses various specifications and capabilities of the Nokia N93 phone, such as compliance with the Bluetooth Specification 2.0 and support of IEEE 802.11b/g standard features.

D. Rooyen

50. Rooyen, titled “Method and System for a Mobile Receiver Architecture for European Band Cellular and Broadcasting,” was filed on December 13, 2004, and published on June 15, 2006. Rooyen discloses a method and system for a mobile receiver architecture for European (EU) Band cellular and broadcasting in video

processing systems. EX1011, Abstract.

E. Desai

51. Desai, titled “Method and Apparatus for Collaborative Coexistence Between Bluetooth and IEEE 802.11 G with Both Technologies Integrated onto a System-on-a-Chip (SOC) Device,” was filed on March 23, 2006, and published on December 7, 2006. Desai discloses a method and apparatus for collaborative coexistence between Bluetooth and IEEE 802.11g with both technologies integrated onto a system-on-a-chip (SOC) device. EX1012 ¶ [0004].

F. BT-Spec

52. BT-Spec, titled *The Specification of the Bluetooth System*, covers the Bluetooth Specification for core package version 2.0 + EDR. EX1014 at 1.

G. 3GPP-Spec

53. 3GPP-Spec, titled 3GPP TS 36.211 v0.2.1 Generation Partnership Project; Technical Specification Group Radio Access Network; Physical Channels and Modulation, is a working document produced by the 3rd Generation Partnership Project and that has “not be subject to any approval process by the 3GPP Organizational Partners and shall not be implemented.” EX1015 at 1, 5.

H. Kao

54. Kao, titled “Radio Receiver Supporting Multiple Modulation Formats with a Single Pair of ADCs,” was filed on June 29, 2004, claims priority to

Provisional Application No. 60/483,115, filed on June 30, 2003, and was published on December 7, 2006. Kao a radio receiver that is capable of supporting multiple modulation formats with a single pair of analog to digital converters. EX1013 ¶ [0003].

VIII. GROUNDS 1, 2, 4, and 5: COMBINATION OF N93 AND DUA

55. Grounds 1, 2, 4, and 5 all rely on the purported combination of N93 and Dua. It is my opinion that Petitioner has not shown a likelihood of prevailing with respect to these Grounds because a POSITA would not have been motivated to combine N93 and Dua at the time of the invention of the '590 Patent.

56. While I may develop additional opinions as to the merits of a N93/Dua combination or other Grounds presented in the Petition, for purposes of this declaration I focus on a POSITA's motivation, or lack thereof, to combine N93 and Dua because failure of a motivation to combine is fatal to Grounds 1, 2, 4, & 5.

57. Petitioner's expert, Dr. Creusere, alleges that it "would have been obvious for a POSITA to combine N93's teachings related to a cellular phone with Dua's teaching that the cellular phone should include an NFC radio circuit." EX1002 ¶ 78. I disagree.

58. A POSITA would not be motivated to combine N93 with Dua because they are two different systems. N93 discloses a product manual for an advanced consumer phone that was carefully and purposely designed to include specific

features, including specific form factor to mimic the form of a digital camcorder. See EX1010 at 11-13; EX1018 at 1 (“[T]he N93 is a very advanced handset that Nokia is marketing more as a mobile computer than cell phone.”). The Nokia N93 phone went through rigorous testing to meet consumer guidelines and was carefully designed to include specific features while excluding other features that were undesirable for the product. See EX1018 at 1 (announcing Nokia N93 has been approved by the FCC); EX1017 at 1 (stating that the Nokia N93 meets requirements for SAR compliance). To this end, N93 discloses various warnings against any type of modification of the phone. For example, N93 includes statements such as:

- Use only batteries, chargers, and **enhancements** approved by Nokia for use with this particular model. The use of any other types may invalidate any approval or warranty, and may be **dangerous**,” EX1010 at 9,
- “Use only approved **enhancements** and batteries. Do not connect incompatible products,” EX1010 at 7, and
- “Use only the supplied or an approved replacement antenna. **Unauthorized** antennas, **modifications**, or attachments could **damage the device** and may violate regulations governing radio services.” EX1010 at 125.

59. On the other hand, Dua is directed to a media player integrated with radio frequency identification technology (“RFID”) and capable of storing and processing of large amounts of media content. For example, Dua discloses that “the media player 100 is a pocket sized device that allows a user to store a large collection

of digital audio/music, video, images, presentations, animation, Internet content, and other types of media” and “[i]n accordance with the invention,...the media player 100 can automatically convert the media into a format that is supported by the stereo.” EX1008 ¶¶ [0058], [0161].

60. A POSITA would not be motivated to combine the components from Dua’s media player device with N93’s advanced proprietary, closed-system device, because Dua and N93 required different hardware and software that would be difficult to integrate onto a mobile device. In addition, Dua’s device and N93’s device were directed to different use case scenarios. Dua’s device was specifically directed to a wireless media player incorporating RFID technology to exchange communication settings with external devices that also had RFID technology. On the other hand, N93 was a specific consumer device directed to enabling specific functionality. There was not an obvious benefit or rationale to using Dua to improve N93, and improving an already advanced device with new capabilities that would potentially interfere with previous functionalities.

61. Mobile devices are resource-constrained. It would require more than ordinary skill to include Bluetooth, UMTS, GSM, Wi-Fi, and NFC capabilities onto one device. For example, given the limitations of the time, a POSITA would not find it obvious to combine all these alleged radio communication circuits because of the difficulty in designing and building an operable device that would support

functionalities of all these alleged radio communication circuits. For example, a POSITA would need to consider managing interference between the different circuits, power sources to support the functioning of different circuits, power management for functioning of different circuits, software to support functioning of the different circuits, placement of the different circuits, size of components for the different circuits, and size of a device needed to support hardware of the different circuits, etc.

62. Combining multiple different systems can be quite challenging as each separate communications system has local oscillators and intermediate frequency stages that can cause internal interference with the others. In addition, each requires different clock signals and local oscillators that create sources of external interference that make it more difficult to meet FCC Part 15 requirements. 47 C.F.R. pt. 15 (2024). In general, a designer is highly motivated to reduce the number of signal sources to an absolute minimum to avoid the problems of meeting FCC Part 15 requirements.

63. In my opinion, a POSITA would not be motivated to modify N93 with a radio circuit of Dua or any radio circuit because N93 **teaches away** from any such modification. In particular, making any addition or modification to the radio circuits of N93 would require the changing/addition of an antenna. **But** N93 explicitly states that “**Unauthorized antennas, modifications, or attachments could damage the**

device and may **violate** regulations governing radio services.” EX1010 at 125 (emphasis added). Thus, a POSITA would not make any such modification to N93 because a POSITA would not want to damage the device or violate any regulations.

64. Indeed, N93 teaches away from **any** modification or enhancements without first seeking approval from Nokia because any such modifications “may be **dangerous**.” EX1010 at 9. A POSITA would not be motivated to make dangerous modifications. In addition, Petitioner never explains how a POSITA would be motivated to first obtain approval from Nokia to make the proposed modifications. Indeed, Nokia is highly unlikely to provide any such modifications in the first place because they had already designed a very specialized “computer” with specific design constraints, regulations, and marketing strategies in mind.

