

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

GENGHISCOMM HOLDINGS LLC,
Patent Owner

Case: IPR2025-00789
U.S. Patent No. 11,075,786

**DECLARATION OF HARRY V. BIMS, Ph.D. IN SUPPORT OF
PETITION FOR *INTER PARTES* REVIEW**

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PETITIONER'S EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 11,075,786
1002	Declaration of Harry Bims, Ph.D.
1003	Angela Doufexi, et al., <i>Design Considerations and Initial Physical Layer Performance Results for a Space Time Coded OFDM 4G Cellular Network</i> , In The 13th IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (Vol. 1, pp. 192-196). IEEE (Sept. 18, 2002) (“Doufexi”).
1004	Dirk Galda & Hermann Rohling, <i>A Low Complexity Transmitter Structure for OFDM-FDMA Uplink Systems</i> , Vehicular Technology Conference. IEEE 55 th Vehicular Technology Conference, vol. 4, pp.1737-1741 (May 6, 2002) (“Galda”).
1005	Stefan Kaiser, <i>Multi-Carrier CDMA Mobile Radio Systems – Analysis and Optimization of Detection, Decoding, and Channel Estimation</i> , VDI-Verlag, Dusseldorf, Germany (Jan. 1998) (ISBN 3-18-353110-0) (“Kaiser”)
1006	Lucent Technologies, <i>Proposed Baseline OFDM Systems for Study</i> , 3GPP TSG-RAN1 #28 bis, R1-02-01246 (Oct. 8-9, 2002) (“Lucent”).
1007	Andres Bury & Jurgen Linder, <i>Comparison of Amplitude Distributions for Hadamard Spreading and Fourier Spreading in Multi-Carrier Code Division Multiplexing</i> , Globecom '00-IEEE. Global Telecommunications Conference, Vol. 2, pp.857-860 (Nov. 27, 2000) (“Bury”)
1008	Kwang-Cheng Chen, et al., <i>A Programmable Architecture for OFDM-CDMA</i> , IEEE Communications Magazine, pp.76-82 (Nov. 1999) (“Chen”)
1009	José Francia, <i>Proposal for an OFDM-based 802.16.3 Air Interface Physical Layer</i> , IEEE 802.16.3c-00/44 (Oct. 30, 2000)
1010	John Langley, <i>PHY Layer System Proposal for Sub 11 GHz BWA Having SC-FDE and OFDM Modules</i> , IEEE802.16.3c-01/31r2 (Mar. 12, 2001).

Exhibit No.	Description
1011	U.S. Patent Application Publication No. 2003/0081538 to Walton et al.
1012	Declaration of Sylvia Hall-Ellis, Ph.D.
1013	Hermann Rohling, et al., <i>Broad-Band OFDM Radio Transmission for Multimedia Applications</i> , Proceedings of the IEEE, Vol. 87, No. 10, Oct. 1999 (“Rohling”)
1014	Stephen B. Weinstein, <i>The History of Orthogonal Frequency-Division Multiplexing</i> , IEEE Communications Magazine, pp.26-35 (Nov. 2009).
1015	Richard van Nee & Ramjee Prasad, <i>OFDM for Wireless Multimedia Communications</i> (Artech House 2000).
1016	Karsten Bruninghaus & Herman Rohling, <i>Multi-carrier spread spectrum and its relationship to single-carrier transmission</i> , Vehicular Technology Conference. IEEE 48 th Vehicular Technology Conference, vol. 3, pp.2329-2332 (May 18-21, 1998) (“Brüninghaus”).
1017	File History of U.S. Patent Application No. 17/105,574 as obtained from Patent Center
1018	File History of U.S. Patent Application No. 15/283,881 as obtained from Patent Center (excerpts).
1019	File History of U.S. Patent Application No. 14/967,633 as obtained from Patent Center (excerpts).
1020	File History of U.S. Patent Application No. 14/168,466 as obtained from Patent Center.
1021	File History of U.S. Patent Application No. 11/187,107 as obtained from Patent Center (excerpts).
1022	File History of Provisional No. 60/589,187
1023	File History of U.S. Patent Application No. 10/145,854 as obtained from Patent Center (excerpts).
1024	U.S. Patent No. 8,670,390

Exhibit No.	Description
1025	U.S. Patent No. 8,750,264
1026	U.S. Patent No. 9,048,897
1027	U.S. Patent No. 11,201,644
1028	File History of U.S. Patent Application No. 15/786,270 as obtained from Patent Center (excerpts)
1029	File History of U.S. Patent Application No. 15/396,567 as obtained from Patent Center (excerpts)
1030	File History of U.S. Patent Application No. 14/727,769 as obtained from Patent Center (excerpts)
1031	File History of U.S. Patent Application No. 14/276,309 as obtained from Patent Center (excerpts)
1032	File History of U.S. Patent Application No. 12/545,572 as obtained from Patent Center (excerpts)
1033	U.S. Patent Application Publication No. 2015/0256308 to Ma et al. (“Ma”)
1034	Declaration of Craig Bishop
1035	3GPP TS 36.306 V8.0.0 (2007-12) (Release 8)
1036	File History of U.S. Patent Application No. 15/489,644 as obtained from Patent Center (excerpts)
1037	File History of U.S. Patent Application No. 15/149,382 as obtained from Patent Center (excerpts)
1038	3GPP TS 36.211 V8.8.0 (2009-09) 3 rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation (Release 8)
1039	Exhibit 1 to Plaintiff’s P.R. 3-1(c) Infringement Contentions (U.S. Pat. No. 9,768,842)
1040	Marco Breiling, et al., <i>Peak-Power Reduction in OFDM without Explicit Side Information</i> , 5 th Int’l OFDM-Workshop 2000 (Hamburg/Germany), Sept. 2000, pp.28-1 to 28-4.

Exhibit No.	Description
1041	EP 0 734 132 A2 to Kabushiki Kaisha Toshiba (“Toshiba”)
1042	U.S. Patent No. 6,597,745 to Dowling
1043	Gerhard P. Fettweis, et al., <i>A Time Domain View to Multi-Carrier Spread Spectrum</i> , IEEE 6 th Int’l Symposium on Spread-Spectrum & Applications (ISSSTA 2000), (Sept. 6-8, 2000) (pre-print)
1044	Armin Dekorsy & Volker Kuehn, <i>Exploiting Time and Frequency Diversity by Iterative Decoding in OFDM-CDMA Systems</i> , Seamless Interconnection for Universal Services, Global Telecommunications Conference. GLOBECOM’99, Vol. 5, pp.2576-2580 (Dec. 5, 1999).
1045	Volker Kuehn, et al., <i>Channel Coding Aspects in an OFDM-CDMA System</i> , ITG FACHBRICHT, pp.31-36 (Jan. 2000).
1046	Docket Control Order, <i>Genghiscomm Holdings, LLC v. Samsung Elecs., Am., Inc.</i> , No. 2:24-cv-0242-RWS-RSP, Dkt. 25 (Sept. 24, 2024).
1047	Complaint, <i>Genghiscomm Holdings, LLC v. Samsung Elecs., Am., Inc.</i> , No. 2:24-cv-0242-RWS-RSP, Dkt. 1 (Apr. 12, 2024).
1048	Ka-Hou Chan, <i>A General Method for Generating Discrete Orthogonal Matrices</i> , IEEE Access, Vol. 9, pp.120380-12391 (Sept. 7, 2021).
1049	Interview Agenda from U.S. Patent Application No. 16/194,290 (obtained from Patent Center)
1050	U.S. Patent No. 6,671,287
1051	U.S. Patent No. 6,785,258 to Garcia, Jr., et al. (“Garcia”)
1052	Jack Dongarra, et al., <i>Guest editors introduction to the top 10 algorithms</i> , Computing in Science & Engineering 2(01) (2000), pp.22-23.
1053	U.S. Patent No. 6,263,017 to Miller
1054	U.S. Patent No. 6,175,551 to Awater et al.
1055	U.S. Patent No. 5,204,876 to Bruckert et al.

Exhibit No.	Description
1056	3GPP TS 36.211 V8.7.0 (2009-05) 3 rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation (Release 8)
1057	David Astély, et al., <i>LTE: The Evolution of Mobile Broadband</i> , IEEE Communications Magazine, pp.44-51 (Apr. 2009).
1058	M. Rinne, et al., <i>LTE, the radio technology path towards 4G</i> , Computer Communications 33 (2010) pp.1984-1906 (2010)
1059	Declaration of Gary Swatzell including Exhibits A-D
1060	Guidance on USPTO's rescission of "Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation" (Mar. 24, 2025).
1061	Docket Control Order, <i>Slyde Analytics LLC v. Apple Inc.</i> , No. 2:24-cv-00331-RWS-RSP, Dkt. 46 (E.D. Tex. Sept. 23, 2024)
1062	Docket Control Order, <i>Innomemory, LLC v. Truist Financial Corp.</i> , No. 2:24-cv-00146-RWS-RSP, Dkt. 38 (E.D. Tex. Sept. 24, 2024)
1063	Docket Control Order, <i>Husky Injection Molding Systems Ltd. V. Ningbo Ao Sheng Mold Co., Ltd. D/B/A Aosimi</i> , No. 2:24-cv-00348-RWS-RSP, Dkt. 46 (E.D. Tex. Oct. 21, 2024)
1064	Docket Sheet for <i>Partec Ag, et al v. Microsoft Corporation</i> , No. 2:24-cv-00433 (downloaded Mar. 25, 2025).
1065	Combined asserted patents in <i>Genghiscomm Holdings, LLC v. Samsung Elecs., Am., Inc.</i> , No. 2:24-cv-0242-RWS-RSP, Dkt. 25 (Sept. 24, 2024).
1066	File History of U.S. Patent Application No. 16/796,888 as obtained from Patent Center (excerpts).
1067	File History of U.S. Patent Application No. 16/199,221 as obtained from Patent Center (excerpts).
1068	File History of U.S. Patent Application No. 16/027,191 as obtained from Patent Center (excerpts).

Exhibit No.	Description
1069	File History of U.S. Patent Application No. 15/642,850 as obtained from Patent Center (excerpts).
1070	Results of Docket Navigator Search for '842 Patent
1071	The title page, page V, page 14, pages 32-24, pages 130-137, page 140, and page 150 of Kaiser, Stefan. <i>Multi-Carrier CDMA Mobile Radio Systems - Analysis and Optimization of Detection, Decoding, and Channel Estimation</i> . Doctoral Dissertation. Department of Computer Science and Engineering, Technische Universität München. Dusseldorf, Germany: Verein Deutscher Ingenieure (VDI) Verlag, ©1998. Obtained from the University of Mannheim Library in Mannheim Germany.
1072	Results of Docket Navigator Search for the '227 Patent
1073	A. Gusmão, et al., <i>Comparison of Two Modulation Choices for Broadband Wireless Communications</i> , VTC2000-Spring. 2000 IEEE 51 st Vehicular Technology Conference Proceedings, Vol. 2, pp.1300-1305 (May 15, 2000).
1074	Exhibit 4 to Plaintiff's P.R. 3-1(c) Infringement Contentions (U.S. Pat. No. 11,075,786)
1075	U.S. Patent No. 11,700,162 to Shattil
1076	Simon Haykin, <i>Communication Systems</i> (4 th Ed. John Wiley & Sons, Inc. 2001) (Chapter 4)
1077	U.S. Patent No. 7,436,896
1078	Results of Docket Navigator Search for '786 Patent
1079	Results of Docket Navigator Search for '568 Patent

I, Harry V. Bims, Ph.D., declare as follows:

I. Introduction

1. I am over the age of 21 and am competent to make this declaration.
2. I have been retained on behalf of Petitioner Samsung Electronics Co., Ltd. (“Samsung”) to provide my opinions regarding the validity of claims 1, 2, and 6-11, 15-18, 19-20, and 24-27 (“Challenged Claims”) of U.S. Patent No. 11,075,786 (Ex-1001, the “‘786 patent”). I submit this declaration based on my personal knowledge and in support of Samsung’s *inter partes* review Petition (the “Petition”) against the ‘786 patent.
3. I have been asked to provide my independent analysis of the ‘786 patent in light of the materials cited below and my knowledge and experience in this field during the relevant period. I have been asked to consider whether the references cited in the Petition render obvious the invention described by the Challenged Claims.
4. I am being compensated at my normal hourly rate for my time. My compensation is not contingent in any way on the content of my analysis or the outcome of this proceeding. I am not and never have been an employee or agent of Samsung.
5. My opinions are based on my study, experience, and background discussed below, informed by my extensive experience regarding the subject matter of the ‘786 patent and the related prior art. For more than 30 years, since

approximately 1981, I have studied, designed, and worked in the field of telecommunications, including wireless communications. During this period, I have designed and implemented various products involving cellular communication technology.

II. Qualifications

6. My findings are also based on my education as an electrical engineer. I received a B.S. in Computer and Systems Engineering from Rensselaer Polytechnic Institute in 1985.

7. I received an M.S. in Electrical Engineering in 1988 and a Ph.D. in Electrical Engineering in 1993, both from Stanford University. As a graduate student, I studied the principle of Digital Communications theory, including data modulation and demodulation, signal constellations and lattices, channel estimation, equalization, filtering, precoding, synchronization, and trellis coding.

8. My Ph.D. thesis addressed the application of trellis coding and precoding to a digital modulation system, and was titled “Trellis Coding for Multi-Level, Partial Response Continuous Phase Modulation with Precoding.”

9. After receiving my Ph.D. in 1993, I worked for Glenayre Technologies – Wireless Access Group, where I worked on applications for wireless communication, including inventing, designing, and building a patented two-way pager test system and co-developing a wireless application protocol.

10. In January of 1999, I launched a technology consulting company, Protocomm Systems Inc., which focuses on the development of advanced wireless communications protocols and related software implementations for wireless product companies.

11. From 1999 to 2001, I was also the Director of Software Architecture for Symmetry Communications System. In this position, I was responsible for the software architecture for core SGSN (Serving GPRS Support Node) and GGSN (Gateway GPRS Support Node) products for the GPRS (Generic Packet Radio Services) market. I also held management responsibility for the Firmware, Hardware, Performance, and Systems Engineering Groups.

12. In 2001, I developed a business plan for building network infrastructure for Institute of Electrical and Electronics Engineers (“IEEE”) 802.11 standard (“Wi-Fi”) enterprise networks, and then later that year founded AirFlow Networks, Inc. where I invented and received eleven patents on a distributed antenna system design for wireless networks, based on the 802.11 wireless local area network specification.

13. I am currently the President of Protocomm Systems, LLC and Bims Laboratories, LLC, both of which I founded. As the President of Bims Laboratories, I perform technical research in wireless technology standards, such as UMTS, LTE/4G, 5G, Wi-Fi, Bluetooth, and other network communication protocols. I am named as an inventor of twenty-three telecommunications related patents.

14. In addition, I am a named Technical Expert and former Vice-Chair and Secretary of the IEEE 802.16 Working Group, which develops technical standards for the wireless protocol commonly known as WiMax. I am also a voting member of the IEEE 802.11 Working Group (which develops technical standards for WiFi), and the IEEE 802.15 Working Group (which develops standards for a variety of specialty wireless networks). Within the IEEE 802.15 Working Group, I am the technical editor for IEEE 802.16t, an amendment to the WiMAX standard that supports long-range wireless networks for the railroad industry. Within the IEEE 802.11 Working Group, I routinely participate and vote on discussions relating to the design of wireless communications, including packet prioritization, transmission, acknowledgment, and retransmission.

15. Attached as Appendix A is my curriculum vitae, which includes a more detailed statement of my professional qualifications, including education, publications, honors and awards, professional activities, consulting engagements, and other relevant experience.

III. Materials Considered

16. As described in more detail below, based on my experiences, I understand and know the capabilities of a person of ordinary skill in the art of the '786 patent in 2004, when the application to which the '786 patent claims priority was filed. I have relevant personal knowledge and experience, in addition to working

directly with many such persons in these fields during that time frame.

17. I have also relied on my review and analysis of the prior art cited in the Petition, information provided to me in connection with this case, and information I have independently reviewed.

18. In forming my opinions, I have been asked to review the '786 patent including the specification and the Challenged Claims. I have also considered the materials cited herein, including those itemized in the Table of Exhibits that precedes this declaration.

19. My opinions are based on the materials I reviewed and my knowledge and professional judgment. My opinions have also been guided by my understanding of how a person of ordinary skill in the art would have understood the claims of the '786 patent in the relevant time frame.

20. I also understand from counsel that the prior art references cited herein qualify as prior art under U.S. law.

21. In my analysis below, emphasis in my citations has been added unless otherwise noted. Likewise, annotations to images and figures (typically highlighting of various colors) has been added unless otherwise noted.

22. I reserve the right to supplement and amend any of my opinions in this declaration based on documents, testimony, and other information that becomes available to me after the date of this declaration.

IV. Legal Standards

23. I am not a lawyer. My understanding of the legal standards to apply in reaching the conclusions in this declaration is based on discussions with counsel for Petitioner, my experience applying similar standards in other patent-related matters, and my reading of the documents submitted in this proceeding. In preparing this declaration, I have tried to faithfully apply these legal standards to the challenged claims.

24. I have been informed that there are two ways in which prior art may render a patent claim unpatentable. First, I have been informed that the prior art can “anticipate” a claim. Second, I have been informed that the prior art can render a claim “obvious” to a person of ordinary skill in the art. I understand that a claim is patentable if it was not anticipated and would not have been obvious by the prior art at the effective filing date of the patent. In this declaration, I only address obviousness.

25. I have been informed that a dependent claim is a patent claim that refers back to another patent claim. I have been informed that a dependent claim includes all of the limitations of the claim to which it refers.

26. I have been asked to provide my opinions as to whether the cited prior art renders obvious the Challenged Claims of the ‘786 patent from the perspective of a person of ordinary skill in the art at the ‘786 patent’s earliest possible effective

filing date in 2004, as described in more detail below.

27. I have been informed that in *inter partes* review proceedings, such as this one, the party challenging the patent bears the burden of proving unpatentability by a preponderance of the evidence. I understand that a preponderance of the evidence means “more likely than not.”

28. For purposes of this declaration, I have been asked to provide my opinions on issues regarding unpatentability. I have been informed of the following legal standards, which I have applied in forming my opinions.

A. Level of Ordinary Skill

29. I understand that my assessment of the claims of the ‘786 patent must be undertaken from the perspective of what would have been known or understood by a person having ordinary skill in the art, reading the ‘786 patent on its priority date and in light of the specification and file history of the ‘786 patent. I will refer to such a person as a “POSITA.”