65. A POSITA would know that specific hardware components are needed to support different capabilities. For example, hardware that supports one Bluetooth version or minimal interference with other communication capabilities cannot be assumed to support every other Bluetooth version as well. Different versions of Bluetooth, UMTS, GSM, NFC, and Wi-Fi cannot be substituted for each other without consideration for the actual hardware implementation of the different combinations. For example, N93 specifically discloses Bluetooth 2.0 and 802.11b/g capabilities and cannot be not associated with modulation schemes and frequencies for different versions of Bluetooth and Wi-Fi. *See, e.g.,* Pet. at 8-9. It would not have

been obvious to a POSITA to swap different versions of Bluetooth, UMTS, GSM, NFC, and Wi-Fi for one another with no consideration for the actual hardware implementation of these combinations.

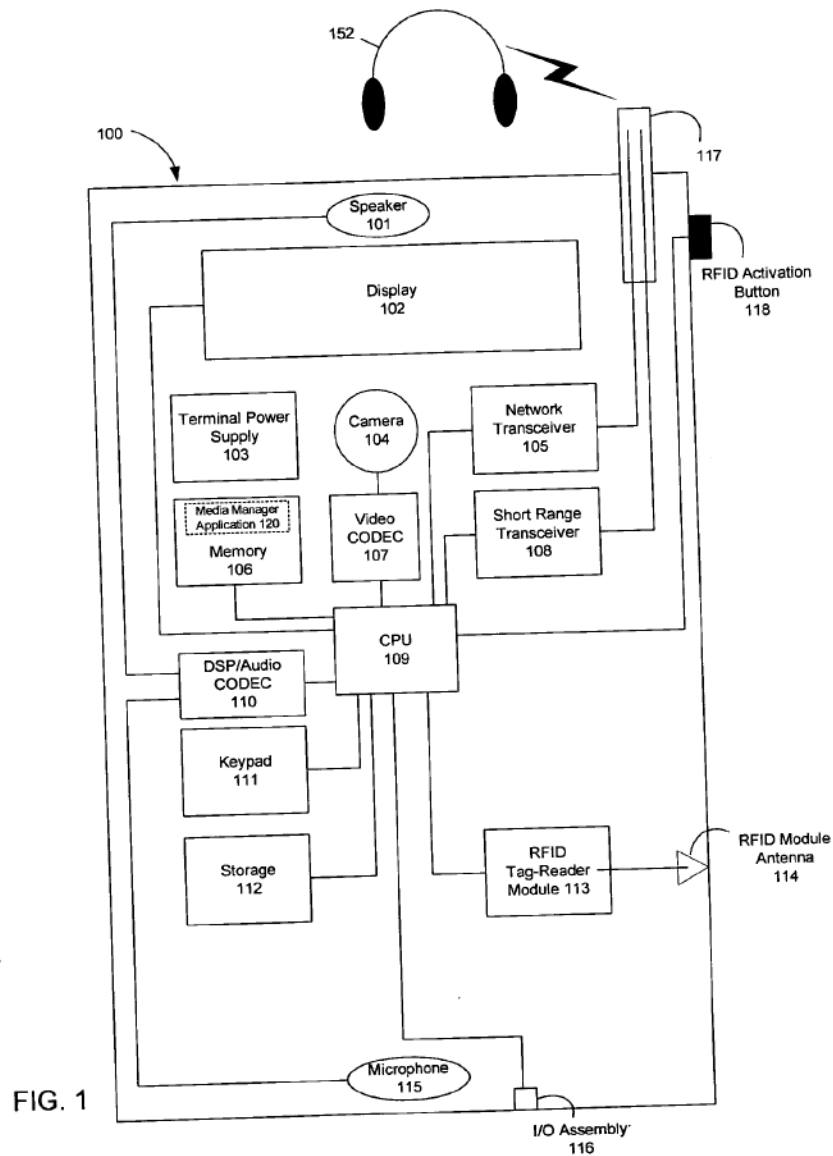
66. A POSITA would not be motivated to combine different circuits, and further, combining different versions of the different circuits. Attempting to combine these different communication circuits onto one device, especially using references that do not even cite same versions of Bluetooth, UMTS, GSM, NFC, and Wi-Fi would require more than ordinary skill of a POSITA, and would therefore not be obvious to combine.

67. Petitioner's expert, Dr. Creusere, further alleges that "A POSITA would have had a reasonable expectation of success in implementing the features described in both of these references in the combination using Dua's implementation details. Dua's details were known techniques that would yield predictable results as taught by Dua and involve only routine skill.." EX1002 ¶72. I disagree.

68. N93 discloses specialized features that would not be obvious to implement using generic, unrelated diagrams. For example, N93 discloses multi-band cellular radio capabilities, (EX1010 at 8), as well as features based on these multi-band cellular radio capabilities, such as automatic selection between GSM and UMTS networks (EX1010 at 113).

69. Dua merely discloses a generic network transceiver "for interacting

with a cellular network, such as a Global system Mobile (GSM) network).” EX1008 ¶ [0066]. Dua makes such fleeting references to its network transceiver that it fails to mention multi-band cellular capabilities, specify whether UMTS or CDMA technology is used, or give any further details on the network transceiver. EX1008 ¶¶ [0064], [0066], [0069]. Dua merely discloses a high level functional representation of a media player terminal interface with no actual details on the network transceiver itself.



EX1008 Fig. 1.

70. It would not be obvious to use Dua to disclose implementation details of N93, such as the hardware used to control multiple cellular radio capabilities when Dua fails to disclose any multi-band cellular radio capabilities at all. For example, the network transceiver may have its own processor or modem, instead of the CPU

109, to execute control to perform control over its actions. Therefore, a POSITA would know that different controllers may execute control of the short range transceiver and network transceiver of Dua.

71. Further, I disagree with Dr. Creusere that modifying Dua or N93 to add additional radio communication circuitry would “involve only routine skill” and would have “a reasonable expectation of success.” EX1002 ¶72. As explained above with respect to the guidance provided by N93 documentation, each device with radio communication circuitry has to comply with certain regulations; undergoes rigorous testing to comply with such regulations; includes specific interfaces, transceivers, antennas, amplifiers, firmware and software to account for transmission and reception paths; and specific design constraints/requirements to avoid interference between such radio communication circuitry and their transmission and reception paths. This is why a market-leader of that time (Nokia) warns against modifications of such devices and explains that such modifications can be “dangerous,” can “damage” the device, and can “violate regulations governing radio services.” Thus, a POSITA would not be motivated to make any modifications to Dua or N93 because such modifications would not involve “routine skill” and would not have a reasonable expectation of success. To the contrary, a POSITA would follow the guidance of a market leader of that time (e.g., Nokia) and avoid making “dangerous” modifications that could “damage” the device and cause violation of “regulations

governing radio services.” Any modification/addition of circuitry to N93 or Dua, as proposed by Dr. Creusere, would require a significant redesign, retesting, and regulatory approval, which is well beyond routine skill because it would involve coordination between numerous engineering teams (hardware design, firmware design, software design; hardware testing, firmware testing, software testing; regulatory testing) and legal team (regulatory submissions and approval).

72. Accordingly, in my opinion the modifications proposed to N93 or Dua by Petitioner are not obvious.

IX. GROUNDS 1-5: HERLE IN VIEW OF N93 OR DUA

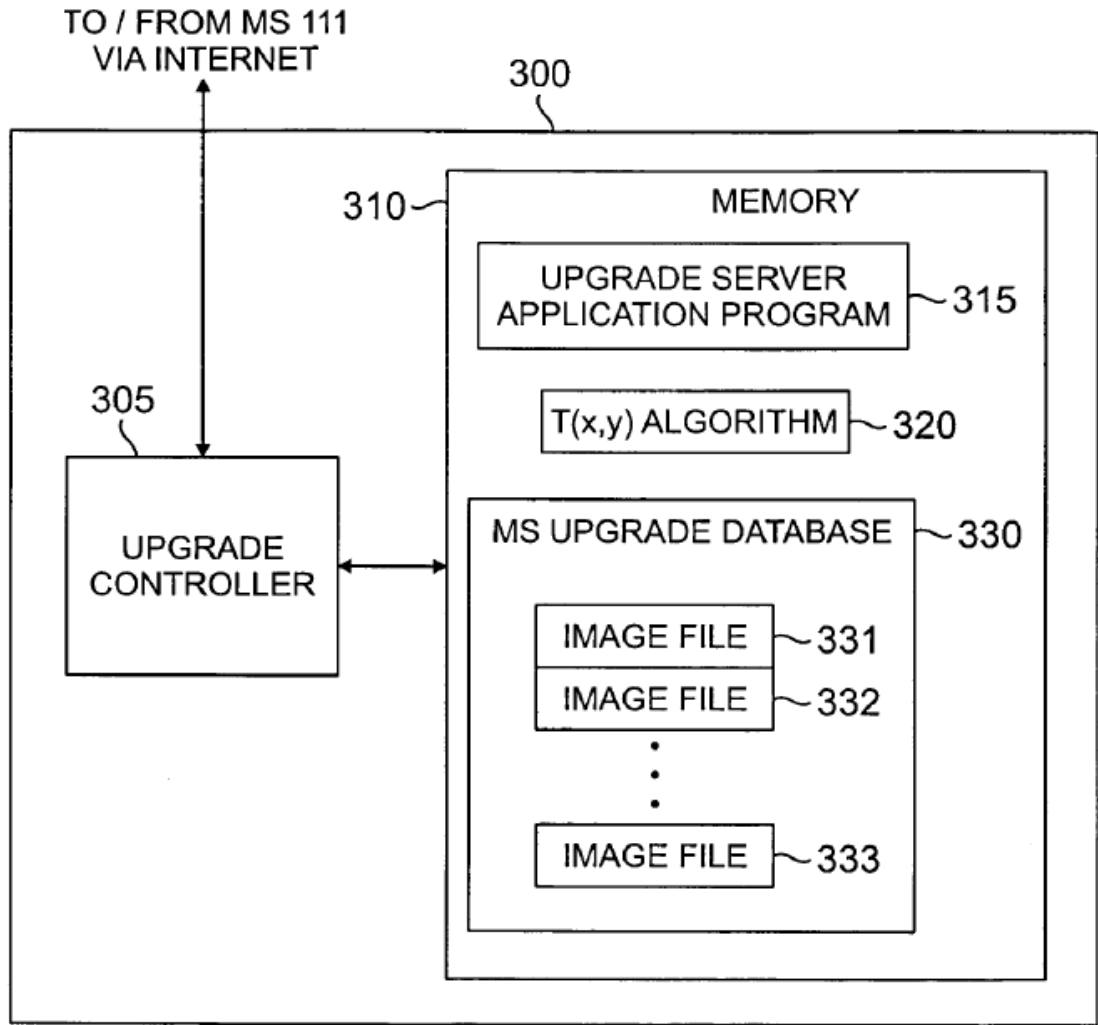
73. Grounds 1-5 all rely on the purported combination of Herle with N93 and/or Dua. It is my opinion that Petitioner has not shown a likelihood of prevailing with respect to Grounds 1-5 because a POSITA would not have been motivated to combine Herle with N93 or Dua at the time of the invention of the '590 Patent.

74. While I may develop additional opinions as to the merits of a N93/Dua/Herle or Dua/Herle combination or other Grounds presented in the Petition, for purposes of this declaration I focus on a POSITA's motivation, or lack thereof, to combine N93 or Dua with Herle because failure of a motivation to combine is fatal to Grounds 1-5.

75. Neither N93 or Dua disclose any information regarding *operating system* updates. Instead, N93 only disclose application downloads using a “pull type

system.” See EX1010 at 115 (“You can use Nokia Application Installer in Nokia PC Suite to install an application to your device.”). Dua only discloses updating media capabilities, RFID tags, and data stored in “device profile.” EX1008 ¶ [0143] (“It should also be noted that devices such as media player 100 may periodically update their media processing capabilities to be able to handle additional formats.”). Dua discloses that “the software can automatically update the RFID transmission information 450 stored in the RFID tag memory unit 322 with the latest information on the device's media capabilities.” *Id.* ¶ [0151]. Additionally, “data stored in a device profile can periodically be updated over-the-air when the media player 100 establishes a communication session with the target device.” *Id.* ¶ [0154].

76. Herle, on the other hand, discloses specific requirements to enable OTA delta updates, including the creation of an “upgrade server 300” with specific software, hardware, and network capabilities. See EX1009 Fig. 3.



77. *Id.* At a minimum, Herle requires provisioning of a specially designed server having an upgrade server application program 315, T(x,y) algorithm 320 to generate change files, an upgrade database 330, and an upgrade controller 305. *See id.* Next, Herle requires that each mobile station be equipped with a specially programed upgrade control program 262, which requires additional memory resources, and an algorithm program 263 to be able to handle a delta file. *See id.*

Based on this, there was no motivation to combine N93 or Dua. There is no evidence that the operating systems in N93 and Dua could be updated at all. Therefore, it is unclear why a POSITA would look to Herle to incorporate delta-based over-the-air updates for operating systems for two devices that do not support updates for operating systems. Herle's "express motivation" is "*improved* systems and methods for performing automatic software upgrades of wireless handsets and other types of mobile stations," in light of previous ineffective methods of updating software upgrades. See EX1009 2:3-28. Herle describes improving mobile devices *already capable* of performing operating system upgrades either through previous methods of updating operating system, such as downloading and "install[ing] software upgrades for a personal computer (PC) via the Internet" or downloading new software based on partitioning the software into small modules. See *id.*

78. Beyond improper hindsight, there is no motivation to overhaul N93 or Dua's system to add the option of OTA operating system updates. For example, N93 was a consumer device from Nokia being sold worldwide. See EX1018. In order to have a uniform customer experience, Nokia would need to have servers all over the world to be able to support updates to its operating system. Adding such servers would increase the costs and require a significant infrastructure investment. In addition, given the high number of phones sold, the MS upgrade database 330 would need to have numerous versions of "image files" 331-333 to be able to accurately

generate delta files for a particular device that needs to be updated.