30. I understand that my analysis and opinions expressed in this declaration must be rendered based on the perspective of a POSITA as of the priority date of the ‘786 patent. I also understand that a POSITA is a hypothetical person who is presumed to know the relevant art at the time of the alleged invention claimed in the ‘786 patent.

31. I further understand that in determining the level of ordinary skill in the

art, I am to consider factors including:

- the type of problems encountered in the art or field of invention,
- prior art solutions to those problems,
- the rapidity with which innovations are made,
- sophistication of the technology, and
- the educational level of active workers in the field.

32. I have been instructed to assume a person of ordinary skill in the art is not a specific real individual, but rather a hypothetical individual having the qualities reflected by the factors discussed above.

33. I understand that a POSITA is a person of ordinary creativity, but not an automaton, and that a POSITA can often fit multiple patents or prior art references together like pieces of a puzzle as a result of this ordinary creativity. I also understand that I may consider the inferences and creative steps that a POSITA would employ. In addition, I understand that a POSITA would necessarily have been capable of understanding the scientific and engineering principles applicable to the pertinent art. I also understand that when I consider what would have been obvious to a POSITA, I am not considering what would have been obvious to me at the time, nor to the inventors, judges, laymen, those skilled in other arts, or to geniuses in the art.

B. Prior Art

34. I have been advised and understand that the information used to evaluate whether an invention was new and not obvious when made is generally

referred to as “prior art.” I understand that prior art includes patents and printed publications that existed before the earliest claimed priority date or the earliest filing date of the patent (which I have been informed is also called the “effective filing date”).

35. I have been informed and understand that a patent or published patent application is prior art if it was filed before the effective filing date of the claimed invention.

36. I have also been informed and understand that a printed publication is prior art if it was publicly available before the earliest filing date and could be located by a POSITA exercising reasonable diligence.

C. Anticipation

37. I understand that a patent is invalid as anticipated if each and every feature of the claim is found, expressly or inherently, in a single item of prior art. I understand that anticipation by inherent disclosure is appropriate only when a prior art reference necessarily includes or discloses the unstated claim element. I also understand that the discovery of a new or previously unreported or unappreciated property of a prior art composition, or of a scientific explanation for how a prior art composition operates, does not make the prior art composition patentably new to the entity or person that discovered the new property or mode of operation. I further understand that there is no requirement that a POSITA would have recognized the

inherent disclosure at the time of the invention.

38. For anticipation by a prior art publication or document, I understand that the reference's description must enable a POSITA to practice the claimed invention without undue experimentation.

D. Obviousness

39. I understand that a claim may be invalid if the subject matter described by the claim as a whole would have been obvious to a POSITA in view of a prior art reference, or in view of a combination of references at the time the claimed invention was made. Therefore, I understand that obviousness is determined from the perspective of a POSITA, and that the asserted claims of the patent should be read from the point of view of such a person at the time the claimed invention was made. I further understand that a POSITA is assumed to know and to have all relevant prior art in the field of endeavor covered by the patent in suit and all analogous prior art. I understand that obviousness in an *inter partes* review proceeding is evaluated using a preponderance of the evidence standard, which means that the claims must be more likely obvious than nonobvious.

40. I also understand that an analysis of whether a claimed invention would have been obvious should be considered in light of the scope and content of the prior art, the differences (if any) between the prior art and the claimed invention, and the level of ordinary skill in the pertinent art involved. I understand as well that a prior

art reference should be viewed as a whole. I understand that in considering whether an invention for a claimed combination would have been obvious, I may assess whether there are apparent reasons to combine known elements in the prior art in the manner claimed in view of interrelated teachings of multiple prior art references, the effects of demands known to the design community or present in the marketplace, and/or the background knowledge possessed by a POSITA. I also understand that other principles may be relied on in evaluating whether a claimed invention would have been obvious, and that these principles include the following:

- A combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results;
- When a device or technology is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or in a different one, so that if a POSITA can implement a predictable variation, the variation is likely obvious;
- If a technique has been used to improve one device, and a POSITA would have recognized that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill;
- An explicit or implicit teaching, suggestion, or motivation to combine two prior art references to form the claimed combination may demonstrate obviousness, but proof of obviousness does not depend on or require showing a teaching, suggestion, or motivation to combine;
- Market demand, rather than scientific literature, can drive design trends and may show obviousness;
- One of the ways in which a patent's subject can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims;

- Any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed;
- “Common sense” teaches that familiar items may have obvious uses beyond their primary purposes, and in many cases a POSITA will be able to fit the teachings of multiple patents together like pieces of a puzzle;
- A POSITA is also a person of ordinary creativity, not an automaton;
- A patent claim can be proved obvious by showing that the claimed combination of elements was “obvious to try,” particularly when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions such that a POSITA would have had good reason to pursue the known options within his or her technical grasp; and
- One should be cautious of using hindsight in evaluating whether a claimed invention would have been obvious.

41. I have been informed that the relevant time for considering whether a claim would have been obvious to a person of ordinary skill in the art is the time of invention. For my obviousness analysis, counsel for Petitioner instructed me to assume that the effective filing date is August 2, 2004, and that I should assume this is the date of invention for the Challenged Claims. My opinions would not change if I assumed a later date of invention.

V. Claim Construction

42. I understand that claim terms in an IPR are generally interpreted according to their ordinary and customary meaning. I further understand that the claims are read in light of the patent’s specification and that claims themselves often provide significant guidance as to the meaning of a particular term. I also understand that extrinsic evidence may be helpful when construing a claim term, but that it is

less relevant than the intrinsic evidence and is often unreliable.

43. The prior art discussed herein would disclose and/or obviate the Challenged Claims under any reasonable constructions, and thus, I believe no formal claim constructions are required.

VI. The '786 Patent

A. General Overview and Background Concepts

44. The '786 Patent is titled "Multicarrier sub-layer for direct sequence channel and multiple-access coding" and describes a "CI Multiple-Access Transceiver." EX1001, cover. The '786 patent discloses that "[a]n information signal, such as a stream of data bits or data symbols may be processed with an optional coder/interleaver 4001" and "[d]ata symbols are coupled to a CI encoder 4002, such as a modulator, that impresses the data symbols onto at least one CI code generated by a CI-code generator 4003." EX1001, 78:6-54.

45. An example of the CI transceiver is shown in Fig. 40A below.

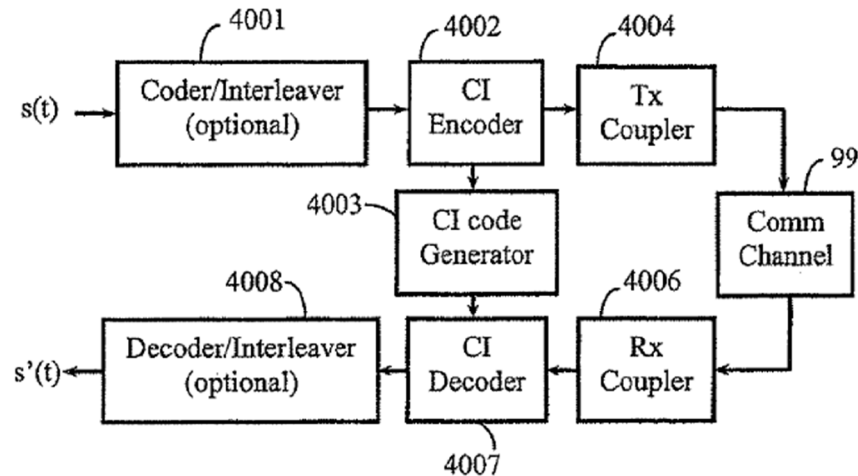


FIG. 40A

EX1001, FIG. 40A. The Challenged Claims are directed to systems and methods that implement DFT spreading and OFDM modulation in wireless communications

B. Prosecution History and Effective Filing Date

46. I understand that Petitioner contends the '786 patent claims priority to US Provisional Application No. 60/598,187, filed Aug. 2, 2004.

C. The Challenged Claims

47. The Challenged Claims are claims 1, 2, and 6-11, 15-18, 19-20, and 24-27. Claims 1, 10, and 19 are independent.

D. Person of Ordinary Skill in the Art ("POSITA")

48. A POSITA as of Aug. 2, 2004 (the earliest claimed effective filing date of the '786 patent) would have had either a Master's degree in electrical engineering or a related field, or a Bachelor's degree in electrical engineering or a related field with three years of experience in wireless communication systems, signal

processing, and related technologies. A POSITA would have been familiar with the use of Orthogonal Frequency Division Multiplexing (OFDM) and Orthogonal Frequency Division Multiple Access (OFDMA) in evolving wireless communication standards and 3GPP standards. Techniques for mitigating inter-symbol interference (ISI) and inter-carrier interference (ICI), including discrete Fourier transform (“DFT”) spreading, modulation comprising the use of inverse discrete Fourier transforms (“IDFT”), cyclic prefix/guard interval insertion, channel estimation, and equalization, would have been well known to a POSITA, along with the advantages of OFDM/OFDMA in terms of spectral efficiency, robustness against multipath fading, and adaptability to varying channel conditions.

49. A POSITA would have also understood subcarrier selection techniques, including adaptive subcarrier allocation based on channel conditions and user requirements, as well as subcarrier spacing considerations.

50. A POSITA would have recognized that OFDM parameter selection was flexible and involved trade-offs among bandwidth efficiency, bit rate requirements, and multipath delay spread. Different guard time durations were used to mitigate ISI due to delay spread, while minimizing signal-to-noise ratio (SNR) loss, and subcarrier spacing was adjusted to balance system complexity, phase noise sensitivity, and peak-to-average power ratio. It was also well-established that DFT-spreading was used to reduce peak-to-average power ratio, including as compared

to other spreading codes like Walsh-Hadamard codes, as detailed further with respect to the prior art discussed herein.

51. A POSITA would have been aware that various wireless standards and deployment scenarios required different OFDM configurations, including variations in modulation schemes, coding rates, and FFT sizes, to achieve optimal performance. The selection of parameters such as symbol duration and sampling rates was driven by system design constraints, ensuring integer sampling intervals for efficient signal processing. These fundamental principles of OFDM parameter selection were well known and widely implemented in contemporary wireless standards.

52. Additional techniques and tools understood by a POSITA are discussed in this Declaration.

VII. Overview of the Prior Art

I understand that the Petition addresses the following grounds:

Ground	Claims	Challenge	Statute
1	1, 2, and 6-9	Obviousness over Galda in view of Brüninghaus	Post- or Pre-AIA §103
2	10-11, 15-18, 19-20, and 24-27	Obviousness over Galda in view of Brüninghaus and Dowling	
3	1, 2, and 6-9	Obviousness over Kaiser in view of Bury	

Ground	Claims	Challenge	Statute
4	10-11, 15-18, 19-20, and 24-27	Obviousness over Kaiser in view of Bury and Dowling	

53. I provide a brief overview of the prior art references identified in Petitioner's grounds below. Each reference discussed below and relied upon in the challenges is analogous prior art and in the same field of endeavor as the '786 Patent.

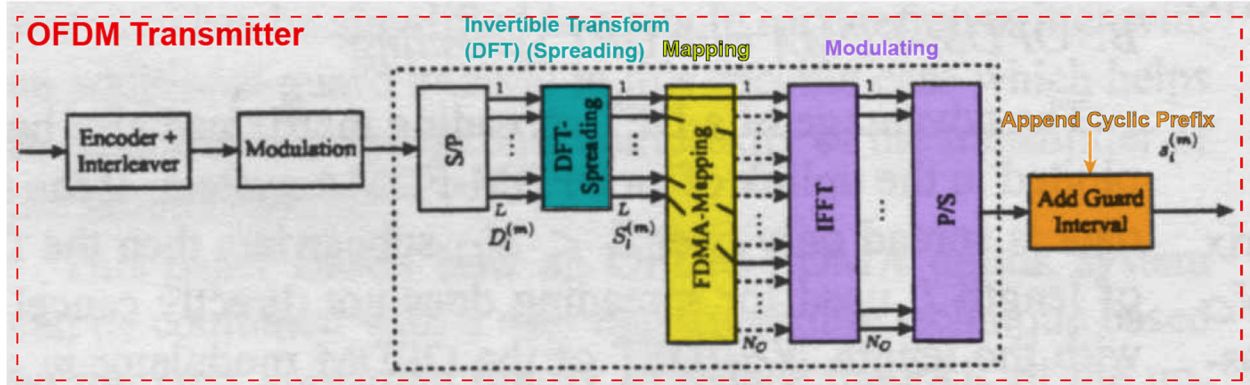
A. Galda

54. Galda is a prior art printed publication because it was distributed and thus accessible to those skilled in the art between May 6th to 9th on CD ROM to as many as 400 attendees at IEEE's 55th Vehicular Technology Conference in Birmingham, Alabama. EX1059, ¶¶4-10. The "main focus" of the conference was "voice and data wireless mobile communications," *Id.*, ¶6, and there were more than 100 presenters skilled in the field at the conference. *Id.* CD ROMs were given to attendees when they checked in for the conference and included as part of the conference registration fee. *Id.*, ¶¶7-10, 11 (Exhibit D). The conference was open to the public and there were no confidentiality restrictions imposed on the conference proceedings, EX1059, ¶¶11-12, and it was expected that the proceedings would be shared widely as confirmed by the fact that the conference proceedings were cataloged into the Linda-Hall Library of Science, Engineering, and Technology less

than two months later, then made available on the IEEE website by August 7, 2002.

EX1012, ¶52. Galda is thus a prior art printed publication by at least May 6, 2002 and is prior art under pre-AIA §§ 102(a) or (b) or post-AIA § 102(a)(1).

55. Galda teaches reducing PAPR (PAR) using “OFDM-FDMA multiple access ... combined with a data spreading technique based on a Discrete Fourier Transform. Spreading matrix using only the user specific subcarriers.” EX1004, p.1737. Galda’s transmitter is illustrated below.



Id., p.1740 (annotated).¹

56. Galda is analogous art to the '786 Patent because it is in the field of multi-carrier spread spectrum communications. EX1001, 1:35-38; EX1004, p.1737 (describing “spreading over the subcarriers assigned to one user”). Both the '786 Patent and Galda describe applying coefficients to data symbols to spread them over subcarriers in the frequency domain. EX1001, 6:48-50; EX1004, pp.1737, 1739

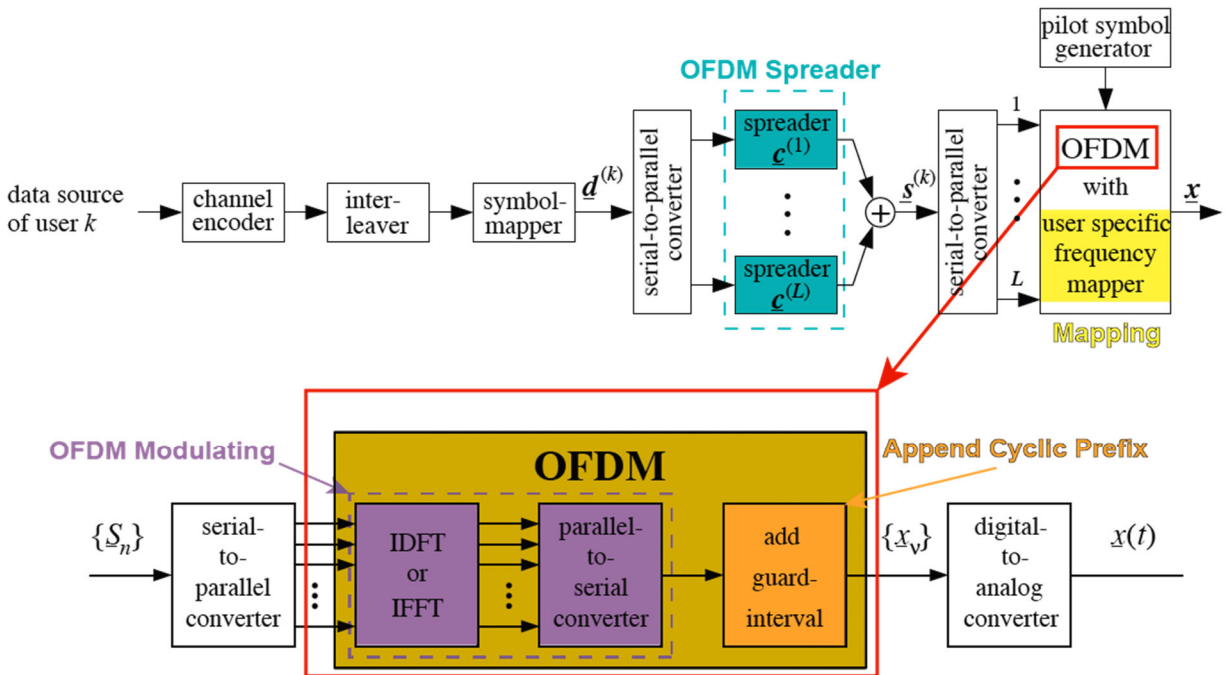
¹ Color highlights and color text herein are Petitioner’s annotations unless otherwise noted.

(using “elements of the discrete Fourier matrix”), 1740, Fig. 6(a). Galda is also analogous art because one of the problems facing the inventor was reducing PAPR in OFDM communications, EX1001, 66:43-44 (“CI-OFDM eliminates problems of high PAPR.”), and Galda seeks to solve that problem by spreading data symbols using complex-valued codes from a DFT before applying OFDM modulation using an IFFT, EX1004, pp.1737, 1739-1740.

B. Kaiser

57. Kaiser is a Ph.D. thesis titled “*Multi-Carrier CDMA Mobile Radio Systems – Analysis and Optimization of Detection, Decoding, and Channel Estimation*,” issued by the Department of Computer Science and Engineering at the Technische Universität München (Dusseldorf, Germany) and published by VDI-Verlag, Dusseldorf, Germany. EX1005. Kaiser bears January 1998 publication date. *Id.*, cover. Kaiser was cataloged by the Bavarian Library Network in its online catalog by April 15, 1998 and into the Bibliothèque Scientifique Nationale / National Research Council Library (Ottawa, Ontario, Canada) by July 6, 1998. EX1012, ¶48. Kaiser was cataloged by subject matter using terms that a POSITA would have reasonably used to locate Kaiser. EX1012, ¶49. As further evidence of Kaiser’s availability, numerous articles cite to Kaiser. EX1043, p.4 (reference [14]), EX1044, p.6 (reference [2]), EX1045, p.6 (reference [4]). Kaiser is thus prior art under pre-AIA §102(b) or post-AIA §102(a)(1).