79. Further, N93 specifically instructs against downloading software that are not Symbian Signed or have passed the Java Verified™ testing, meaning Nokia was averse to having third-party servers host such upgrade programming. Further, Symbian was not an open source operating system until after 2009. *See* EX2011. Instead, it was a proprietary operating system with a very complex file structure and features. *See* EX2012 (“a large OS, containing hundreds of classes and thousands of member functions”).

80. Thus, the servers would need to have large amounts of processing resources and memory just to be able to implement Herle’s system and generate delta files. Petitioner has also not explained whether the limited bandwidth of the UMTS/GSM systems of N93 and Dua will be able to handle receiving such delta files over cellular networks.

81. Similarly, significant computing resources would be needed on the devices of N93 and Dua to determine the differences between the received delta file and the existing operating system, compare them, then execute a process whereby the phone is reimaged with a completely new operating system. N93 specifically recites limited memory resources. *See* EX1010 at 22. There is no explanation by Petitioner how N93 or Dua’s limited memory and/or processor resources would handle such a significant reimaging of the operating system. Additionally, Dua

specifically calls over the air configurations “generally insecure.” *See* EX1008 ¶ [0009].

82. Further, historical evidence shows it was not obvious to implement OTA operating system updates for specialized devices like N93 or Dua in light of systems like Herle. For example, development history of the Symbian operating system (the operating system of N93) refutes Petitioner’s contention that it would have been obvious to combine N93’s teachings with Herle’s teaching of OTA updates for operating system. EX2013.

83. Other specialized devices also had delays in implementing OTA operating system updates, even in light of delta-based update technology of Herle. For example, Apple’s first major release of a mobile operating system, iOS 1.0, was announced in 2007, but Apple did not support OTA operating system updates until the release of iOS 5.0 in 2011. *See* EX2014; EX2015 (“Software updates available over the air without tethering.”). This shows there were additional considerations for specialized systems to implement OTA operating system updates.

84. All of this evidence supports my opinion that adding OTA updates to operating system of Herle into N93 or Dua was not a matter of routine skill. To the contrary, the state of the art at that time shows that updates to closed and proprietary operating systems were not supported at that time in view of memory constraints, network bandwidth concerns, and the desire of entities to limit access to their

proprietary operating systems. Indeed, this is confirmed by Herle's own disclosures because just to achieve OTA updates, Herle discloses a specialized system with significant investments in network infrastructure that requires specialized servers working in conjunction with specialized software on each device to accomplish this task. To accomplish Herle's disclosure, a system would need to be designed from the start to comply with all of Herle's requirements, which is not something that can be achieved retroactively in a proprietary and close-ended device like N93 or Dua. Petitioner and Dr. Creusere have never addressed this evidence and state of the art of implementing OTA updates in operating systems of proprietary systems, instead just providing a conclusory and hindsight driven analysis. In my opinion, such modifications are not obvious.

X. GROUND 1-5: STREAMING VIDEO OVER BLUETOOTH

85. The Petition states that "[a] POSITA would have had a reasonable expectation of success in supporting 'simultaneous' communications over Bluetooth and UMTS radios in the combination. A POSITA would have known Bluetooth could stream video." Pet. at 13.

86. In my opinion, a POSITA would not assume simultaneous video streaming over Bluetooth in N93 or Dua's systems and cellular service as proposed by Petitioner. N93 and Dua are completely silent about simultaneously using the circuit combination proposed by Petitioner. At most, they disclose using these

circuits in different instances of time. A POSITA would not be motivated to specifically arrive at this combination of simultaneous communications specifically because Bluetooth circuitry disclosed in Dua and N93 had various bandwidth limitations. For example, streaming video requires substantial data transfer rates and low latency. *See* EX2010 at 225. (“Bluetooth wireless technology is a hot research topic...Unfortunately, It is not suitable for traditional media encoding and real time transition (Kassem et al., 2009) due to limited bandwidth (Smith, 2012; Tariq et al., 2000), high degree of error rates (Peterson et al., 2003; Smith, 2012) and the time varying nature of radio link (Selvaradjou et al., 2010).”).

87. To stream video over Bluetooth in N93 or Dua while simultaneously using UMTS circuit, video data must be heavily compressed to fit into Bluetooth’s bandwidth. This compression would result in loss of quality. The Bluetooth circuitry of Dua and N93 also has higher latency than other wireless communication technologies, such as Wi-Fi, that would cause delays, synchronization issues, etc. with video streaming. Therefore, a POSITA would not be motivated to specifically arrive at the proposed combination of simultaneous communication specifically using Bluetooth for video streaming and UMTS for cellular communication, as such exchanges would come with its challenges. *See id.* at 236 (“Media streaming over Bluetooth connection is a huge challenge. Although all devices support Bluetooth technology, it requires an enhancement in the buffering scheme.”). Integrating video

streaming over Bluetooth onto a cellular device with other communication hardware would create difficulties because of the limited resources, design constraints, regulatory compliance etc. A POSITA would use the existing circuitry and solutions in N93 or Dua to stream video non-simultaneously or over additional circuitry (e.g., Wi-Fi) instead of specifically arriving at the claimed combination based on hindsight.

XI. CONCLUSION

88. In addition to the opinions and evidence expressed herein, I reserve the right to rebut any arguments made or evidence presented in response to this report. I also reserve the right to supplement this report based on further investigation or analysis. I also plan to use graphic exhibits and/or demonstratives to help illustrate the facts and opinions I express herein.

Bruce McNair

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Career Summary	• Sixty years engineering research, design, development, systems engineering experience in communications systems (including extensive background in wireless communications and system/network security) • Twenty four years as a well-rated member of one of world's most highly respected R&D organizations, recognized for breadth, depth and practicality of expertise • Extensive experience teaching technical short courses for premiere educational programs over a fourteen year period • Full time university educator for fifteen years with experience teaching a broad set of courses focusing on practical engineering approach • On-line university educator for twenty years teaching well-attended graduate courses in wireless and security technologies
Research interests	• High speed wireless data networking • System/network security • Geolocation technology • Real-time digital signal processing • Software-Defined Radio technology • Broadband Powerline (BPL) technology
Present Organizations	• Stevens Institute of Technology, • Novidesic Communications, LLC
Job Titles	• Distinguished Service Professor of Electrical and Computer Engineering • Founder, Chief Technology Officer
Education	• M.E., E.E., Stevens Institute of Technology, 1974 • B.E. (with Honor), Stevens Institute of Technology, 1971 • Completed qualifiers and course work for PhD in Computer Science at Stevens

**Relevant
Experience**

January 2003 – present – on-line teaching professor – Electrical and Computer Engineering, Stevens Institute of Technology, Hoboken, NJ;
Teach several well-enrolled on-line graduate courses in wireless security, information systems security and physical design of wireless communications systems.

August 2002 – December 2017 (retired) – Distinguished Service Professor of Electrical and Computer Engineering, Program Director, Computer Engineering graduate program, Stevens Institute of Technology, Hoboken, NJ;

Design and manage the Senior Design Project, a two-semester program that forms a substantial portion of the senior year in the engineering program. This project comprises a large fraction of the seniors' efforts and serves to provide real-world engineering design experiences for the student. Teach a large number of well-enrolled graduate and undergraduate core and elective courses. Conduct research in wireless systems, geolocation services, and broadband powerline (BPL) systems, particularly security needs and solutions. Member of Stevens Intellectual Property Review Board, Stevens Honor Board Advisory Council, Stevens' Schaeffer School of Engineering and Science Promotion and Tenure Committee, and the Senior Design Coordinator Committee.

February 2002 – present – CTO, Novidesic Communications, LLC, Holmdel, NJ;

Founded a technical consulting company, providing expert witness support and testimony, telecommunications, wireless networking, security, software, computing, product evaluation, proof-of-concept prototyping, and web site design guidance to individuals and small businesses. Clients include health care facilities, patent attorneys, major telecommunications providers, venture capitalists, major component manufacturing company, start-up hardware and concept development companies. Supported technology needs of small local business leading to Phase I and Phase II SBIR funding in the area of RFID with patented technology. Provide IP portfolio evaluation. Expert witness in patent litigation with experience testifying at deposition and trial as well as preparing USPTO IPR declarations.

August 2011 – February 2012 – Part-time consultant, Lockheed-Martin, Moorestown, NJ;

Support development of advanced radar systems and interactions with other wireless systems.

2010 – 2015 (part-time, on an as-needed basis) – Senior Systems Engineer consultant, AT&T Government Solutions, Columbia, MD;

Support AT&T's projects with the US Government customers on defense and intelligence-related systems, drawing on previous knowledge and experience in signal processing, wireless systems, telephone and computer networks, and secure system design.

**Relevant
Experience**
(continued)

May 1994 to February 2002 (retired) -- Wireless Systems Research Department, AT&T Bell Labs/ AT&T Labs - Research, Holmdel/Red Bank/Middletown, NJ

Member of Technical Staff/Research Staff Member/Principal Technical Staff Member/Technology Consultant; Investigating high-speed, high-mobility wireless data communications systems for untethered access to high speed global networks. Proposed and investigated IEEE 802.11(a & b) physical and MAC layer extensions to outdoor, high mobility environment. Efforts involved system architecture, system control, real-time DSP programming in C, high-speed hardware design, RF design, analog, RF interfacing, Matlab/SIMULINK simulation and experimental investigations. Responsible for complete design, implementation and characterization of a multiple TMS320C40-based 384 kb/s OFDM transmission system and definition/design of advanced signal processing platforms. Recent research extended results to 5-40 Mb/s with TMS320C62/FPGA-based platform and incorporated 802.11a and DVB-T technology. Previous research involved speech quality/data rate enhancements to IS-136, the North American TDMA cellular standard.

November 1987 to April 1994 -- Security and System Reliability Architecture Group, AT&T Bell Labs, Holmdel, NJ

Technical Manager; Created, staffed, and led a group of security, systems reliability and fraud control experts to assess security/quality of products, services, operations systems, communications networks, operating systems, and work centers and to recommend, specify, and prototype cost effective improvements. Created corporate process to build security into the development process. Transformed small (2 person) corporate-funded activity into well-staffed (multi million dollar), successful business unit supported program. Served as security technologies subject matter expert for AT&T Corporate Security and other (AT&T and outside) organizations

May 1982 to October 1987 -- various AT&T Bell Labs organizations, MTS - Supervisor; System Design, Exploratory Development, Applied Research, and Final Product Development of secure voice terminals, modems, speech recognition and speaker verification systems, security chips, encryption devices, and network management systems

June 1978 to April 1982 -- various AT&T Bell Labs organizations, Member of Technical Staff, System design, digital hardware design and simulation of wide area (X.25) data communications networks and high-speed data transmission techniques for voiceband modems. Led \$1M IR&D secure voice terminal initiative, ultimately resulting in promotion to MTS-Supervisor and laying groundwork for AT&T's breakthrough success in NSA's STU-3 program.

Relevant Experience (continued)	June 1971 to February 1973, January 1974 to June 1978 -- U.S Army Communications R&D Command, Fort Monmouth, NJ. GS-7, 9, 11 & 12 Electronic Engineer (GS-0855) Development of tactical military radio communications equipment, specializing in modulation, data transmission, communications security and electronic warfare (frequency hopping and direct sequence spread spectrum) for the SINCGARS VHF-FM radio system. March 1973 to December 1973 -- ITT Defense Communications Division, Nutley, NJ. Junior Member of Technical Staff; Designed, developed and tested software and digital hardware for portable satellite terminals for use by White House and the world's first hardware implementation of a 2400 bps Linear Predictive Coder (LPC) secure speech transmission system.
Patents, Presentations and Publications	Twenty six U.S. patents and nineteen international patents granted (several pending) in areas such as data transmission, cryptographic techniques, speech processing, video processing, security systems, user authentication, fraud control, synchronization, dynamic channel assignment, localization techniques, hazardous voltage detection, RFID, biomedical applications, vibration energy harvesting, solar energy harvesting for portable devices, etc. Presented numerous well-rated short courses in Digital Communications, Digital Telephony, Digital Signal Processing, and Wireless Communications, & Security. Course sponsors included: Bell Labs In-hours Continuing Education Program, George Washington University, University of Maryland, UCLA Extension, Johns Hopkins University – Organizational Effectiveness Institute, Berlin (Germany) Continuing Engineering Education Program, Monmouth University, and the Fort Monmouth Education Center. Several papers presented at IEEE Vehicular Technology and other Conferences and published in AT&T Technical Journal, IEEE Transactions on Wireless Communications, and IEEE Communications Magazine on various topics in wireless systems and security.
Skills	System/network architecture, communications system design, digital hardware design, RF design, signal processing, real-time DSP programming, software design and coding, proof-of-concept prototyping, designing and conducting laboratory research experiments, OFDM, TDMA/IS-136, FPGA, encryption, computer network security, threat assessment, data communications protocols, computer architecture, digital and analog video systems, system & link-level simulation, UNIX/Linux, Windows, C/C++, Matlab/Simulink, MathCad, PASCAL, Algol, SNOBOL, Verilog, VHDL, FORTRAN. Recruitment, development and management of highly effective technical staff. Highly effective technical presentations and training sessions to any level audience. Well-developed technical writing skills. Preparation, deposition, and testifying regarding expert report for patent infringement/non-infringement/validity/invalidity and other litigation matters. Assist in claim construction and prior art research for patent litigation.