58. Kaiser discloses an OFDM transmitter comprising an OFDM spreader block, “user-specific frequency mapper,” and an OFDM transmission block that includes an IDFT/IFFT, parallel-to-serial converter, and a block for adding a guard interval (cyclic prefix):



EX1005, pp.34, 132 (Figs. B.2 & 3.2 (annotated)).²

59. Kaiser is analogous to the '786 Patent because it is in the field of multi-

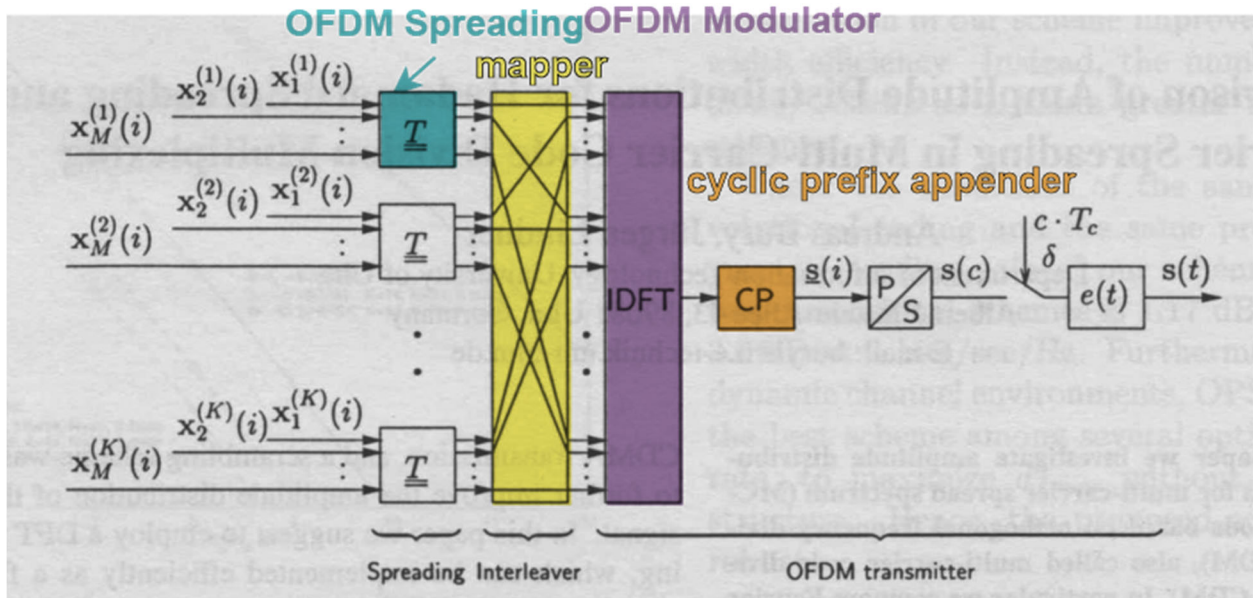
² This Figure combines two figures in Kaiser: Figure B-2, which discloses an “OFDM” element, and Figure 3.2 from Chapter 3, §3.1.1. EX1005, pp.34, 132. Kaiser teaches that the OFDM steps are applied in the SS-MC-MA transmitter in the same manner discussed in §3.1.1. EX1005, pp.132-133.

carrier spread spectrum communications. EX1001, 1:35-38; EX1005, pp.130-37 (describing spread spectrum multiple access). Kaiser is also analogous because one of the problems facing the inventor was to achieve more efficient use of bandwidth in communication systems, EX1001, Abstract (“[B]andwidth efficiency of multicarrier protocols is greatly enhanced with CI.”), 5:41-42 (“CI avoids the problem of reduced bandwidth efficiency....”). Kaiser is reasonably pertinent to this problem because it achieves “high bandwidth efficiency and great flexibility” using SS-MC-MA in the uplink. EX1005, p.137.

C. Bury

60. Bury is a conference paper from the IEEE Global Telecommunications Conference. EX1007. Exhibit 1007 was obtained from the Linda Hall Library, which entered it into its catalog by January 12, 2001. EX1012, ¶¶58, 60-61. Bury was cataloged by subject matter as indicated in the records identified by Dr. Hall-Ellis and based on the subject matter categories, a POSITA would have been able to find Bury with the exercise of reasonable diligence. EX1012, ¶¶37, 63-64. Bury is thus prior art under pre-AIA §102(b) or post-AIA §102(a)(1).

61. Bury discloses an OFDM transmitter in Figure 1 including a spreader with an invertible transform (a DFT matrix), a mapping block, an IDFT/OFDM modulator block, and a block for appending a cyclic prefix:



EX1007, p.858 (Fig. 1(a) (annotated)).

62. Bury further teaches that DFT-spreading codes/matrices should be used instead of conventional Walsh-Hadamard codes to improve overall performance by reducing peak-to-average power ratio (PAPR). EX1007, pp.857, 860.

63. Bury is analogous art to the '786 Patent because it is in the field of multi-carrier spread spectrum communications. EX1001, 1:35-38; EX1007, p.857 (referring to “multi-carrier spread spectrum (MC-SS) transmission methods based on” OFDM). Bury is also analogous because one of the problems facing the inventor was reducing PAPR in OFDM communications, EX1001, 66:43-44 (“CI-OFDM eliminates problems of high PAPR.”), and Bury seeks to solve that problem by spreading symbols using complex-valued codes from a DFT, EX1007, pp.857, 860.

D. Brüninghaus

64. Brüninghaus is a conference paper from the 48th IEEE Vehicular Technology Conference held in May 1998. EX1016, p.1. Exhibit 1016 was obtained from the Linda Hall Library. EX1012, ¶72. It was cataloged into that library as of July 16, 1998. EX1012, ¶75. It was cataloged by subject matter including “Mobile communication systems \$v\$ Congresses,” which would have been sufficient to allow for a POSITA to locate Brüninghaus based on subject matter. EX1012, ¶77; As a further indication of its accessibility to those skilled in the art, Brüninghaus has been cited in other scholarly works. EX1073, p.1305 (reference [7]); EX1004, p.1741 (reference [3]); EX1007, p.860 (reference [4]). Brüninghaus is thus prior art under pre-AIA §102(b) or post-AIA §102(a)(1).

65. Brüninghaus describes that “[t]he combination of orthogonal frequency division multiplexing (OFDM) and code division multiplexing (CDM) has found great interest during the last few years.” EX1016, p.2329. Brüninghaus also discloses that “[s]ince the single-carrier system which results from an OFDMCDM system with Fourier spreading matrix is a special case of an OFDM-CDM system, the same detection algorithms can be applied and the same performance can be expected.” *Id.*, p.2330. “In case of a Fourier spreading matrix, despreading in the receiver is achieved by an inverse Fast-Fourier matrix, i.e. $[H]^H = [\text{IFFT}]$.” EX1016, p.2330.

66. Brüninghaus is analogous to the '786 patent because they share the same field including multi-carrier spread spectrum communications. EX1001, 1:35-38; EX1016, p.2329 (titled: "Multi-Carrier Spread Spectrum"). Brüninghaus is also analogous because one of the problems facing the inventor was reducing transceiver complexity, EX1001, Abstract ("CI-based ultra-wideband protocols are implemented via frequency-domain processing to reduce ... transceiver complexity..."), 6:67-66, and Brüninghaus achieves an equivalent single-carrier system with reduced computational complexity, EX1016, p.2330.

E. Dowling

67. Dowling was filed on April 6, 1999 and issued July 22, 2003. EX1042, cover. Dowling is prior art under post-AIA §102(a)(1) or pre-AIA §102(e).

68. Dowling discloses multicarrier modulation and OFDM systems that may be implemented as software modules executing on programmable processors. Dowling's transmitters, receivers, and precoders may be implemented in either hardware or software. EX1042-Dowling, 3:46-50, 5:66-6:1.

69. Dowling is analogous to the '786 Patent at least because it is in the same field of endeavor including multicarrier systems. EX1001, 1:35-38 (referring to the "field" as including "multicarrier spread spectrum communications"); EX1042, 1:6-12 ("field" relates to "data transmission," more specifically to for multicarrier (e.g., OFDM) systems), 21:62-64 (invention "applied to other FFT based multicarrier

modulation and OFDM systems.”). Dowling is also reasonably pertinent to a problem faced by the inventor including reducing the complexity in a transmitter. EX1001, Abstract (“CI-based ultra-wideband protocols are implemented via frequency-domain processing to reduce ... transceiver complexity...”), 6:67-66; EX1042, 1:7-10 (“[T]he invention relates to a reduced complexity precoder method and apparatus for multicarrier systems.”).

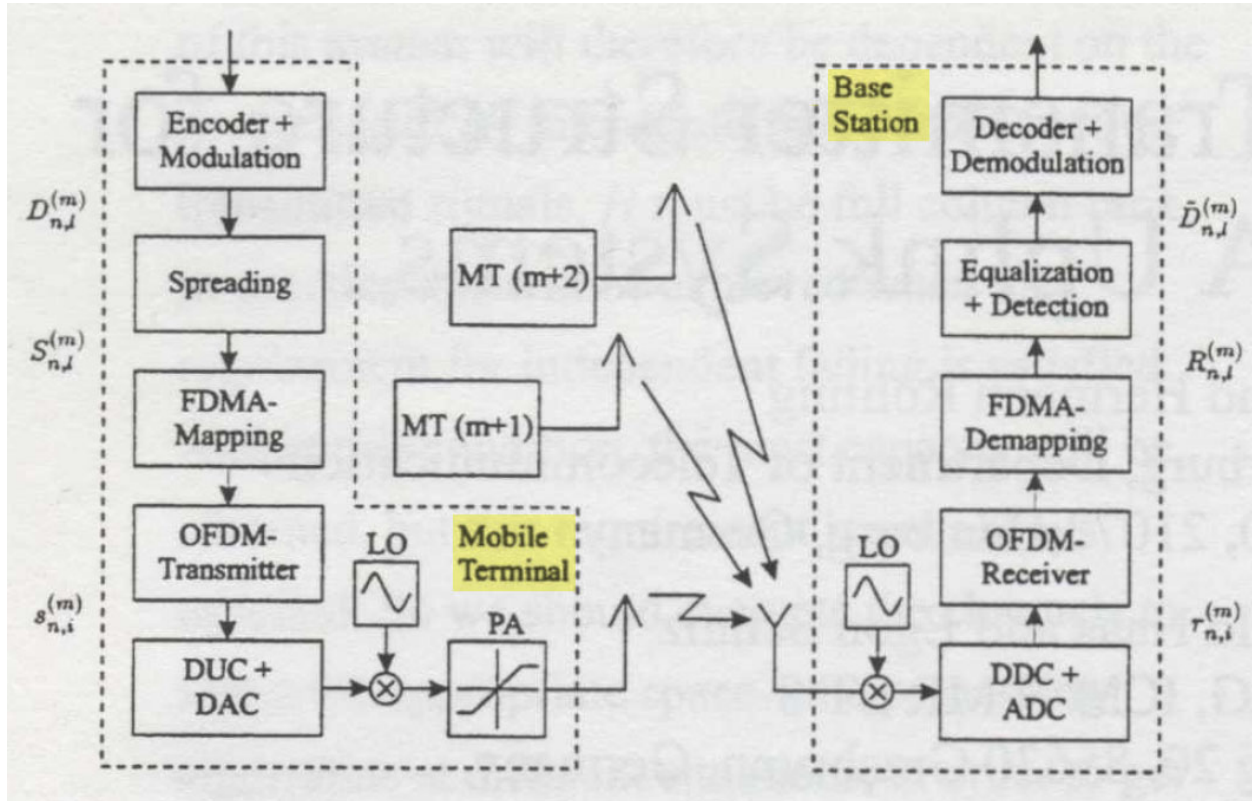
VIII. GROUND 1: Claims 1, 2, and 6-9 are obvious over Galda in view of Brüninghaus

A. Claim 1

[1Pre] “A method of communication in a wireless communication network that employs a first set of complex-valued codes to encode data symbols to be transmitted, and employs a second set of complex-valued codes to recover transmitted data symbols from a received signal, the method comprising:”

70. Assuming claim 1’s preamble is limiting, Galda in view of Brüninghaus renders obvious the claimed *method of communication in a wireless communication network* (Galda’s “Mobile Terminal” transmits to “Base Station”) *that employs a first set of complex-valued codes* (Galda’s DFT coefficients; Brüninghaus’ “Fourier matrix” coefficients) to encode data symbols to be transmitted (Galda’s L complex modulation symbols $D_l^{(m)}$, $l = 0, \dots, L - 1$), *and employs a second set of complex-valued codes to recover transmitted data symbols from a received signal* (Brüninghaus explains that the receiver applies the “inverse Fast-Fourier matrix, i.e. $[H]^H = [\text{IFFT}]$ ” to perform “despreading” as explained in more detail in Limitation [1E]).

71. Galda's OFDM system spreads data symbols with "a Discrete Fourier Transform (DFT) spreading matrix" before mapping and OFDM modulation, and ultimately *communication in a wireless transmission network* as shown below where "Mobile Terminal" transmits wirelessly to "Base Station":



EX1004, p.1738 (Fig. 1).

72. Galda employs a first set of complex-valued codes to encode data symbols to be transmitted because it explains that " L complex modulation symbols $D_l^{(m)}$, $l = 0, \dots, L - 1 \dots$ are spread over the L user specifically allocated subcarrier with a[] unitary spreading matrix $[C]$ resulting in L complex transmit symbols $S_l^{(m)}$."

EX1004, p.1738. Galda's "elements of the discrete Fourier matrix" are *complex-*

valued codes because they take the form:

$$C_{i,j} = \left(\frac{1}{\sqrt{L}} \right) \cdot e^{j2\pi i j / L}$$

EX1004, p.1739.

73. When *data symbols* $D_l^{(m)}$, $l = 0, \dots, L - 1$ are multiplied by the elements of the Fourier matrix, it *encodes* the data symbols to be transmitted by spreading them.

74. Galda in view of Brüninghaus renders obvious employing *a second set of complex-valued codes to recover transmitted data symbols from a received signal*. Galda shows receiving a time-domain waveform $r_i^{(m)}$ corresponding to the time-domain waveform $s_i^{(m)}$. EX1004, pp.1738-39 (Fig. 1). This is the *received signal*. Brüninghaus explains that “[i]n the receiver, the inverse processing is performed” and that when “the Fourier matrix is used as orthogonal code matrix,” the received signal can be despread “in the receiver ... by an inverse Fast-Fourier matrix” EX1016, pp.2329, 2330. As explained in more detail below, Brüninghaus’ inverse Fourier matrix includes *complex valued codes* that recover Galda’s *transmitted data symbols* from the *received signal*. See §VIII(A)[1B-1E]. Accordingly, Galda in view of Brüninghaus renders obvious Limitation [1Pre].

[1A] “selecting a plurality of subcarriers to be transmitted”

75. Galda in view of Brüninghaus renders obvious selecting a plurality of

subcarriers to be transmitted.

76. Galda explains that the transmission bandwidth is divided into “a set of orthogonal subcarriers” and that “distinct sets of subcarriers” are allocated “to different users.” EX1004, p.1737. This allows bandwidth to be “flexibly shared between different mobile terminals while avoiding any multiple access interferences (MAI) between different users.” Id. This provides “high flexibility for the radio resource management (RRM)” Id., p.1737. As Galda explains “the set of subcarrier[s] assigned to each user can be composed of any L out of N_C subcarrier that have not been assigned to another user.” Id., p.1738. Galda’s transmitter performs selecting a plurality of subcarriers to be transmitted because, based on the allocation, Galda’s transmitter can “spread the user data over the allocated subcarrier only.” Id., p.1737.

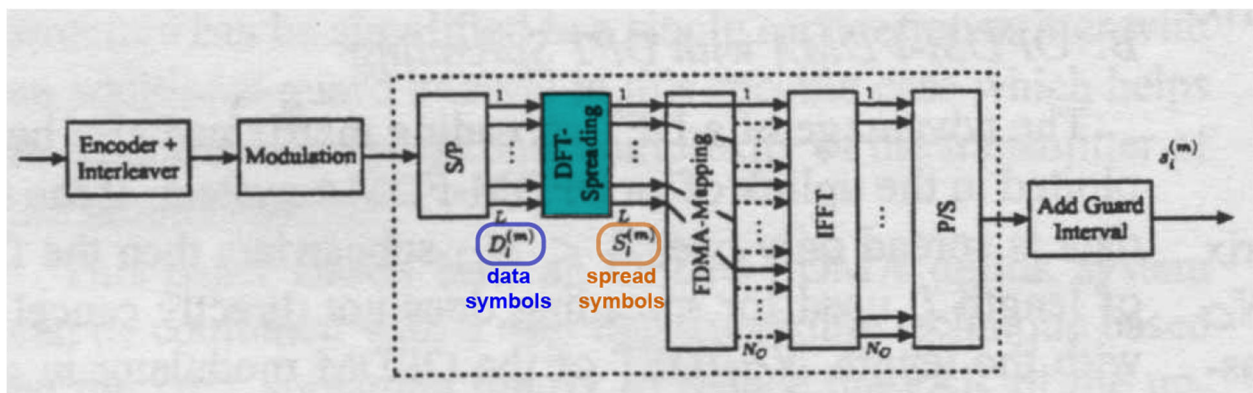
77. According to Galda, “each user allocates L different subcarrier[s] exclusively.” Id., p.1738. Because the “user allocates” the L subcarriers, Galda describes *selecting a plurality of subcarriers* (i.e., L subcarriers from an available N_C subcarriers). These L subcarriers are *to be transmitted* because the “OFDM time signal of user m” is summed across subcarriers $l=0$ to $L-1$, EX1004, p.1738 (equation (3)), and can be expressed similarly as signal $s_t^{(m)}$ which is the “transmit signal of user m,” id., p.1739 (equation (7)).

78. Therefore, Galda in view of Brüninghaus renders obvious limitation

[1B] “encoding the data symbols with the first set of complex-valued codes to produce encoded data symbols encoding the data symbols with the first set of complex-valued codes to produce encoded data symbols”

79. Galda in view of Brüninghaus renders obvious encoding the data symbols with the first set of complex-valued codes to produce encoded data symbols encoding the **data symbols** with the **first set of complex-valued codes** to produce **encoded data symbols**.

80. Galda describes performing *encoding the data symbols with the first set of complex-valued codes* because vector of “complex modulation symbols,” i.e., **data symbols “ $\vec{D}^{(m)}$ ”** are multiplied by codes from **complex-valued code matrix “ $[C]$ ”** to produce *encoded data symbols*—i.e., “complex transmit symbols” “ $\vec{S}^{(m)}$.” EX1004, p.1738. The encoding is performed in Galda’s “DFT-Spreading” block:



EX1004, p.1740 (Fig. 6(a)).

81. Galda’s complex-valued code matrix includes *first set of complex-valued codes “ $C_{i,j}$ ”* defined as:

$$C_{i,j} = \left(\frac{1}{\sqrt{L}} \right) \cdot e^{j2\pi ij/L}$$

EX1004, p.1739.

82. At the very least, a POSITA would have found this expression to refer to complex-valued codes because as admitted by Patent Owner in co-pending litigation, exponential term “ $e^{j2\pi ij/L}$ ” is complex-valued because it includes “exponential function e ”). EX1004, p.1739; EX1074, p.9.

83. Accordingly, Galda in view of Brüninghaus renders obvious Limitation [1B].

[1C] “applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal,”

84. Galda in view of Brüninghaus renders obvious applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal.

85. Galda’s “FDMA-Mapping” block applies the vector of “complex transmit symbol[s] $S_l^{(m)}$ ” “onto L of the available N_C subcarrier[s] which are exclusively allocated to user m .” EX1004, p.1738. This *applies the encoded data symbols* represented as **subcarrier values** “ $\vec{S}^{(m)}$ ” to the L subcarriers and inputs them into the IFFT block *to produce a spread-OFDM signal*—i.e., Galda’s **time-domain waveform** (“the resulting OFDM time signal of user m ” $s_l^{(m)}$). EX1004, p.1738. Galda’s time-domain waveform is reflected in the following mathematical

$$s_i^{(m)} = e^{j2\pi im/N_C} \frac{1}{\sqrt{L}} \sum_{l=0}^{L-1} s_l^{(m)} e^{-j2\pi il/L} \quad (3)$$

$$\text{for } i = -N_G, \dots, 0, \dots, N_C,$$

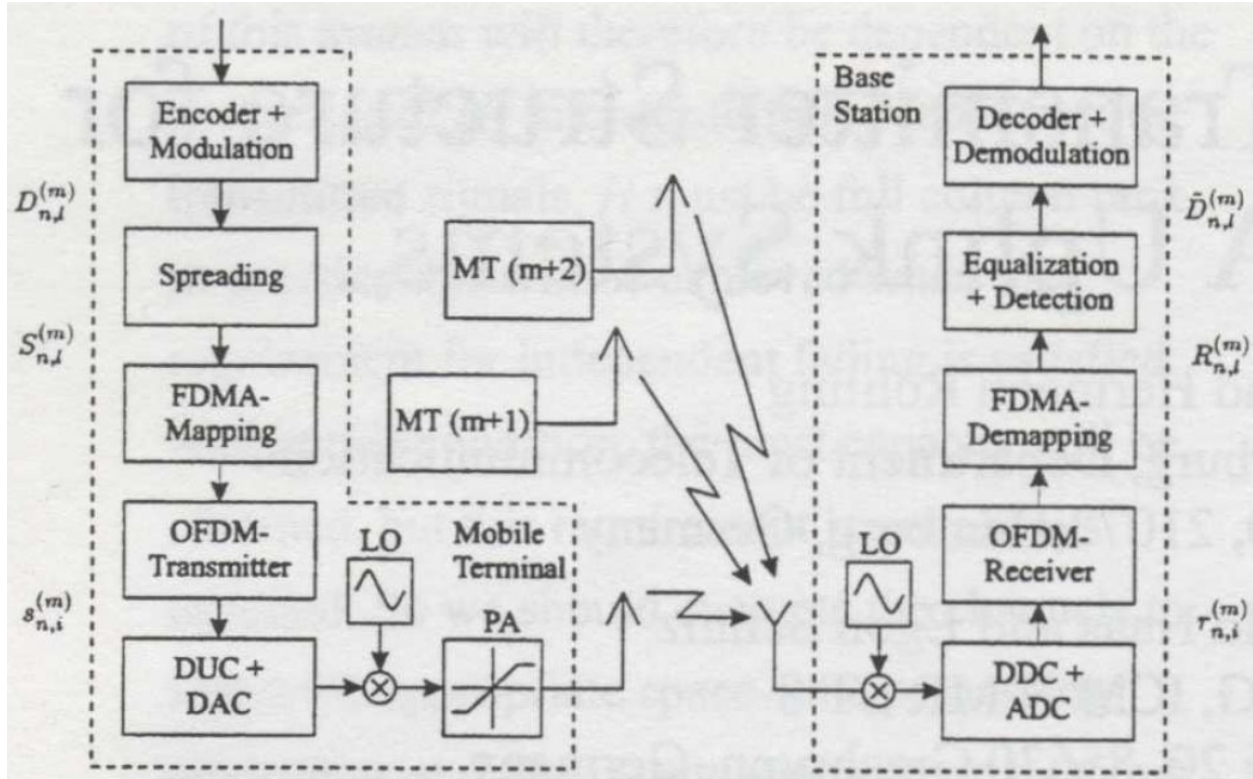
where the summation of subcarriers from $l = 0$ to L represents a superposition of the subcarriers modulated by the **set of subcarrier values** $s_l^{(m)}$. EX1004, pp.1738-1739; *see also id.*, p.1739 (providing alternative expression of “transmit signal of user m ”). Galda’s OFDM signal is *spread* because the “complex transmit symbols $s_l^{(m)}$ ” are DFT-spread.

86. Accordingly, Galda in view of Brüninghaus renders obvious Limitation [1C].

[1D] “transmitting the spread-OFDM signal.”

87. Galda in view of Brüninghaus renders obvious *transmitting the spread-OFDM signal*.

88. Galda discloses a “low complexity transmitter structure for OFDMA-FDMA uplink structures.” EX1004, p.1737. Galda’s Fig. 1 shows spread OFDM signals being converted to analog form, being amplified (PA) and transmitted over the air to “Base Station.” EX1004, p.1738.



89. Accordingly, Galda in view of Brüningshaus renders obvious Limitation [1D].”

[1E] “wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes.”

90. Galda in view of Brüningshaus renders obvious *wherein the first set of complex-valued codes* (codes from Galda’s “spreading matrix C ,” i.e., “elements of the discrete Fourier matrix,” C_{ij}) *are complex conjugates of the second set of complex-valued codes* (Brüningshaus’ “despreading in the receiver” which is “achieved by an inverse Fast-Fourier matrix, i.e. $[H]^H = [\text{IFFT}]$ ”).

91. Galda discloses a “*first set of complex-valued codes*” (i.e., “elements of the discrete Fourier matrix” C_{ij} from matrix $[C]$), as explained above. *Supra*

§VIII(A)[1B]. Galda does not expressly disclose that the *first set of complex-valued codes are complex conjugates of [a] second set of complex-valued codes* used “to recover transmitted data symbols from a received signal.

92. However, Galda implements DFT spreading from Brüninghaus, a paper that shares an author (Hermann Rohling) with Galda. EX1004, p.1739; EX1016, p.2329. Brüninghaus describes *[a] second set of complex-valued codes* that are used to (i.e., an IDFT despreading matrix). EX1004, 1739; EX1016, 2330 (“In case of a Fourier spreading matrix, despreading in the receiver is achieved by an inverse Fast-Fourier matrix, i.e. $[H]^H = [\text{IFFT}]$.”).

93. While Galda and Brüninghaus describe spreading using a DFT matrix, they use different mathematical notation. For example, Brüninghaus uses the following expression to describe its spreading operation:

$$s = [H] \cdot x \quad (1),$$

corresponds to the following equivalent expression in Galda:

$$\vec{S}^{(m)} = [C]\vec{D}^{(m)} \quad (1).$$

EX1016, p.2329; EX1004, p.1738.

94. Brüninghaus’s “complex data symbols x ” (“vector of data symbols $x = (x_1, \dots, x_M)^T$ ”) corresponds to Galda’s **data symbols $D_l^{(m)}$** and corresponding vector of data symbols ($\vec{D}^{(m)}$), Brüninghaus’s DFT “spreading matrix” “[H]” corresponds to Galda’s DFT “**spreading matrix $[C]$** ”, and Brüninghaus’s “modulation symbols”

“s” is equivalent to Galda’s encoded data symbols “ $\vec{s}^{(m)}$.”³

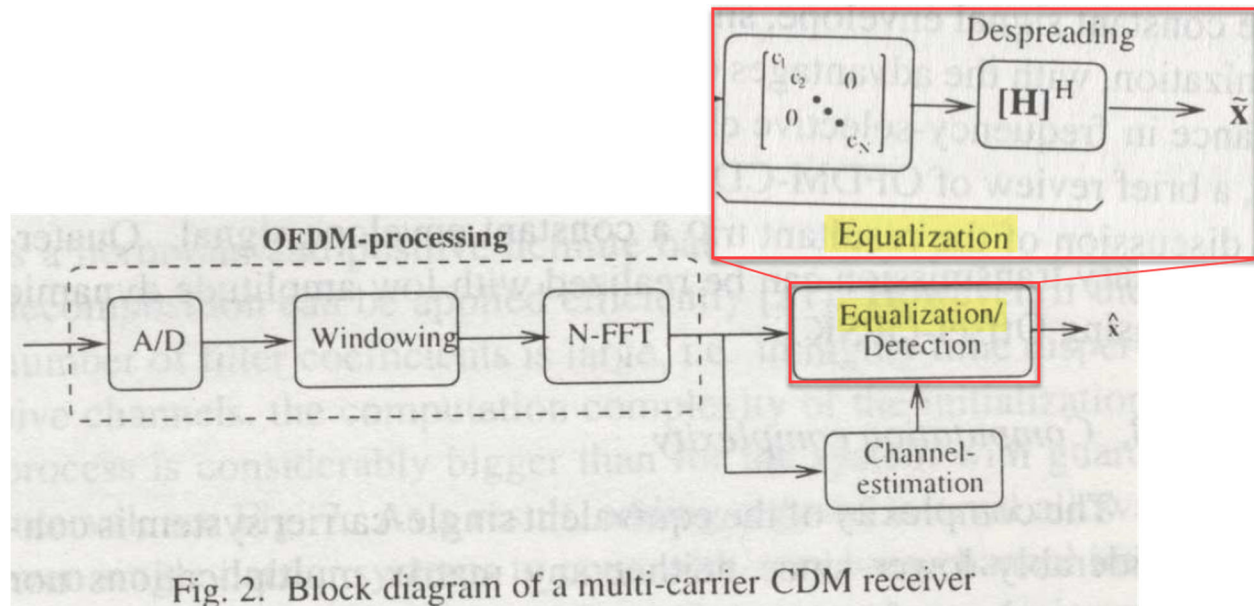
95. Galda’s “Base Station” receives time-domain waveform $r_i^{(m)}$ corresponding to the **time-domain waveform** $s_i^{(m)}$. EX1004, p.1739. Galda’s base station then processes received time-domain waveform in OFDM-Receiver “by removing the guard interval, calculating the Fourier transformation (FFT) which splits the time signal into the orthogonal subcarrier channels.” *Id.* Next “FDMA-Demapping” module “select[s] the user specific complex valued symbols $R_l^{(m)}$ at the FFT output” of the OFDM-Receiver. *Id.* Galda’s base station also includes an “Equalization + Detection” module that calculates $\tilde{D}_{n,l}^{(m)}$, which estimates the values of **data symbols** $D_l^{(m)}$. EX1004, p.1739.

96. While Galda does not provide specifics about its “Equalization + Detection” module, Brüninghaus does:

³ A distinction between Galda and Brüninghaus lies in how spread (encoded) data symbols are mapped to subcarriers. EX1004, p.1739. Brüninghaus describes “OFDM-TDM with DFT Spreading” in which spread/encoded data symbols are mapped to all subcarriers, while Galda describes “OFDM-FDMA with DFT Spreading” where spread/encoded data symbols are mapped to less than all subcarriers. *Id.*

A general block diagram of an OFDM-CDM receiver with linear equalization [8] is depicted in Fig. 4. In case of a Fourier spreading matrix, despreading in the receiver is achieved by an inverse Fast-Fourier matrix, i.e. $[H]^H = [\text{IFFT}]$.

EX1016, 2330.



EX1016, pp.2329, 2330 (Figs. 2 & 4 (combined)).

97. Brüninghaus uses the Hermitian transpose—i.e., $[H]^H$ —to perform despreading in the receiver. EX1016, p.2330. The superscript “ H ” reflects the Hermitian transpose, which is also known as the “conjugate transpose.” See EX1077, 2:2-3 (The Hermitian transpose of a matrix A , denoted by A^H , is the complex conjugate transpose of A .”). It was well known to a POSITA that a Hermitian transpose is the same as complex conjugate transpose. *Id.* In fact, Patent Owner admits this in its US Patent No. 11,700,162 by stating that “[t]he **conjugate transpose is also known as the** adjoint matrix, adugate matrix, Hermitian adjoint,

or **Hermitian transpose**.” EX1075, 21:59-61. Thus, Brüninghaus describes that the “*first set of complex-valued codes* (DFT matrix coefficients as in Brüninghaus and Galda) *are complex conjugates of [a] second set of complex-valued codes* (Brüninghaus’s despreading matrix coefficients defined by the Hermitian (i.e., “inverse Fast-Fourier matrix, i.e. $[H]^H = [\text{IFFT}]$ ”).

98. It would have been obvious to modify Galda in view of Brüninghaus so as to use a second set of complex codes that are complex conjugates of the codes used for spreading for the reasons explained below, *infra* §VIII(A)(1). Therefore, Galda in view of Brüninghaus renders limitation [1F] obvious.

1. Motivation to Combine Galda and Brüninghaus and a Reasonable Expectation of Success

99. A POSITA would have found it obvious to improve Galda’s system with the use of complex conjugates as disclosed in Brüninghaus. “The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). In view of Brüninghaus’s disclosure of a benefits of inverting the spreading operation in the receiver using complex conjugates of the spreading codes, it would have been obvious to a POSITA to implement Galda’s Base Station to use the **negative** exponential factor “ $e^{-j2\pi ij/L}$,” for despreading spread received complex-valued symbols, by using the complex conjugate of the **positive** exponential factor exponential factor “ $e^{j2\pi ij/L}$,” to thereby reverse the DFT

spreading operation performed by Galda's mobile terminal. *Id.* As Dr. Bims explains, the result of inverting the DFT matrix coefficients applied in Galda using complex conjugate codes at the receiver will be an estimate in the receiver for the data transmitted at each subcarrier frequency, thus allowing the transmitted data bits to be recovered. As taught in Brüninghaus, applying the complex conjugate of the complex-valued codes (e.g., by applying the Hermitian transpose of the DFT matrix in the receiver) was a known way to recover an estimate of the data bits encoded at the transmitter. EX1016, pp.2329-2330 (Figs. 2 & 4).

100. When an IDFT is applied to a parallel set of data to produce a modulated signal, each data value in the set of data independently multiplies a subcarrier frequency wave denoted by " $e^{-j2\pi ij/L}$," where the pair of variables i and j correspond to the index for the data value in the set of data values, and the index for the time-domain samples of the modulated signal respectively. This mathematical term is called a complex exponential, and is represented by a complex number for each value of the variables i and j . Thus, for a given data value modulated at a particular subcarrier frequency, a time-domain waveform is generated that is a set of complex-valued samples enumerated by the j variable. A corresponding receiver can optimally retrieve the set of data that was transmitted by estimating, for each subcarrier frequency wave, the multiplicand used by the transmitter to modulate its transmission. Because any pair of subcarrier frequencies in an OFDM transmission

are orthogonal to each other, when the receiver multiplies a received OFDM signal by a reference signal that is composed of a single subcarrier frequency, the result of the multiplication will necessarily produce a value of zero for all transmitted subcarrier frequencies, except for the subcarrier frequency that matches the reference signal subcarrier frequency.

101. An OFDM signal transmitted to the receiver is a superposition of subcarrier frequencies, each of which is comprised of complex number-valued samples. Thus, the reference signal generated by the receiver at a particular subcarrier frequency is also comprised of complex number-valued samples. When the receiver multiplies the received signal with this reference signal, the result will be a complex multiplication of the transmitted samples generated at the transmitter, for the same subcarrier frequency as the reference signal in the receiver.

102. Generally, when two complex numbers are multiplied, their result will be a complex number that has a non-zero amplitude and a non-zero phase component. These components can change their value from one sample-based multiplication to the next, making it difficult for the receiver to estimate the transmitted data. Thus, the optimal approach in the receiver is to generate a reference signal at each OFDM subcarrier frequency that is composed of samples that are the complex conjugate of the samples in the corresponding OFDM subcarrier frequency component of the transmitted OFDM signal. Mathematically, this is

represented by $D * (\cos A + j \sin A) * (\cos A - j \sin A)$, where D represents the data modulated by the transmitter on this subcarrier frequency, $D * (\cos A + j \sin A)$ represents a sample that was transmitted in the OFDM subcarrier frequency component of the transmitted OFDM signal, and $(\cos A - j \sin A)$ represents a sample that was generated by the receiver in its reference signal for that subcarrier frequency. The result of this complex multiplication is necessarily $D * (\cos A * \cos A + \sin A * \sin A)$, which is equal to D , the transmitted data value on this subcarrier frequency.

103. Because of the orthogonality of OFDM subcarriers in an OFDM symbol transmission, an OFDM receiver can superpose the reference signals it generates into a single generated signal. This composite signal can therefore independently determine the modulated data on each subcarrier frequency. The FFT is an optimal implementation in the receiver for multiplying this composite signal by the signal it has received. Therefore, the result of the FFT will be an estimate in the receiver for the data transmitted at each subcarrier frequency, because the FFT is based on complex exponentials “ $e^{j2\pi ij/L}$,” that is are the complex conjugate of the complex exponentials “ $e^{-j2\pi ij/L}$ ” that are the basis for the IFFT used by the transmitter.

104. Therefore, a POSITA would have been motivated to implement the method disclosed in Galda with “*first set of complex-valued codes*” that are “*complex*

conjugates of the second set of complex-valued codes” as taught in Brüninghaus.

Doing so would merely have merely combined Brüninghaus’s and Galda’s known spreading and despreading codes according to known methods to yield the predictable result of being able to spread and despread data symbols at transmitters and receivers, respectively.