**Other
information**

U.S. Citizen. Held Top Secret - Sensitive Compartmented Information (TS/SCI) clearance with full scope polygraph until October 2015.

Selected as one of twenty-six finalists among 490 entrants in the 2014 Bell Labs Prize competition for proposal "High-precision, low-cost, low-power indoor geolocation techniques."

Stevens Institute of Technology, Henry Morton Distinguished Teaching Professor, 2013-2014.

Named to New Jersey Inventors Hall of Fame, Inventor of the Year (2012) for "Patented/Innovative Research and Entrepreneurial Leadership Related to: Groundbreaking modem development and next generation wireless data communications systems"

Mentored two AT&T Labs Fellowship Program (ALFP) participants, three students in the MentorNet program, 5 Bell Labs Early Career Advisory Program (ECAP) participants, numerous summer students (graduate and undergraduate), several new employees, and all of the staff in groups I have managed.

Advised a significant fraction of ECE Senior Design groups, numerous graduate students; participation in thesis committees of several Stevens PhD students in various departments, including Physics, Computer Science, Mechanical Engineering, and ECE. Consult with non-ECE students on ECE aspects of their Senior Design projects

Mentor summer students at Stevens in NSF-funded Research Experience for Undergraduates (co-PI).

Stevens Institute of Technology, Schaefer School of Engineering, Undergraduate Teaching Award, December 2006.

Life Senior Member, Institute of Electrical and Electronic Engineers - Member of Communications, Signal Processing, Computer and Education Societies

Member, American Society for Engineering Education

Secretary, IEEE Communications Society Communications Security Committee

Identified by Rutberg & Co. Investment Bankers (San Francisco) as member of a group of 213 "Top Wireless Influencers: 2002"

Member of the Council of Communications Advisors

Amateur radio operator licensed since 1963, Amateur Extra Class since 1970

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2/24

US Patents

- "Liquid Crystal Display using the photovoltaic behavior of LED backlights as a source of electrical energy." US Patent #10,310,326, June 4, 2019.
- "Method and apparatus for locating and distinguishing blood vessel." US Patent #8,764,663, July 1, 2014.
- "Secure IP access protocol framework and supporting network architecture," US Patent #8,046,577, October 25, 2011.
- "Method for Estimating Time and Frequency Offset in OFDM Systems," US Patent #7,990,839, August 2, 2011.
- "Simulcasting OFDM system having mobile station location identification," US Patent 7,962,162, June 14, 2011.
- "RFID Devices for Verification of Correctness, Reliability, Functionality and Security," US Patent 7,712,674, May 11, 2010.
- "Dynamic Channel Assignment," US Patent 7,457,259, November 25, 2008.
- "RFIDs Embedded into Semiconductors," US Patent 7,348,887, March 25, 2008.
- "Method for Estimating Time and Frequency Offset in OFDM Systems," US Patent #7,310,302, December 18, 2007.
- "Mobile Device Having Network Interface Selection," US Patent #7,180,876, February 20, 2007.
- "Dynamic Channel Assignment," US Patent #6,954,465, October 11, 2005.
- "Method for Estimating Time and Frequency Offset in OFDM Systems," US Patent #6,891,792, May 10, 2005.
- "Security System Providing Lockout for Invalid Access Attempts," US Patent #5,559,505, September 24, 1996.
- "Telecommunications Fraud Detection Scheme," US Patent #5,504,810, April 2, 1996.
- "Authenticator Card and System," US Patent #5,450,491, September 12, 1995.
- "Secure Telecommunications," US Patent #5,392,357, February 21, 1995.
- "Data Message Storage and Pickup Service," US Patent #5,392,336, February 21, 1995.
- "System and Method for Granting Access to a Resource," US Patent #5,375,244, December 20, 1994.
- "Secure Teleconferencing," US Patent #5,353,351, October 4, 1994.
- "Method and Apparatus for Processor Based Encryption," US Patent #5,278,905, January 11, 1994.
- "Centralized Security Control System," US Patent # 5,276,444, January 4, 1994.
- "Technique for Voice Based Security System," US Patent #5,265,191, November 23, 1993.

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- "Video Scrambling System", US Patent # 5,206,906, April 27, 1993.
- "Cryptographic Transmission System," US Patent #4,642,424, February 10, 1987.
- "Processing of Encrypted Voice Signals," US Patent #4,608,455, August 26, 1986.
- "Control of Coefficient Drift for Fractionally Spaced Equalizers," US Patent #4,376,308, March 8, 1983

Several other published and unpublished US patents pending

**International
Patents**

- "Voltage-controlled apparatus for battery-powered electronic devices," EP Patent #0568237 B1, January 23, 2002.
- "A Dynamic Channel Assignment," EP Patent #1,137,299, September 26, 2001.
- "Data Message Storage and Pickup Service," EP Patent #0626776 B1, April 7, 1999.
- "Data Message Storage and Pickup," Canadian Patent #CA-2119227A1, February 24, 1998.
- "Centralized Security Control System," Canadian Patent #CA-2078077, January 27, 1998.
- "Improved centralized security control system and method," EP Patent #0534679, August 12, 1997.
- "Authenticator Card with Changing Bar Code Pattern," EP Patent #0,715,789, June 12, 1996.
- "Technique for voice-based security systems," Canadian Patent #CA-2072172, April 30, 1996.
- "Method and apparatus for user identification and verification of data packets in a wireless communications network," EP Patent #0,689,316, December 27, 1995.
- "Central Difference Control System," Japanese Patent #1995-131526, May 19, 1995.
- "Authenticator Card with Changing Bar Code Pattern," WO Patent #1995/006371, March 2, 1995.
- "Method for safety system of voice base and device therefore," Japanese Patent #1995-049696, February 21, 1995.
- "Data message storage and pick up service, EP Patent #0,626,776, November 30, 1994.
- "Method for safety system of voice base and device therefore," Japanese Patent #1995-049696, February 21, 1995.
- "Data message storage and pick up service, EP Patent #0,626,776, November 30, 1994.
- "Apparatus for battery type electronic device," Japanese Patent #1994-138983, May 20, 1994.
- "Method and system for making communication via exchange network available, method for providing," Japanese Patent #1994-085811, March 25, 1994.

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Patent
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- Voltage-controlled apparatus for battery-powered electronic devices," EP Patent #0,568,237, November 3, 1993
- "Security node in switched telecommunication network", EP Patent #0,553,553, August 4, 1993.
- "Improved centralized security control system and method," EP Patent 0,534,679, March 31, 1993.
- "An improved technique for voice-based security systems," EP Patent #0,533,396, March 24, 1993.
- "Cryptographic Transmission System," Canadian Patent #CA-1223932, July 7, 1987.

Several other published and non-published applications pending.