105. A POSITA would have had a reasonable expectation of success in implementing a “*first set of complex-valued codes*” that are “*complex conjugates of the second set of complex-valued codes*,” because it was well known in the art the time to use complex conjugates of codes to reverse the operation performed on data symbols in wireless communications. EX1077, 2:2-3; EX1016, pp.2329-2330. Indeed, implementing complex-conjugates of the spreading codes used at the transmitter to recover data symbols was a well-understood mathematical technique used to invert operations performed using coefficients of a matrix in communications.

B. Claim 2: “wherein selecting is responsive to spectrum allocation or is configured to provide for orthogonal frequency division multiple access”

106. Galda in view of Brüninghaus renders obvious wherein selecting is responsive to spectrum allocation or is configured to provide for orthogonal frequency division multiple access.

107. Galda’s selection both responds to spectrum allocation and provides for

OFDM, though one of these is sufficient to render claim 2 unpatentable. Galda explains that the “transmission bandwidth” is subdivided “into a set of orthogonal subcarriers.” EX1004, p.1737. The transmission bandwidth is divided into a total of N_C subcarriers. *Id.*, p.1738 (referring to “ L of the available N_C subcarrier[s]”). The selecting of the L subcarriers is *responsive to spectrum allocation*—namely the allocation of a total of N_C subcarriers from which L subcarriers are used by any particular user m . EX1004, p.1738 (“In principle, the set of subcarrier assigned to each user can be composed of any L out of N_C subcarrier that have not been assigned to another user.”).

108. Additionally, *selecting is ... configured to provide for OFDMA* because it provides for OFDM-FDMA, a form of OFDMA which allows multiple users m to access the shared bandwidth. EX1004, p.1737 (“The subdivision of the transmission bandwidth into a second of orthogonal subcarriers can additional by exploited by an OFDM-FDMA multiple access scheme” where “different users” use “distinct sets of subcarriers.”).

109. Thus, Galda in view of Brüninghaus renders obvious claim 2.

C. Claim 6: “wherein the plurality of subcarriers are contiguous subcarriers or interleaved subcarriers”

110. Galda in view of Brüninghaus renders obvious wherein the plurality of subcarriers are contiguous subcarriers or interleaved subcarriers.

111. Galda explains that “the set of subcarrier assigned to each user can be

composed of any L out of N_C subcarrier that have not been assigned to another user.”

EX1004, p.1738. Because Galda teaches that “any L ” subcarriers can be used, a POSITA would have found it obvious to use either contiguous or interleaved subcarriers because doing so would have merely chosen from among a finite number of predictable solutions with predictable results. Additionally, Galda discloses selecting “equidistant subcarriers” that are “shifted by m subcarrier in the frequency domain,” Galda discloses that the subcarriers are interleaved subcarriers with one user having one set of subcarriers, and the next user having the next set of subcarriers where every one of the L subcarriers is incremented by 1, thus resulting in interleaved subcarriers. EX1004, p.1738 (Fig. 2). Galda in view of Brüninghaus thus renders claim 6 obvious.

D. Claim 7: “wherein encoding comprises multiplying a vector or matrix of data symbols with a vector or matrix comprising the first set of complex-valued codes”

112. Galda in view of Brüninghaus teaches the claimed wherein encoding comprises multiplying a vector or matrix of **data symbols** (Galda’s vector of symbols $\vec{D}^{(m)}$ which includes “ L complex modulation symbols $D_l^{(m)}, l = 0, \dots, L - 1$) with a vector or matrix comprising **the first set of complex-valued codes** (Galda’s “unitary spreading matrix $[C]$ ” that includes “the elements of the discrete Fourier transform matrix”). Galda explains that “[t]he spreading operation can be denoted mathematically by the following simple matrix multiplication: $\vec{S}^{(m)} =$

[C] $\vec{D}^{(m)}$.” EX1004, p.1738. Galda’s matrix [C] is a DFT matrix that includes the first set of complex valued codes defined as “ $C_{i,j}$ ”:

$$C_{i,j} = \left(\frac{1}{\sqrt{L}} \right) \cdot e^{j2\pi i j / L}$$

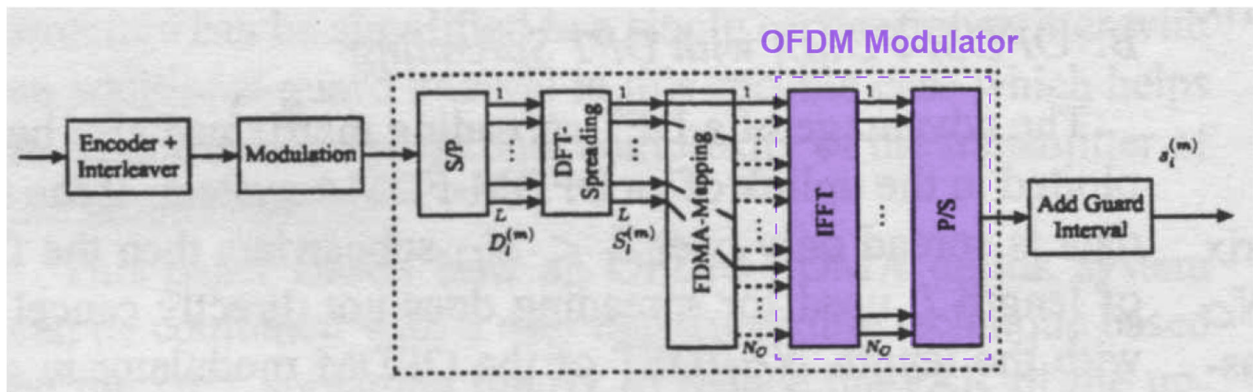
EX1004, p.1739 (“elements of the discrete Fourier transform”).

113. Thus Galda in view of Brüninghaus renders obvious claim 7.

E. Claim 8: “wherein applying comprises modulating the encoded data symbols onto the plurality of subcarriers”

114. Galda in view of Brüninghaus renders obvious the claimed *wherein applying comprises modulating the encoded data symbols onto the plurality of subcarriers*.

115. Galda shows an IFFT that is for modulating the encoded (i.e., DFT spread) data symbols onto the plurality of subcarriers (i.e., L subcarriers).



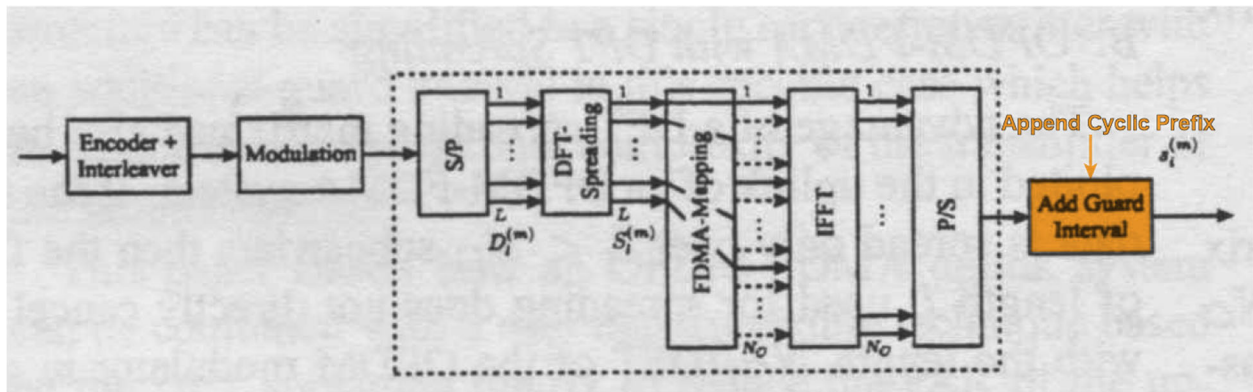
EX1004, p.1740 (Fig. 6(a)).

116. Indeed, this is the common use of an IFFT in OFDM communications as reflected in the '786 patent itself. EX1001, 3:54-58, 41:13-15.

F. Claim 9: “further comprising adding a cyclic prefix to the spread-OFDM signal before transmitting the spread-OFDM signal”

117. Galda in view of Brüninghaus renders obvious the claimed *adding a cyclic prefix to the spread-OFDM signal before transmitting the spread-OFDM signal*.

118. Galda’s Fig. 6(a) shows a block “Add Guard Interval,” which Galda explains adds “a guard interval as a cyclic prefix” onto the DFT-spread OFDM signal:



EX1004, p.1740 (Fig. 6(a)); *see also id.*, pp.1737 (noting that interferences can be avoided by “by introducing an additional guard interval into the OFDM symbol”), 1739 (“a guard interval is added in the time domain as a cyclic prefix”).

119. As seen here, the cyclic prefix is added after spreading and before transmission. EX1004, p.1740 (Fig. 6(a)).

IX. GROUND 2: Claims 10-11, 15-18, 19-20, and 24-27 are obvious over Galda in view of Brüninghaus and Dowling

A. Overview of the combination; motivation to combine; expectation of success

120. Ground 2 relies on Galda in view of Brüninghaus and Dowling and addresses independent claims 10 and 19, and the challenged dependent claims that depend from claims 10 and 19. Claim 10 requires “*a processor*” [10A] and “*a non-transitory computer-readable memory communicatively coupled to the at least one processor, the non-transitory computer-readable memory including a set of instructions stored thereon and executable by the at least one processor*” to perform subsequent steps [10B]. Like claim 10, claim 19 recites a “*computer program product for operating a transmitter in a wireless communication network*” [19Pre]. The challenged dependent claims that depend from claims 10 and 19 are duplicative of the challenged dependent claims that depend from claim 1.

121. Galda does not explicitly state whether the disclosed system is implemented in hardware or a combination of hardware and software. Nevertheless, a POSITA would have understood that Galda would have needed to be implemented using at least one of these technologies. A POSITA would have found it obvious to implement Galda’s transmitter in software stored in memory coupled to a processor such that the software is executed by the processor.

122. A POSITA would have known that transmitters could be implemented

in hardware or software. For example, Dowling discloses an OFDM transmitter and explains that various aspects of its OFDM transmitter including its modulation techniques “may be implemented as software modules which execute on a programmable processor architecture.” EX1042, 3:46-50; *see id.* at 5:66-6:1 (disclosing that the transmitter, receiver, and precoder may be implemented in hardware or software”); 21:62-64 (disclosing that the “present invention” is applicable to FFT based multicarrier modulation and OFDM systems). Specifically, Dowling discloses that the “transmitter, receiver, and precoder” can be “constructed using general purpose DSP (digital signal processor) chips, custom VLSI, gate arrays/semicustom VLSI, or a high powered host processor such as a future generation Pentium processor which also runs a computer host operating environment.” EX1042, 6:2-6. Dowling further discloses that its transmitter may be implemented as “a computer program which executes on a processor.” EX1042, 19:14-15.

123. A POSITA would have understood that, in a software implementation, software is stored in memory, and is provided from memory to a processor for execution. Indeed, as exemplified by numerous prior art references, those skilled in the art were aware of “software radios” that used code in memory and processors to execute that code to provide flexibility in design and updating and were significantly easier to upgrade than hardware whose implementation would have been fixed in

silicon. EX1008 (describing OFDM-CDMA software radio); EX1011, ¶¶[0124]-[0125] (noting that modulation “and other techniques” can be implemented in “hardware, software, or a combination thereof”).

124. A POSITA would have been motivated to implement Galda’s digital transmitter functions in a software radio (including code in memory and a processor coupled to memory to execute the code) rather than in specialized hardware because doing so would have involved (a) the simple substitution of one known element (a software-based transmitter) for another (hardware implementation of same) to obtain predictable results (the same functionality performed in software rather than hardware), (b) the predictable use of prior art elements (software-based transmitter components) according to their established functions (i.e., performing the same functions taught by Galda), and (c) applying a known technique (software implementation) to a known device (Galda’s transmitter) ready for improvement—e.g., in need of implementation details—to yield predictable results (a transmitter performing Galda’s operations in software).

125. A POSITA also would have expected to succeed in making this combination. Galda discloses an OFDM transmitter and defines the various mathematical operations for each of the components. *Supra* §§VII(A), VIII(A)[1A-1E]. Implementing these mathematical operations in software would have required only routine knowledge because software is especially well-suited for performing

mathematical operations.. Given the number of disclosures indicating that those in the field were aware that various transmitter functions were able to be implemented in either hardware or software—two known alternatives—a POSITA would have reasonably expected in achieving a software implementation using instructions stored on a memory for execution by a processor.

B. Claim 10

[10Pre] “An apparatus for communication in a wireless communication network that employs a first set of complex-valued codes to encode data symbols to be transmitted, and employs a second set of complex-valued codes to recover transmitted data symbols from a received signal, the apparatus comprising.”

126. This preamble corresponds to the preamble of claim 1 except that this preamble is to an apparatus instead of a method. Galda in view of Brüninghaus discloses an apparatus that performs the method of claim 1 and as such also renders obvious [10Pre]. *Cf. In re Lonardo*, 119 F.3d 960, 968 (Fed. Cir. 1997) (“[T] he claimed structure of the device suggests how it is to be used and that use thus would have been obvious.”). Moreover, as explained above and in further detail below, the combined teachings of Galda in view of Brüninghaus and Dowling render claim 10 obvious. *Supra* §XI(A); *infra* §§XI(B)[10A-10Cv].

[10A] & [10B]: “at least one processor; and a non-transitory computer-readable memory communicatively coupled to the at least one processor, the non-transitory computer-readable memory including a set of instructions stored thereon and executable by the at least one processor for.”

127. Galda in view of Brüninghaus and Dowling discloses and renders

obvious at least one processor **[10A]** and a non-transitory computer-readable memory communicatively coupled to the at least one processor, the non-transitory computer-readable memory including a set of instructions stored thereon and executable by the at least one processor for **[10B]** performing the remaining elements of claim 10.

128. Dowling explains that various aspects of an OFDM transmitter including its modulation techniques “may be implemented as software modules which execute on a programmable processor architecture.” EX1042, 3:46-50; see id. at 5:66-6:1 (disclosing that the transmitter, receiver, and precoder may be implemented in hardware or software”); 21:62-64 (disclosing that the “present invention” is applicable to FFT based multicarrier modulation and OFDM systems). In a software implementation, software is stored in memory, and is provided from memory to a processor for execution. Dowling further discloses that its transmitter may be implemented as “a computer program which executes on a processor.” EX1042, 19:14-15.

129. A POSITA would have understood that “software radios” with code in memory and processors to execute that code to provide flexibility in design and updating, as opposed to hardware which was significantly more difficult to upgrade because it is fixed in silicon. EX1008 (describing OFDM-CDMA software radio); EX1011, ¶¶[0124]-[0125] (modulation can be implemented in “hardware, software,

or a combination thereof”). These references have similar disclosures to the ’786 Patent, which states that various aspects “may be implemented in hardware or special purpose circuits, software,” etc. EX1001, 76:37-43. For the reasons explained above, a POSITA would have found it obvious to implement Galda’s transmitter in software stored on memory for execution by a processor coupled to the memory as recited in claim 10. *Supra* §XI(A).

130. Thus, Galda in view of Brüninghaus and Dowling discloses and renders obvious Limitations [10A] and [10B].

[10Ci]: “selecting a plurality of subcarriers to be transmitted”

131. Limitation [10Ci] is the same as Limitation [1A]. *See* Section VIII(A)[1A]. Below is comparison of Limitation [10Ci] with Limitation [1A].

Claim [1A]	Claim [10Ci]
selecting a plurality of subcarriers to be transmitted	selecting a plurality of subcarriers to be transmitted

132. Accordingly, Limitation [10Ci] is obvious for same reasons as Limitation [1A]. *Id.*

[10Cii]: “encoding the data symbols with the first set of complex-valued codes to produce encoded data”

133. Limitation [10Cii] is the same as Limitation [1B]. *See* Section VII(A) [1B]. Below is comparison of Limitation [10Cii] with Limitation [1B].

Claim [1B]	Claim [10Cii]
encoding the data symbols with the first set of complex-valued codes to produce encoded data	encoding the data symbols with the first set of complex-valued codes to produce encoded data

134. Accordingly, Limitation [10Cii] is obvious for same reasons as Limitation [1B]. *Id.*

[10Ciii]: “applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal”

135. Limitation [10Ciii] is the same as Limitation [1C]. *See* Section VII(A) [1C]. Below is comparison of Limitation [10Ciii] with Limitation [1C].

Claim [1C]	Claim [10Cii]
applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal	applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal

136. Limitation [10Ciii] is obvious for same reasons as Limitation [1C]. *Id.*

[10Civ]: “transmitting the spread-OFDM signal”

137. Limitation [10Civ] is the same as Limitation [1D]. *See* Section VII(A) [1D]. Below is comparison of Limitation [10Civ] with Limitation [1D].

Claim [1D]	Claim [10Civ]
transmitting the spread-OFDM signal	transmitting the spread-OFDM signal

138. Accordingly, Limitation [10Civ] is obvious for same reasons as Limitation [1D]. *Id.*

[10Cv]: “wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes”

139. Limitation [10Cv] is the same as Limitation [1E]. *See* Section VII(A)[1E]. Below is comparison of Limitation [10Cv] with Limitation [1E].

Claim [1E]	Claim [10Cv]
wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes	wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes

140. Accordingly, Limitation [10Cv] is obvious for same reasons as Limitation [1E]. *Id.*

C. Claim 19

“[19Pre] A computer program product for operating a transmitter in a wireless communication network that employs a first set of complex-valued codes to encode data symbols to be transmitted, and employs a second set of complex-valued codes to recover transmitted data symbols from a received signal, the computer program product comprising a non-transitory computer readable storage device having computer readable program code stored therein, said program code containing instructions executable by one or more processors of a computer system for:

[19A] selecting a plurality of subcarriers to be transmitted;

[19B] encoding the data symbols with the first set of complex-valued codes to produce encoded data symbols;

[19C] applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal; and

[19D] transmitting the spread-OFDM signal;

[19E] wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes.”

141. Claim 19 recites a “*computer program product*” with the same limitations as the apparatus limitations in claim 10. Below is comparison of claim 10 with claim 19.

Claim 10	Claim 19
[10Pre] An apparatus for communication in a wireless communication network that employs a first set of complex-valued codes to encode data symbols to be transmitted, and employs a second set of complex-valued codes to recover transmitted data symbols from a received signal, the apparatus comprising: [10A] at least one processor; and [10B] a non-transitory computer-readable memory	[19Pre] A computer program product for operating a transmitter in a wireless communication network that employs a first set of complex-valued codes to encode data symbols to be transmitted, and employs a second set of complex-valued codes to recover transmitted data symbols from a received signal, the computer program product comprising a non-transitory computer readable storage device having computer

communicatively coupled to the at least one processor, the non-transitory computer-readable memory including a set of instructions stored thereon and executable by the at least one processor for:	readable program code stored therein, said program code containing instructions executable by one or more processors of a computer system for:
[10Ci] selecting a plurality of subcarriers to be transmitted;	[19A] selecting a plurality of subcarriers to be transmitted;
[10Cii] encoding the data symbols with the first set of complex-valued codes to produce encoded data symbols;	[19B] encoding the data symbols with the first set of complex-valued codes to produce encoded data symbols;
[10Ciii] applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal; and	[19C] applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal; and
[10Civ] transmitting the spread-OFDM signal;	[19D] transmitting the spread-OFDM signal;
[10Cv] wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes.	[19E] wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes.

142. Specifically, the “selecting,” “encoding,” “applying,” and “transmitting” steps recited in claim 10 are identical to the instructions for “selecting,” “encoding,” “applying,” and “transmitting” recited in claim 19. Furthermore, both claim 19 and claim 10 conclude with the same wherein clause, as follows: “*wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes.*”

143. As noted above in Section §XI(A), Dowling further discloses that its transmitter may be implemented as “**a computer program which executes on a**

processor.” EX1042, 19:14-15. Furthermore, as established above in §XI(A), it would have been obvious to a POSITA, in a software implementation, software is stored in memory, and is provided from memory to a processor for execution. Accordingly, just as the processor and memory recited in claim 10 would have been obvious over Galda in view of Brüninghaus and Dowling, the “*computer program product*” recited in claim 19 is rendered obvious by Galda in view of Brüninghaus and Dowling. Thus, claim 19 is obvious over Galda in view of Brüninghaus and Dowling for the same reasons as set forth for claim 10 above. *Supra* §XI(B).

D. Claims 11 and 20: “wherein selecting is responsive to spectrum allocation or is configured to provide for orthogonal frequency division multiple access”

144. Claims 11 and 20 are substantially the same as claim 2. Below is comparison of claims 2, 11, and 20.

Claim 2	Claim 11	Claim 20
2. The method of claim 1,	11. The apparatus of claim 10,	20. The computer program product of claim 19,
wherein selecting is responsive to spectrum allocation or is configured to provide for orthogonal frequency division multiple access.	wherein selecting is responsive to spectrum allocation or is configured to provide for orthogonal frequency division multiple access.	wherein selecting is responsive to spectrum allocation or is configured to provide for orthogonal frequency division multiple access.

145. Accordingly, claims 11 and 20 are obvious for same reasons as claim

E. Claims 15 and 24: “wherein the plurality of subcarriers are contiguous subcarriers or interleaved subcarriers”

146. Claims 15 and 24 are substantially the same as claim 6. Below is comparison of claims 6, 15, and 24.

Claim 6	Claim 15	Claim 24
6. The method of claim 1,	15. The apparatus of claim 10,	24. The computer program product of claim 19,
wherein the plurality of subcarriers are contiguous subcarriers or interleaved subcarriers.	wherein the plurality of subcarriers are contiguous subcarriers or interleaved subcarriers.	wherein the plurality of subcarriers are contiguous subcarriers or interleaved subcarriers.

147. Accordingly, claims 15 and 24 are obvious for same reasons as claim 6. *See* Section VII(C).

F. Claims 16 and 25: “wherein encoding comprises multiplying a vector or matrix of data symbols with a vector or matrix comprising the first set of complex-valued codes”

148. Claims 16 and 25 are substantially the same as claim 7. Below is comparison of claims 7, 16, and 25.

Claim 7	Claim 16	Claim 25
7. The method of claim 1,	16. The apparatus of claim 10,	25. The computer program product of claim 19,
wherein encoding comprises multiplying a vector or matrix of data	wherein encoding comprises multiplying a vector or matrix of data	wherein encoding comprises multiplying a vector or matrix of data

symbols with a vector or matrix comprising the first set of complex-valued codes.	symbols with a vector or matrix comprising the first set of complex-valued codes.	symbols with a vector or matrix comprising the first set of complex-valued codes.
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149. Accordingly, claims 16 and 25 are obvious for same reasons as claim

7. *See* Section VII(D).

G. Claims 17 and 26: “wherein applying comprises modulating the encoded data symbols onto the plurality of subcarriers”

150. Claims 17 and 26 are substantially the same as claim 8. Below is comparison of claims 8, 17, and 26.

Claim 8	Claim 17	Claim 26
8. The method of claim 1,	17. The apparatus of claim 10,	26. The computer program product of claim 19,
wherein applying comprises modulating the encoded data symbols onto the plurality of subcarriers.	wherein applying comprises modulating the encoded data symbols onto the plurality of subcarriers.	wherein applying comprises modulating the encoded data symbols onto the plurality of subcarriers.

151. Accordingly, claims 17 and 26 are obvious for same reasons as claim

8. *See* Section VII(E).

H. Claims 18 and 27: “further comprising adding a cyclic prefix to the spread-OFDM signal before transmitting the spread-OFDM signal”

152. Claims 18 and 27 are substantially similar to claim 9. Below is comparison of claims 9, 18, and 27.

Claim 9	Claim 18	Claim 27
9. The method of claim 1, further comprising	18. The apparatus of claim 10, wherein the non-transitory computer-readable memory further includes instructions stored thereon and executable by the processor for	27. The computer program product of claim 19, wherein said program code further includes instructions executable by the one or more processors of the computer system for
adding a cyclic prefix to the spread-OFDM signal before transmitting the spread-OFDM signal.	adding a cyclic prefix to the spread-OFDM signal before transmitting the spread-OFDM signal.	adding a cyclic prefix to the spread-OFDM signal before transmitting the spread-OFDM signal.

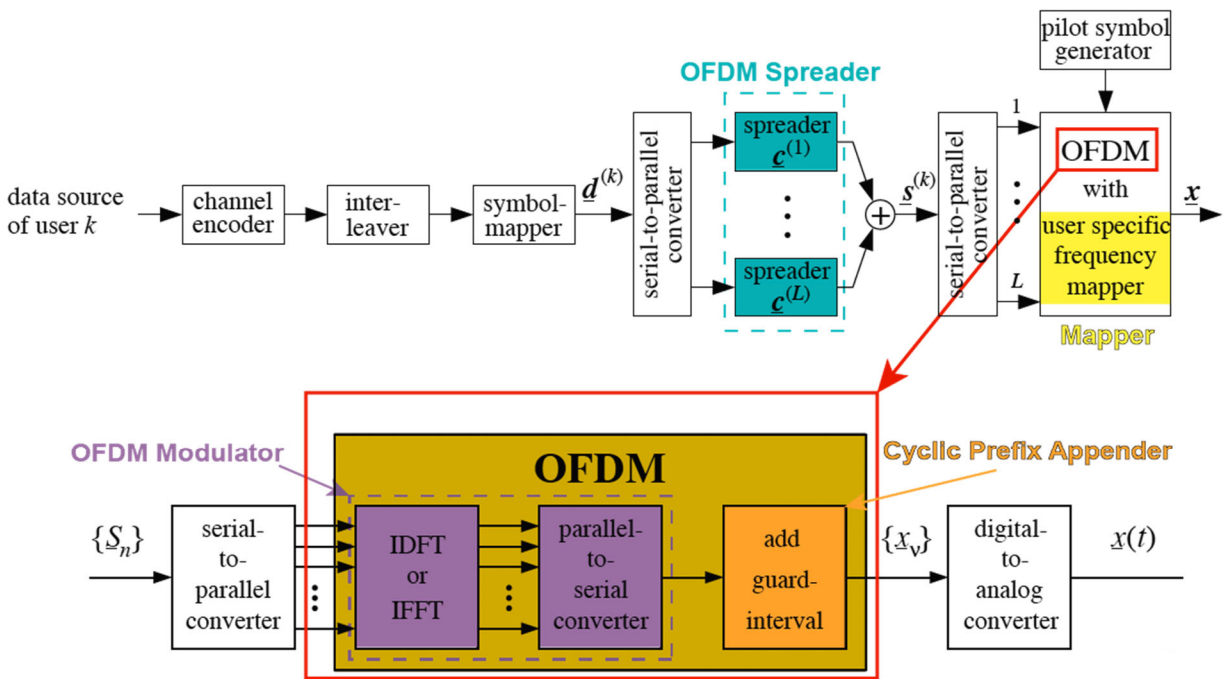
153. Accordingly, claims 18 and 27 are obvious for same reasons as claim

9. *See* Section VII(F).

X. GROUND 3: Claims 1, 2, and 6-9 Are Obvious Over Kaiser in View Bury

A. Overview of the Motivation to Combine Kaiser in View of Bury and the Reasonable Expectation of Success

154. Kaiser expressly discloses most elements of the Challenged Claims. Kaiser describes an “SS-MC-MA transmitter” (e.g., Figure B.2) in which data symbols ($\underline{d}^{(k)}$) are encoded (spread) with Walsh-Hadamard codes (“OFDM Spreader,” below) and an element that applies the spread data symbols to L selected subcarriers to produce a spread OFDM signal ($\underline{x}$), and a block for adding a cyclic prefix (guard interval):



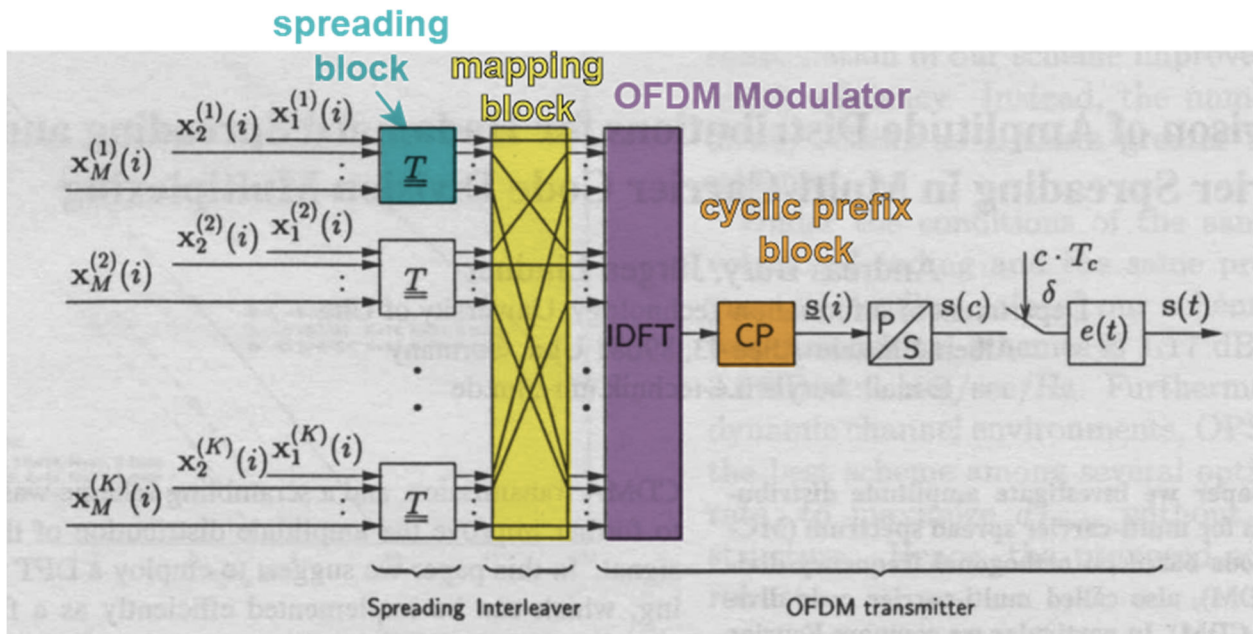
EX1005 (Fig. B.2 & Fig. 3.2).

155. “OFDM with guard interval is applied in SS-MC-MA systems”—see Kaiser Figure B.2—“in the same way as in MC-CDMA systems, cf. Section 3.1.1.” EX1005, p.133. Thus, a POSITA would have understood that Figure B.2’s “OFDM” has the functional blocks shown in §3.1.1, Figure 3.2.

156. Kaiser’s OFDM transmitter spreads data symbols with Walsh-Hadamard spreading and not the claimed DFT spreading. EX1005, p.135 (“[A] block of ... data symbols is ... spread with orthogonal Walsh Hadamard codes”); *id.*, p.134 (Table B.1, “spreading code”). Kaiser, however, does not disclose using complex-valued spreading codes.

157. Bury describes a multi-carrier code division multiplexing (MC-CDM)

transmitter that is “valid for both[] MC-CDMA and MC-FDMA” (called “MC-SS-MA” by Kaiser). EX1007, pp.857, 858. Bury describes an OFDM transmitter in Figure 1 that, like Kaiser, includes a spreading block, a mapping block (interleaver), a modulator, and a block for adding a cyclic prefix:



EX1007, p.858 (Fig. 1).

158. “Walsh-Hadamard spreading” is “commonly used” in MC-CDM systems. EX1007, p.857. This is true of Kaiser. Bury evaluated whether there were better spreading codes. Bury concluded that using “Fourier spreading” using a “discrete Fourier transform (DFT) operation” materially improved PAPR performance over Walsh-Hadamard codes. For instance, using Kaiser’s MC-SS-MA (i.e., Bury’s MC-FDMA) technique, “the PAPR remains nearly constant at a low level for all spreading factors.” *Id.*, p.860. Thus, “in the uplink Fourier spreading

outperforms Hadamard spreading in most cases.” *Id.* “For both up- and down-link Fourier spreading delivers a lower or equal PAPR. This superiority increases significantly for larger spreading factors. In the uplink, MC-FDMA (Kaiser’s MC-SS-MA) delivers lower PAPRs than MC-CDMA.” *Id.* Bury thus concludes Fourier spreading is “the best choice” combined with MC-FDMA in the uplink. *Id.*

159. Based on these teachings, a POSITA would have been motivated to use Bury’s DFT-spreading (Fourier spreading “implemented by” a DFT, EX1007, p.857) instead of Kaiser’s Walsh-Hadamard codes in Kaiser’s spreader for uplink OFDM transmissions. Not only are Kaiser and Bury discussing the same types of OFDM transmission systems (MC-FDMA (Bury) or MC-SS-MA (Kaiser), EX1007, p.857), but Bury concluded that DFT-spreading was “the best choice” for uplink communications. Bury thus provides an explicit motivation to use DFT spreading codes (DFT matrix) for spreading instead of Kaiser’s Walsh-Hadamard codes.

160. Combining Kaiser and Bury would have merely applied Bury’s known Fourier spreading techniques to improve Kaiser’s MC-SS-MA uplink transmitter with Bury’s Fourier spreading codes instead of Kaiser’s Walsh-Hadamard codes thereby improving Kaiser’s MC-SS-MA transmitter in the same way that it improved Bury’s MC-FDMA transmitter.

161. As described above, when an FFT is used by an OFDM receiver to estimate the data transmitted on each subcarrier frequency, a multiplication of

complex numbers occurs for each time-domain sample that is received. In an FFT implementation, these complex numbers are composed of real-valued numbers for its in-phase and quadrature dimensions. However, when Walsh-Hadamard spreading is similarly used by an OFDM receiver, only integer values are used in the reference signal generated by the receiver, due to the fact that Walsh-Hadamard spreading uses an error-correction code whose binary alphabet is a finite set of integers. Thus, the result from using the Walsh-Hadamard spreading approach suffers from significantly increased quantization noise than when using an FFT. This quantization noise degrades the performance of the receiver.

162. A POSITA would have reasonably expected to succeed in using Bury's spreading codes in Kaiser's system because Bury describes using such spreading codes in the context of a system like Kaiser's and a POSITA would have understood that implementing DFT spreading codes would have merely required the undergraduate-level mathematical techniques (i.e., a DFT) to spread data symbols.

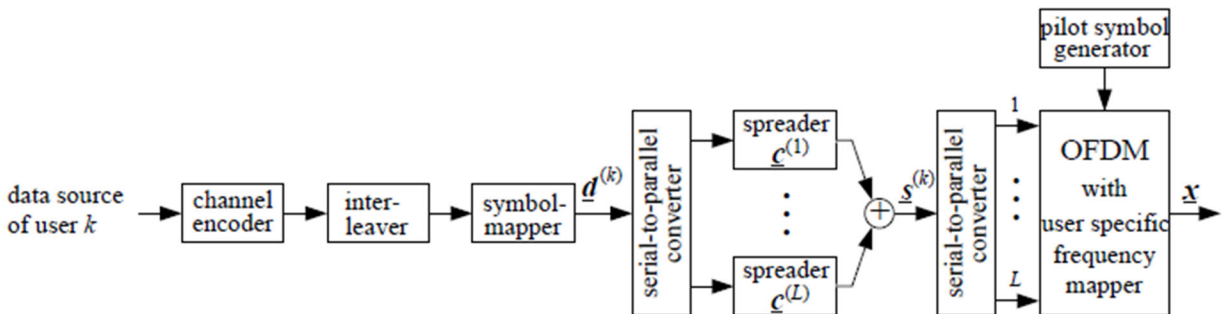
B. Claim 1

[1Pre] "A method of communication in a wireless communication network that employs a first set of complex-valued codes to encode data symbols to be transmitted, and employs a second set of complex-valued codes to recover transmitted data symbols from a received signal, the method comprising:"

163. Assuming that claim 1's preamble is limiting, Kaiser in view of Bury renders obvious the claimed *method of communication in a wireless communication network that employs a first set of complex-valued codes* (Kaiser's Walsh-Hadamard

codes replaced with Bury's complex-valued DFT coefficients) *to encode data symbols to be transmitted* (to encode Kaiser's "complex valued data symbols $\underline{d}_l^{(k)}, l = 1 \dots L$ ") *and employs a second set of complex-valued codes* (complex-conjugate of the spreading codes as taught by Kaiser and complex-valued codes as taught by Bury) *to recover transmitted data symbols from a received signal* (to recover "complex valued data symbols $\underline{d}_l^{(k)}, l = 1 \dots L$ " at the receiver).