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- Leung, K., Clark, M.V., McNair, B., Kostic, Z., Cimini, L.J., Winters, J.H., "Outdoor IEEE 802.11 Cellular Networks: Radio and MAC Design and Their Performance", *IEEE Transactions on Vehicular Technology*, Vol. 56, No. 5, pp. 2673-2684, September 2007.
- Chuang, J., Cimini, L., Li, G., Lin, L., McNair, B., Sollenberger, N., Suzuki, M., Zhao, H., "High Speed wireless data access based on combining EDGE with wideband OFDM," *IEEE Communication Magazine*, November, 1999.
- D'Angelo, D.M., McNair, B., Wilkes, J.E., "Security in Electronic Messaging Systems," *AT&T Technical Journal*, Volume 73, Number 3, 1994.

**Research
awards**

- "Standalone/Networked Compact, Low Power, Image-fused Multi-Spectrum Sensor System for Target Acquisition, Tracking and Fire Control," ARDEC, \$2365000, co-PI with Victor Lawrence, Hong Man. AY2008-2009
- NSF: "REU Site: Integrated Software Radio and Radio Frequency Test Bed for Wireless Research in Dynamic Spectrum Access"; \$296,754; NSF; Co-PI with Yu-Dong Yao. AY2004-2005
- AT&T Labs-Research Equipment donation of \$900k DSP systems and wireless test equipment. AY2003-2004
- AT&T Labs-Research - \$60k grant for "Investigation of Broadband Powerline technology" AY2003-2004

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- Xiongwei Xu, "The synchronization of IEEE 802.11A System", May 2014.
- Abdurazak Fathalla, "Security of Cloud Computing," May 2011.
- Tejas Marathe, "Comprehensive Performance Criteria for Wi-Fi Location Systems," December 2008.

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- Milin Patel, "Network Performance Enhancement using QoS, TCP Optimization, Application Acceleration and Dynamic Resource Allocation Techniques," January 2008.
- Leo Gerard Raj, "Security in 4G Wireless Systems," May 2005.

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- Chao Tian, "Realization of Pure AM/FM Modulation via Combined Optical and Electrical Injection of Carriers in DFB Laser," Stevens Institute of Technology, Physics Department, March 2015.
- Tao Yang, "All-optical frequency modulation of quantum cascade laser and its application on infrared spectroscopy," Stevens Institute of Technology, Physics Department, May 2014.
- Fangming He, "Physical Security in Wireless Communications," Stevens Institute of Technology, Electrical and Computer Engineering Department, May, 2012.
- Vinod Challa, "Vibration Energy Harvesting for Low Power and Wireless Applications," Stevens Institute of Technology, Mechanical Engineering Department, May, 2011.
- Brian Borowski, "Application of Channel Estimation to Underwater Acoustic Communication," Stevens Institute of Technology, Computer Science Department, June, 2010.
- Gang Chen, "All-Optical Modulation of Quantum Structure/Devices," Stevens Institute of Technology, Physics Department, May 2010.

**Conference
Papers**

- He, F., Man, H., Kivanc, D., McNair, B., "EPSON: Enhanced Physical Security in OFDM Networks," *Proc. ICC 2009*, Dresden, Germany, June 2009.
- Patel, S.; Cimini Jr, L.J.; McNair, B., "Comparison of frequency offset estimation techniques for burst OFDM," *Proc. IEEE Vehicular Technology Conference VTC2002*, Birmingham, AL, May, 2002.
- Cimini, L., Leung, K., McNair, B., Winters, J. "Outdoor IEEE 802.11b Cellular Networks: MAC Protocol Design and Performance," *Proc. ICC 2002*, New York, NY, April 2002
- Clark, M., Leung, K., McNair, B., Kostic, Z., "Outdoor IEEE 802.11b Cellular Networks: Radio Link Performance", *Proc. ICC 2002*, New York, NY, April 2002.
- McNair, B., "Software Radio – the Commercial Perspective," *Proc. IEEE Sarnoff Symposium*, Princeton, NJ, March 2002.
- Zou, H., Daneshmand, B., McNair, B., "An Integrated OFDM Receiver for High-Speed Mobile Data Communications," *Proc. IEEE Globecom 2001*, San Antonio, TX, Oct. 2001.
- McNair, B., "Future Directions for Wireless Communications," *Supercomm2001*, Atlanta, GA, June, 2001

**Conference
Papers
(continued)**

- Cimini, L., McNair, B, "OFDM for High Data Rate, High-Mobility, Wide-Area Wireless Communications," *Proc. IEEE Sarnoff Symposium*, Princeton, NJ, March, 2001.
- Cimini, L., McNair, B, Sollenberger, N., "Implementation of an Experimental 384 kb/s Radio Link for High-Speed Internet Access," *Proc. IEEE Vehicular Technology Conference VTC2000*, Boston, MA, September, 2000.
- Cimini, L., McNair, B, Sollenberger, N., "Performance of an Experimental 384 kb/s 1900 MHz Radio Link In a Wide-Area High-Mobility Environment," *Proc. IEEE Vehicular Technology Conference VTC2000*, Boston, MA, September, 2000.
- Takamura, K.; Kunihiro, T.; Yamaura, T.; Fujita, E.; Anderson, G.; Chibane, C.; Feinberg, P.; Sollenberger, N.; McNair, B.; Mielcarek, E., "Field trial results of a band hopping OFDM system," *Proc. IEEE Vehicular Technology Conference VTC99-Fall*, 1999. Amsterdam, the Netherlands, September 1999.
- McNair, B., Cimini, L., Sollenberger, N., "A Robust Timing and Frequency Offset Estimation Scheme for Orthogonal Frequency Division Multiplexing (OFDM) Systems," *Proc. IEEE Vehicular Technology Conference, VTC99*, Houston, TX, May 1999.
- McNair, B., Gupta, S., Kostic, Z., Sollenberger, N., "Experimental Results for Extensions to the IS-136 TDM Standard Based on Higher Level Modulation, Coherent Detection, and Equal Gain Antenna Combining," *Proc. IEEE Vehicular Technology Conference, VTC99*, Houston, TX, May 1999.
- Kostic, Z., McNair, B., Sollenberger N., "Experimental Performance Results of an Indoor Wireless Extension of IS-136 Based on $\pi/8$ D8PSK, Coded Modulation, and Antenna Diversity," *Proc. IEEE Vehicular Technology Conference, VTC98*, Ottawa, Canada, May 1998.
- McNair, B., "The Effectiveness of Preselection Diversity for Indoor Wireless Systems," *Proc. Int. Conf. on Universal Personal Communications*, San Diego, CA, Oct. 1997.

Invited talks

- "Adventures in On-Line Education," Tsinghua University Webinar: Showcasing Online Course Designs, Online Teaching Guidance Expert Group, International Center for Engineering Educations (ICEE) – The United Nations Educational, Scientific and Cultural Organization (UNESCO), April 27, 2020.
- "Providing Structure, Motivation and Process in Security Education," Stevens/NIKSUN Workshop on Innovations in Cyber Security Research, Education and Training, Hoboken, NJ, March 2015
- "Wireless Security Panel," IEEE/AFCEA Fort Monmouth Annual Information Technology Forum and Expo, April 2005.