164. Kaiser illustrates a "SS-MC-MA transmitter of the k th user for the uplink" as shown below:



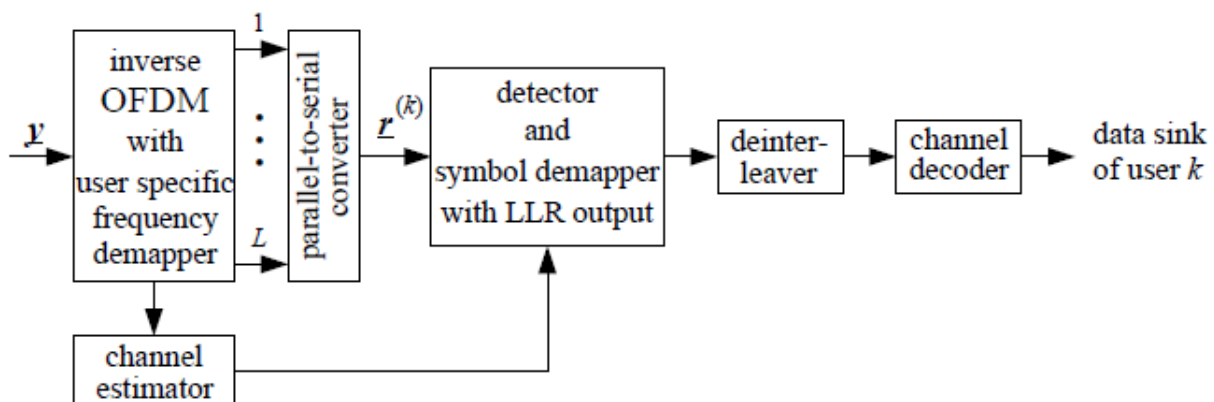
EX1005, p.132.

165. This transmitter performs *a method* when it is operated. Specifically, it performs a method for *communicating in a wireless communication network* as is evident from Kaiser's reference to "an SS-MC-MA mobile radio system," EX1005, pp.130, 133; a POSITA would have understood that mobile radio systems transmit over wireless channels on the uplink.

166. Kaiser's transmitter *employs a first set of codes to encode data symbols*

to be transmitted. Specifically, Kaiser describes encoding “complex-valued data symbols $\underline{d}_l^{(k)}, l = 1 \dots L$ ” by multiplying them “with another orthogonal spreading code of length L ” where the spreading codes are defined by a matrix ($\underline{C}$) that “is the same for all users.” EX1005, p.132 (describing “ $L \times L$ matrix” $\underline{C}$ that “represents the L different spreading codes $\underline{c}_l$ ”). The spreading codes are Walsh-Hadamard codes. EX1005, pp.134, 135. But, as explained above, it would have been obvious to replace Kaiser’s Walsh-Hadamard codes with Bury’s DFT spreading codes. EX1007, p.857 (“Fourier spreading ... implemented by a discrete Fourier transform (DFT) operation”). *Supra* §X(A). This renders obvious the claimed *first set of complex codes* because Fourier coefficients are complex-valued.

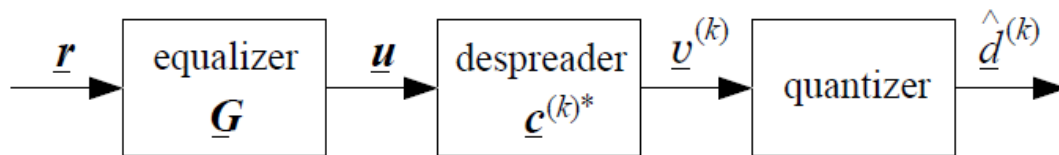
167. Kaiser’s receiver *employs a second set of codes to recover transmitted data symbols from a received signal*. Kaiser’s “SS-MC-MA receiver for the k th user” is depicted below:



EX1005, p.133.

168. Kaiser’s receiver can use “any of the SD or MD data detection

techniques presented for MC-CDMA systems in Section 3.3 ... for the detection of data of a single user per subsystem in SS-MC-MA systems.” *Id.* “Single-User Detection” or “SD” uses an equalizer, despreader, and quantizer to detect “the user signal of interest”:



EX1005, p.49.

169. Despreader accepts “[t]he complex-valued output $\underline{u}$ of the equalizer” and correlates “it with the conjugate complex user specific spreading code $\underline{c}^{(k)*}$.” *Id.* Thus, Kaiser describes *a second set of codes to recover transmitted data symbols from a received signal* where $\underline{r}$ is the received signal and $\underline{c}^{(k)*}$ is the *second set of codes* (where user specific codes is defined as a set of codes $\underline{c}^{(k)} = (\underline{c}_1^{(k)}, \underline{c}_2^{(k)}, \dots, \underline{c}_L^{(k)})^T$, EX1005, p.39 (equation 3.25). While the second set of codes is not *complex-valued*, it would have been obvious to use Bury’s *complex-valued* codes for the reasons explained above. *Supra* §X(A).

[1A] “selecting a plurality of subcarriers to be transmitted”

170. Kaiser in view of Bury renders obvious selecting a plurality of subcarriers to be transmitted.

171. Kaiser describes an SS-MC-MA system that “is an FDMA scheme on

[the] subcarrier level” and in which “each subcarrier is exclusively used by one user.” EX1005, p.131. Kaiser’s transmitter “performs a user-specific frequency mapping ... such that subsequent components of $\underline{s}^{(k)}$ are interleaved and mapped to subcarriers with maximum distance.” EX1005, p.132. “The subcarriers of the different systems are chosen such that each subsystem exploits the whole transmission bandwidth.” Id. In Kaiser’s system there are 256 subcarriers and each user is allocated eight of them. EX1005, pp.133, 134. Thus, Kaiser describes selecting a plurality of L subcarriers per user to be transmitted on the uplink. EX1005, p.132 (“The user specific frequency mapping assigns each subsystem, and, hence, each user exclusively its L subcarriers.”).

172. Accordingly, Kaiser in view of Bury renders obvious Limitation [1A].

[1B] “encoding the data symbols with the first set of complex-valued codes to produce encoded data symbols encoding the data symbols with the first set of complex-valued codes to produce encoded data symbols”

173. Kaiser in view of Bury renders obvious *encoding the data symbols* (Kaiser’s “complex-valued data symbols $\underline{d}_l^{(k)}, l = 1 \dots L$ ”) *with the first set of complex-valued codes* (Kaiser’s spreading codes as modified by Bury to be DFT coefficients) *to produce encoded data symbols* (spread data symbols $\underline{s}^{(k)} = (\underline{s}_1^{(k)}, \underline{s}_2^{(k)} \dots \underline{s}_L^{(k)})$).

174. Kaiser encodes *data symbols* which Kaiser describes as being “complex-valued data symbols $\underline{d}_l^{(k)}, l = 1 \dots L$ ” using a *first set of codes*, namely,

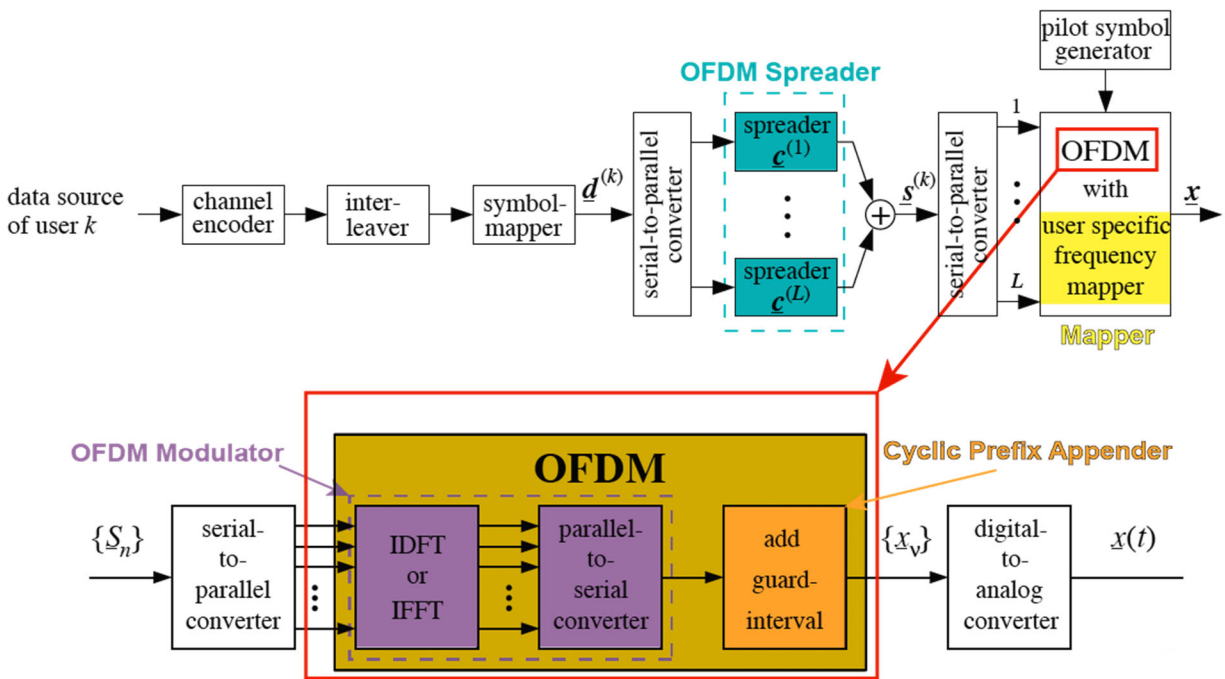
“spreading codes $\underline{c}_l, l=1, \dots, L$ ” from matrix $\underline{C}$. EX1005, p.132. Kaiser describes the encoding as being a multiplication of matrix $\underline{C}$ by vector $\underline{d}^{(k)}$: $\underline{s}^{(k)} = \underline{C}\underline{d}^{(k)}$. EX1005, p.132. Kaiser’s spreading codes are not *complex-valued* but Bury teaches “Fourier spreading” which use complex-valued Fourier coefficients. EX1007, p.857; EX1047, p.4 (Patent Owner admitting that “portion of the DFT $e^{-j\frac{2\pi ik}{M_{SC}^{PUSCH}}}$... correspond to complex-valued spreading codes”). It would have been obvious to modify Kaiser to use Bury’s *complex-valued codes* instead of Kaiser’s Walsh-Hadamard codes for the reasons explained above. *Supra* §X(A). The result would be to produce Kaiser’s *encoded data symbols* $\underline{s}^{(k)} = (\underline{s}_1^{(k)}, \underline{s}_2^{(k)} \dots \underline{s}_L^{(k)})$, using DFT spreading.

175. Accordingly, Kaiser in view of Bury renders obvious Limitation [1B].

[1C] “applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal,”

176. Kaiser in view of Bury renders obvious applying the encoded data symbols $(\underline{s}^{(k)} = (\underline{s}_1^{(k)}, \underline{s}_2^{(k)} \dots \underline{s}_L^{(k)})$ to the plurality of subcarriers (to L subcarriers) to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal (e.g., transmission signal “ $\underline{x}$ ” in Fig. B.2).

177. Kaiser applies the encoded data symbols $(\underline{s}^{(k)} = (\underline{s}_1^{(k)}, \underline{s}_2^{(k)} \dots \underline{s}_L^{(k)})$ to the subcarriers using “user specific frequency mapper”:



EX1005, pp.34, 132 (Fig. B.2 & Fig. 3.2).

178. This “user specific frequency mapper” “assigns each subsystem and, hence, each user exclusively its L subcarriers, avoiding MAI.” EX1005, p.132. Kaiser also discloses a specific example in which its mapper maps spread symbols of each user’s data signals to $L=8$ subcarriers (out of an available $N_C=256$ total subcarriers). EX1005, pp.134-135 (describing “8 subcarriers used by the k th user”).

179. The encoded data is applied to the L subcarriers and then OFDM modulated using “IDFT or IFFT” block. EX1005, p.32 (“MC modulation can be implemented in the discrete domain using an IDFT, or a more computationally efficient IFFT....”). This produces a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal “ $\underline{x}$ ” in Fig. B.2, which has been spread using Bury’s

DFT coefficients (“Fourier spreading”) instead of Kaiser’s Walsh-Hadamard spreading codes for the reasons discussed above. Supra §X(A).

180. Thus, Kaiser in view of Bury renders obvious Limitation [1C].

[1D] “transmitting the spread-OFDM signal.”

181. Kaiser in view of Bury renders obvious *transmitting the spread-OFDM signal*.

182. Kaiser describes an “SS-MC-MA transmitter” for the uplink (i.e., from a mobile device to a base station). EX1005, pp.131-132. Kaiser’s transmitter is used in the context of a “SS-MC-MA mobile radio system.” EX1005, p.130. A POSITA would have understood that transmitters transmit signals, and, in the case of Kaiser, a spread-OFDM signal (spread using Walsh-Hadamard codes). In the case of the combined Kaiser-Bury system, the spread-OFDM signal is a DFT spread OFDM signal. *Id.*, ¶X(A). Kaiser recommends using SS-MC-MA in the uplink to achieve “high bandwidth efficiency and great flexibility.” EX1005, p.137. Therefore, a POSITA would have understood that Kaiser describes *transmitting a spread-OFDM signal*, and in the context of Kaiser in view of Bury, transmitting a DFT *spread-OFDM signal*.

183. Thus, Kaiser in view of Bury renders obvious Limitation [1D].

[1E] “wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes.”

184. Kaiser in view of Bury renders obvious wherein the first set of

complex-valued codes are complex conjugates of the second set of complex-valued codes.

185. Kaiser complex conjugate codes in the “despreader” found in its SS-MC-MA receiver. EX1005, p.49. Reference is made to the discussion of the preamble [1Pre]. Supra §X(B)[1Pre]. As explained there, Kaiser’s despreader accepts “[t]he complex-valued output $\underline{u}$ of the equalizer” and correlates “it with the conjugate complex user specific spreading code $\underline{c}^{(k)*}$.” Id. Thus, while Kaiser performs spreading with “spreading codes $\underline{c}_l$, $l=1, \dots, L$,” represented in matrix $\underline{C}$, EX1005, p.132, Kaiser performs despreading in receiver using the complex conjugate of the codes used to perform spreading. EX1005, p.39 (describing user specific spreading codes as a set of codes $\underline{c}^{(k)} = (\underline{c}_1^{(k)}, \underline{c}_2^{(k)}, \dots, \underline{c}_L^{(k)})^T$, EX1005, p.39 (equation 3.25). Specifically, Kaiser discloses that **“[t]he complex-valued output $\underline{u}$ of the equalizer is despread by correlating it with the conjugate complex user specific spreading code $\underline{c}^{(k)*}$ cf. (3.25).** The complex-valued soft decided value at the output of the despreader is $\underline{v}^{(k)} = \underline{c}^{(k)*} \underline{u}^T$ ” which indicates that complex conjugate codes $\underline{c}_1^{(k)*}, \underline{c}_2^{(k)*}, \dots, \underline{c}_L^{(k)*}$ are applied to the “sequence at the output of the equalizer” $\underline{u} = (\underline{u}_1, \underline{u}_2 \dots \underline{u}_L)^T$. EX1005, p.49. This means that the first set of codes are complex conjugates of the second set of codes. And, for the reasons explained above it would have been obvious to use complex-valued codes

in the context of Kaiser based on Bury. Supra §X(A).

186. Therefore, Kaiser in view of Bury renders Limitation [1E] obvious.

C. Claim 2: “wherein selecting is responsive to spectrum allocation or is configured to provide for orthogonal frequency division multiple access”

187. Kaiser in view of Bury renders obvious wherein selecting is responsive to spectrum allocation or is configured to provide for orthogonal frequency division multiple access.

188. Kaiser’s subcarriers are “chosen such that each subsystem exploits the whole transmission bandwidth” from among the 256 total subcarriers where each user is allocated eight subcarriers. EX1005, pp.133, 134. Thus, Kaiser’s selecting is configured to provide for orthogonal frequency division multiple access by allowing user data for user k to be spread across eight subcarriers and user data for another user k’ to be spread across a different group of eight subcarriers. EX1005, p.132 (“The user specific frequency mapping assigns each subsystem, and, hence, each user exclusively its L subcarriers.”); see also EX1005, p.131 (“SS-MC-MA is an FDMA [frequency division multiple access] on subcarrier level”).

189. Therefore, Kaiser in view of Bury renders obvious claim 2.

D. Claim 6: “wherein the plurality of subcarriers are contiguous subcarriers or interleaved subcarriers”

190. Kaiser in view of Bury renders obvious wherein the plurality of subcarriers are contiguous subcarriers or interleaved subcarriers.

191. Kaiser's subcarriers are interleaved subcarriers. Kaiser explains:

Comparable to the frequency interleaving in MC-CDMA systems, the SS-MC-MA transmitter performs a user specific frequency mapping [KaF97b] such that subsequent components of $\underline{s}^{(k)}$ are interleaved and mapped to subcarriers with maximum distance. The subcarriers of the different subsystems are chosen such that each subsystem exploits the whole transmission bandwidth. The user specific frequency mapping assigns each subsystem and, hence, each user exclusively its L subcarriers, avoiding MAI.

EX1005, pp.130-31.

192. This discloses interleaved subcarriers that are separated such that they occupy the "whole transmission bandwidth" for each user.

193. Therefore, Kaiser in view of Bury renders obvious claim 6.

E. Claim 7: "wherein encoding comprises multiplying a vector or matrix of data symbols with a vector or matrix comprising the first set of complex-valued codes"

194. Kaiser in view of Bury renders obvious wherein encoding comprises multiplying a vector or matrix of data symbols ($\underline{d}^{(k)} = (\underline{d}_1^{(k)}, \underline{d}_2^{(k)}, \dots, \underline{d}_L^{(k)})^T$) with a vector or matrix comprising the first set of complex-valued codes (Kaiser's code matrix $\underline{C}$ with "spreading codes $\underline{c}_l, l = 1, \dots, L$, used by user k " as modified to include Bury's DFT spreading codes/coefficients).

195. Kaiser's encoding (i.e., spreading) includes multiplying a vector of data symbols with a matrix comprising the first set of codes, as explained below:

196. In SS-MC-MA systems ... [t]he vector

$$\underline{d}^{(k)} = \left(\underline{d}_1^{(k)}, \underline{d}_2^{(k)}, \dots, \underline{d}_L^{(k)} \right)^T \quad (B.1)$$

represents one block of L parallel converted data symbols of the k th user. Each of the L data symbols is multiplied with another orthogonal spreading code of length L . The $L \times L$ matrix

$$\underline{C} = \begin{pmatrix} \underline{C}_{1,1} & \underline{C}_{2,1} & \cdots & \underline{C}_{L,1} \\ \underline{C}_{1,2} & \underline{C}_{2,2} & \cdots & \underline{C}_{L,2} \\ \vdots & \ddots & \cdots & \vdots \\ \underline{C}_{1,L} & \underline{C}_{2,L} & \cdots & \underline{C}_{L,L} \end{pmatrix} \quad (B.2)$$

represents the L different spreading codes $\underline{C}_l, l = 1, \dots, L$, used by user k . The matrix $\underline{C}$ is the same for all users. The modulated spreading codes are data symbol and, thus, chip synchronously added, resulting in the transmission vector

$$\underline{s}^{(k)} = \underline{C} \underline{d}^{(k)} = \left(\underline{s}_1^{(k)}, \underline{s}_2^{(k)}, \dots, \underline{s}_L^{(k)} \right)^T \quad (B.3)$$

consisting of L components.