**Invited talks
(continued)**

- “Of What Use is Wireless Multimedia Without Security,” “What’s Next in Multimedia Panel,” 14th Annual Wireless and Optical Communications Conference, April 2005.
- “Is Wireless Security an Oxymoron?” IEEE Princeton/Central NJ Communications and Consumer Electronics and Computer Science Chapters, December, 2003.

**Other
Publications**

- McNair, B., “Automatic Repeater Offsets,” *73 Magazine*, November 1978, pp. 82-86.
- McNair, B, Williman, G., “Digital Keyboard Entry System,” *Ham Radio*, Volume 11, Number 9, September, 1978, pp. 92-97.
- McNair, B., “A Digital Display for Amateur Radio Communications Equipment,” *Ham Radio*, Volume 9, Number 9, September 1976, pp. 16-25.
- MIL-STD-188-114, “Electrical Characteristics of Digital Interface Circuits,” Department of Defense Interface Standard, 24 March 1976
- Graduate:
 - EE/CpE-517 - Digital and Computer Systems Architecture (on-campus)
 - EE/TM/NIS-584 – Wireless System Security (on-campus and on-line)
 - EE-585/PEP-685/MT-685 – Physical Design of Wireless Communications (on-campus and on-line)
 - NiS/CpE-691 – Information Systems Security (on-campus and on-line)
 - EE/CpE-810A - Special Topics in EE/CpE - Digital and Computer Systems Architecture (on-campus)
- Undergraduate (on-campus):
 - E-232 – Design IV
 - BME-322 – Biomedical Design VI
 - EE/CpE-322 – ECE Design VI
 - EE/CpE-345 – Modeling and Simulation
 - CpE-358/CS-381 – Switching Theory and Logical Design
 - EE-359 – Electronic Circuits
 - EE/CpE-423; EE/CpE-424 – Senior Design
 - CpE-450 – Real-time Embedded Systems

Short Courses

- "Electronics and Computers," preparation course for Fundamentals of Engineering/Professional Engineering license
Stevens Institute of Technology
- "Digital Signal Processing - Principles, Architecture, and System Applications"
 - *Organizational Effectiveness Institute (originally Johns Hopkins University's continuing education program),*
- "Wireless Digital Communications Systems: Components, Specifications, Test and Evaluation"
 - *Organizational Effectiveness Institute*
- "Security in Digital Communications Networks"
 - *Bell Labs Architecture Area Adopt a University Program: Grambling State University*
 - *Monmouth University*
- "Digital Telephony"
 - *Monmouth University*
 - *Fort Monmouth Education Center*
 - *Berlin (F.R.G.) Continuing Engineering Education Program*
- "Digital Communications & Applications"
 - *University of Maryland*
 - *Fort Monmouth Education Center*
 - *UCLA Extension University*
- "Digital Communications," presented with Allen Gersho, N.S. Jayant and David Falconer.
 - *George Washington University*
- "Data Communications for the System Designer"
 - *Bell Labs In-Hours Continuing Education Program*

**Expert
witness,
patent
consulting
experience**

- Authentication technology
- Bluetooth, WiFi, ZigBee, and other local/personal area wireless networking
- Cellular systems
- Communications networking
- Digital clock control for power management in SoCs
- Digital Rights Management
- Digital Subscriber Loop (DSL) technology
- Electronic technology
- Embedded systems
- Emergency alerting systems
- Geolocation technology
- Industrial process control software
- Localization services
- Messaging systems
- Multifactor Authentication
- Peer-to-peer and client-server networks
- Secure voice communications
- Signal processing
- Smart cards and magnetic stripe cards for payment systems
- Software/firmware code analysis (C, VHDL)
- Software trade secrets
- Television and television tuner technology
- Trusted systems
- User and system authentication technology
- Video messaging
- Video scrambling and pay-per-view systems
- Voice processing and voice response systems
- Wireless communications and networking – particularly PHY and MAC layers

**Law firms
supported**

- Alston-Bird, New York, NY and Charlotte, NC (Ross Barton, Kirk Bradley, Darlena Subashi, Karlee Wroblewski)
- Baker & McKenzie, Dallas, TX (William McSpadden)
- Bradley, Birmingham, AL (Paul Sykes, Benn Wilson, Jake Gipson)
- Bragalone-Conroy, Dallas, TX (Nick Kliewer, Daniel Olejko, Stephanie Wood)
- Cantor-Colburn, Hartford, CT (Steve Coyle)
- Carella-Byrne (Donald Ecklund)
- Clark-Hill, Pittsburgh, PA, (J. Alexander Hershey)
- Desmarais, New York, NY (Kerri-Ann Leembeck)
- DLA Piper, Austin, TX, San Francisco, CA and San Diego, CA (Brian Erickson, Gerald Sekimura, Kevin Hamilton)
- Fox Rothschild, Lawrenceville, NJ (Gerard Norton)
- Gibbons-Deldeo, Newark, NJ (Michael Cukor, Sheila McShane, Vin McGeary, Erich Falke, Chris Strate)
- Goodwin-Proctor, New York, NY and Washington, DC. (Mark Abate, Calvin Wingfield)
- Greenberg-Traurig, McLean, VA (Andrew Sommer)
- Hogan-Lovells, Denver, CO (Matt Rozier, Aaron Oakley, Lucky Vidmar)
- Jones-Day, New York, NY (Tom Gianetti)
- Latimer, LLP, Oakhurst, NJ (Brian Latimer)
- Merchant-Gould, Atlanta, GA (George Jenson)
- Morrison-Foerster, San Diego, CA (Christian Andreau-von Eaw)
- Oblon Spivak, Arlington, VA (Robert Mattson, Scott McKeown)
- Orrick, Herrington and Sutcliffe, Silicon Valley (Jason Angell)
- Quattlebaum, Grooms, Tull & Burrow, Little Rock, AR (Steve Quattlebaum)
- Quinn-Emanuel, New York, NY (Marc Kaplan)
- Ropes & Gray, Washington, DC, (Scott McKeown, Victor Cheung)
- Sabety & Associates (Ted Sabety)
- Sidley Austin, Chicago, IL, Washington, D.C. (Doug Lewis, Rick Cederoth, Mike Franzinger)
- Steptoe & Johnson, Washington, D.C. (Kate Cappaert, Brian Johnson)
- Carr & Waddoups, Salt Lake City, UT (Trent Waddoups)
- Unified Patents, Washington, DC (Michelle Callaghan/Aspen, Ashraf Fawzy, Jung Hahm, Roshan Mansinghani, Jessica Marks, Jordan Rossen, David Seastrunck)
- Wilson, Sonsini, Goodrich & Rosati, Palo Alto, CA, Seattle, WA (Matthew Argenti, Quincy Lu)
- White Case, Washington, DC, New York, NY (David Tennant, Grace Wang)
- Wisser and Weinstein, West Hartford, CT (Kerry Wisser)
- Woodcock and Washburn, Philadelphia, PA (Michael Bonella)