EX1005, pp.131-32; see id., pp.130-31, 133-35.

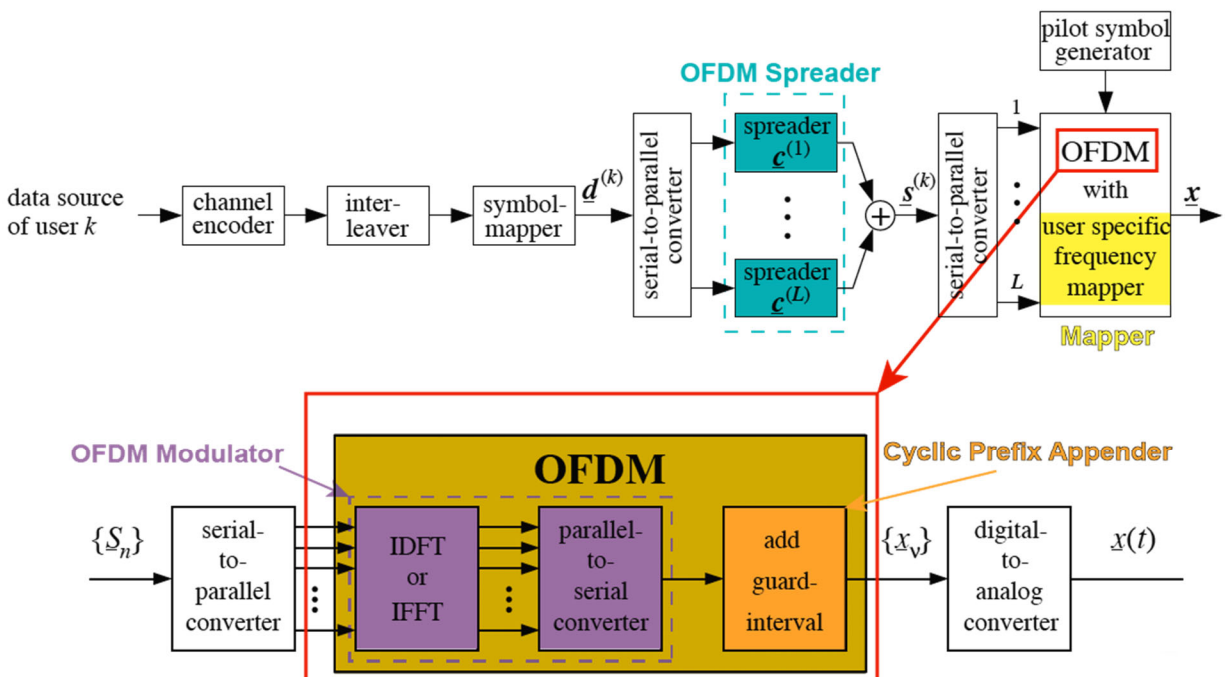
197. Here, the expression $\underline{s}^{(k)} = \underline{C} \underline{d}^{(k)}$ shows a vector ($\underline{d}^{(k)}$) multiplied by a matrix of spreading codes ($\underline{C}$). And, it would have been obvious to use complex-valued codes instead of Kaiser's Walsh-Hadamard codes for the reasons explained above. Supra §X(A).

198. Therefore, Kaiser in view of Bury renders obvious claim 7.

F. Claim 8: “wherein applying comprises modulating the encoded data symbols onto the plurality of subcarriers”

199. Kaiser in view of Bury renders obvious the claimed *wherein applying comprises modulating the encoded data symbols onto the plurality of subcarriers*.

200. Kaiser illustrates a block that includes “OFDM with user specific frequency mapping.”



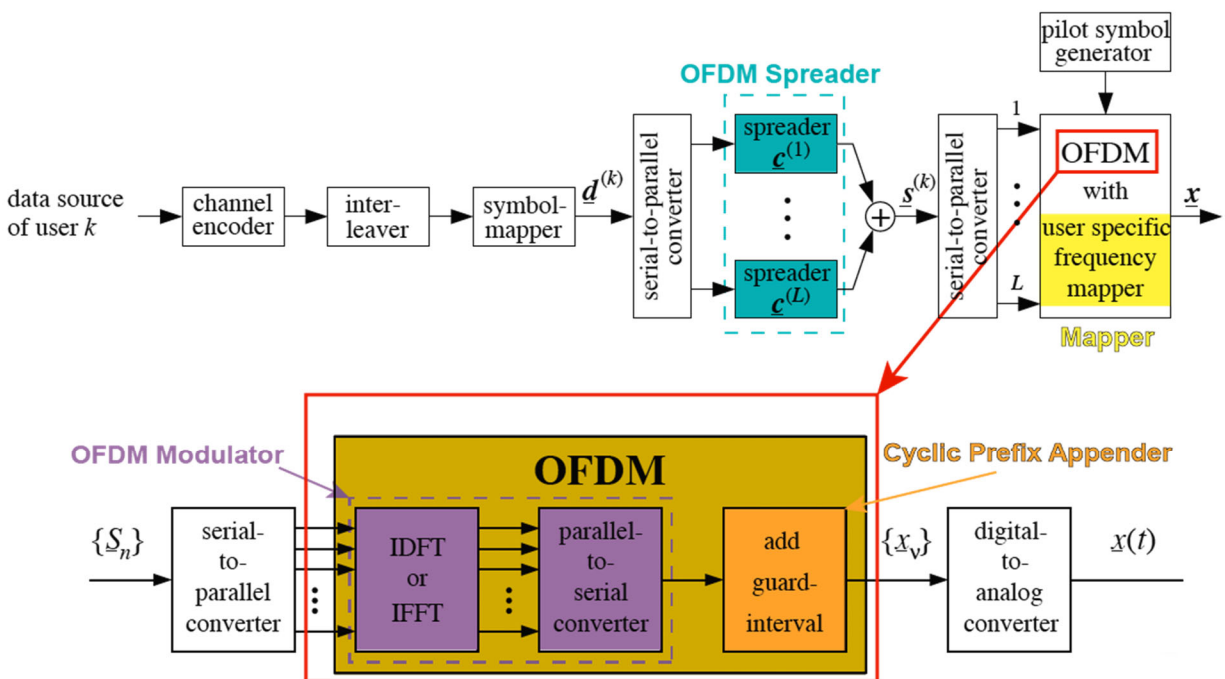
EX1005, p.132.

201. This mapping applies encoded data to L subcarriers and then OFDM modulates that data using “IDFT or IFFT” block. EX1005, p.32 (“MC modulation can be implemented in the discrete domain using an IDFT, or a more computationally efficient IFFT...”). Thus Kaiser teaches applying comprises modulating the encoded data symbols $\underline{s}^{(k)}$ onto the plurality of subcarriers—i.e., (L)

G. Claim 9: “further comprising adding a cyclic prefix to the spread-OFDM signal before transmitting the spread-OFDM signal”

202. Kaiser in view of Bury renders obvious the claimed *adding a cyclic prefix to the spread-OFDM signal before transmitting the spread-OFDM signal*.

203. Kaiser shows a block called “add guard interval” as part of the OFDM block:



EX1005, pp.34, 132 (Fig. B.2 & Fig. 3.2).

204. Kaiser explains “[t]he guard interval is a cyclic prefix added to each OFDM symbol which is obtained by extending the duration of the OFDM symbol....” EX1005, p.33. Bury also contemplates adding a “cyclic extension” in the transmitter. EX1007, p.859.

205. Therefore, Kaiser in view of Bury renders obvious claim 9.

XI. GROUND 4: Claims 10-11, 15-18, 19-20, and 24-27 are obvious over Kaiser in View of Bury and Dowling

A. Overview of the Motivation to Combine Kaiser in View of Bury and Dowling and the Reasonable Expectation of Success

206. Ground 4 relies on Kaiser in view of Bury and Dowling and addresses independent claims 10 and 19, and the challenged dependent claims that depend from claims 10 and 19. Claim 10 requires “*a processor*” [10A] and “*a non-transitory computer-readable memory communicatively coupled to the at least one processor, the non-transitory computer-readable memory including a set of instructions stored thereon and executable by the at least one processor*” to perform subsequent steps [10B]. Similar to claim 10, claim 19 recites a “*computer program product for operating a transmitter in a wireless communication network.*” The challenged dependent claims that depend from claims 10 and 19 are duplicative of the challenged dependent claims that depend from claim 1.

207. Kaiser does not explicitly state whether the disclosed system is implemented in hardware or a combination of hardware and software. Nevertheless, a POSITA would have understood that Kaiser would have needed to be implemented using at least one of these technologies. A POSITA would have found it obvious to implement Kaiser in software stored in memory coupled to a processor such that the software is executed by the processor.

208. A POSITA would have known that transmitters could be implemented in hardware or software. For example, Dowling discloses an OFDM transmitter and explains that various aspects of its OFDM transmitter including its modulation techniques “may be implemented as software modules which execute on a programmable processor architecture.” EX1042, 3:46-50; *see id.* at 5:66-6:1 (disclosing that the transmitter, receiver, and precoder may be implemented in hardware or software”); 21:62-64 (disclosing that the “present invention” is applicable to FFT based multicarrier modulation and OFDM systems). Specifically, Dowling discloses that the “transmitter, receiver, and precoder” can be “constructed using general purpose DSP (digital signal processor) chips, custom VLSI, gate arrays/semicustom VLSI, or a high powered host processor such as a future generation Pentium processor which also runs a computer host operating environment.” EX1042, 6:2-6. Dowling further discloses that its transmitter may be implemented as “a computer program which executes on a processor.” EX1042, 19:14-15.

209. A POSITA would have understood that, in a software implementation, software is stored in memory, and is provided from memory to a processor for execution. Indeed, as exemplified by numerous prior art references, those skilled in the art were aware of “software radios” that used code in memory and processors to execute that code to provide flexibility in design and updating, as opposed to

hardware which was significantly more difficult to upgrade because it is fixed in silicon. EX1008 (describing OFDM-CDMA software radio); EX1011, ¶¶[0124]-[0125] (noting that modulation “and other techniques” can be implemented in “hardware, software, or a combination thereof”). These references have similar disclosures to the ’786 Patent, which states that various aspects “may be implemented in hardware or special purpose circuits, software,” etc. EX1001, 76:37-43.

210. A POSITA would have known that transmitters could be implemented in hardware or software. For example, Dowling discloses an OFDM transmitter and explains that various aspects of its OFDM transmitter including its modulation techniques “may be implemented as software modules which execute on a programmable processor architecture.” EX1042, 3:46-50; *see id.* at 5:66-6:1 (disclosing that the transmitter, receiver, and precoder may be implemented in hardware or software”); 21:62-64 (disclosing that the “present invention” is applicable to FFT based multicarrier modulation and OFDM systems). Specifically, Dowling discloses that the “transmitter, receiver, and precoder” can be “constructed using general purpose DSP (digital signal processor) chips, custom VLSI, gate arrays/semicustom VLSI, or a high powered host processor such as a future generation Pentium processor which also runs a computer host operating environment.” EX1042, 6:2-6. Dowling further discloses that its transmitter may be

implemented as “a computer program which executes on a processor.” EX1042, 19:14-15.

211. A POSITA would have understood that, in a software implementation, software is stored in memory, and is provided from memory to a processor for execution. Indeed, as exemplified by numerous prior art references, those skilled in the art were aware of “software radios” that used code in memory and processors to execute that code to provide flexibility in design and updating, as opposed to hardware which was significantly more difficult to upgrade because it is fixed in silicon. EX1008 (describing OFDM-CDMA software radio); EX1011, ¶¶[0124]-[0125] (noting that modulation “and other techniques” can be implemented in “hardware, software, or a combination thereof”).

212. A POSITA also would have expected to succeed in making this combination. Kaiser discloses an OFDM transmitter and defines the various mathematical operations for each of the components. *Supra* §§VII(B); X(B)[1A-1E]. Implementing these mathematical operations in software would have required only routine knowledge because software is especially well-suited for performing mathematical operations. Given the number of disclosures indicating that those in the field were aware that various transmitter functions were able to be implemented in either hardware or software—two known alternatives—a POSITA would have reasonably expected in achieving a software implementation using instructions

stored on a memory for execution by a processor.

B. Claim 10

[10Pre] “An apparatus for communication in a wireless communication network that employs a first set of complex-valued codes to encode data symbols to be transmitted, and employs a second set of complex-valued codes to recover transmitted data symbols from a received signal, the apparatus comprising.”

213. Assuming that claim 1’s preamble is limiting, Kaiser in view Bury and Dowling renders obvious an *apparatus for communication in a wireless communication network*. This preamble corresponds to the preamble of claim 1 except that this preamble is to an apparatus instead of a method. Kaiser in view of Bury disclose an apparatus that, when taken together, performs the method of claim 1 and as such also renders obvious **[10Pre]**. *Cf. In re Lonardo*, 119 F.3d at 968 (“[T]he claimed structure of the device suggests how it is to be used and that use thus would have been obvious.”). Moreover, as explained above and in further detail below, the combined teachings of Kaiser in view of Bury and Dowling render claim 10 obvious. *Supra* §XI(A); *infra* §§XI(B)[10A-10Cv].

[10A] & [10B]: “at least one processor; and a non-transitory computer-readable memory communicatively coupled to the at least one processor, the non-transitory computer-readable memory including a set of instructions stored thereon and executable by the at least one processor for.”

214. Kaiser in view of Bury and Dowling discloses and renders obvious at least one processor **[10A]** and a non-transitory computer-readable memory communicatively coupled to the at least one processor, the non-transitory computer-

readable memory including a set of instructions stored thereon and executable by the at least one processor for **[10B]** performing the remaining elements of claim 10.

215. Dowling explains that various aspects of an OFDM transmitter including its modulation techniques “may be implemented as software modules which execute on a programmable processor architecture.” EX1042, 3:46-50; see id. at 5:66-6:1 (disclosing that the transmitter, receiver, and precoder may be implemented in hardware or software”); 21:62-64 (disclosing that the “present invention” is applicable to FFT based multicarrier modulation and OFDM systems). In a software implementation, software is stored in memory, and is provided from memory to a processor for execution. Dowling further discloses that its transmitter may be implemented as “a computer program which executes on a processor.” EX1042, 19:14-15.

216. A POSITA would have understood that “software radios” with code in memory and processors to execute that code to provide flexibility in design and updating, as opposed to hardware which was significantly more difficult to upgrade because it is fixed in silicon. EX1008 (describing OFDM-CDMA software radio); EX1011, ¶¶[0124]-[0125] (modulation can be implemented in “hardware, software, or a combination thereof”). For the reasons explained above, a POSITA would have found it obvious to implement Kaiser’ transmitter in software stored on memory for execution by a processor coupled to the memory as recited in claim 10. Supra

217. Thus, Kaiser in view of Bury and Dowling renders obvious Limitations [10A] and [10B].

[10Ci]: “selecting a plurality of subcarriers to be transmitted”

218. Limitation [10Ci] is the same as Limitation [1A]. *See* Section X(B)[1B]. Below is comparison of Limitation [10Ci] with Limitation [1A].

Claim [1A]	Claim [10Ci]
selecting a plurality of subcarriers to be transmitted	selecting a plurality of subcarriers to be transmitted

219. Accordingly, Limitation [10Ci] is obvious for same reasons as Limitation [1A]. *Id.*

[10Cii]: “encoding the data symbols with the first set of complex-valued codes to produce encoded data”

220. Limitation [10Cii] is the same as Limitation [1B]. *See* Section X(B)[1C]. Below is comparison of Limitation [10Cii] with Limitation [1B].

Claim [1B]	Claim [10Cii]
encoding the data symbols with the first set of complex-valued codes to produce encoded data	encoding the data symbols with the first set of complex-valued codes to produce encoded data

221. Accordingly, Limitation [10Cii] is obvious for same reasons as Limitation [1B]. *Id.*

[10Ciii]: “applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal”

222. Limitation [10Ciii] is the same as Limitation [1C]. *See* Section X(B)[1D]. Below is comparison of Limitation [10Ciii] with Limitation [1C].

Claim [1C]	Claim [10Cii]
applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal	applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal

223. Accordingly, Limitation [10Ciii] is obvious for same reasons as Limitation [1C]. *Id.*

[10Civ]: “transmitting the spread-OFDM signal”

224. Limitation [10Civ] is the same as Limitation [1D]. *See* Section X(B)[1E]. Below is comparison of Limitation [10Civ] with Limitation [1D].

Claim [1D]	Claim [10Civ]
transmitting the spread-OFDM signal	transmitting the spread-OFDM signal

225. Accordingly, Limitation [10Civ] is obvious for same reasons as Limitation [1D]. *Id.*

[10Cv]: “wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes”

226. Limitation [10Cv] is the same as Limitation [1E]. *See* Section X(B)[1F]. Below is comparison of Limitation [10Cv] with Limitation [1E].

Claim [1E]	Claim [10Cv]
wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes	wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes

227. Accordingly, Limitation [10Cv] is obvious for same reasons as Limitation [1E]. *Id.*

C. Claim 19

“[19Pre] A computer program product for operating a transmitter in a wireless communication network that employs a first set of complex-valued codes to encode data symbols to be transmitted, and employs a second set of complex-valued codes to recover transmitted data symbols from a received signal, the computer program product comprising a non-transitory computer readable storage device having computer readable program code stored therein, said program code containing instructions executable by one or more processors of a computer system for:

[19A] selecting a plurality of subcarriers to be transmitted;

[19B] encoding the data symbols with the first set of complex-valued codes to produce encoded data symbols;

[19C] applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal; and

[19D] transmitting the spread-OFDM signal;

[19E] wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes.”

228. Claim 19 recites a “*computer program product*” with the same limitations as the apparatus limitations in claim 10. Below is comparison of claim 10 with claim 19.

Claim 10	Claim 19
[10Pre] An apparatus for communication in a wireless communication network that employs a first set of complex-valued codes to encode data symbols to be transmitted, and employs a second set of complex-valued codes to recover transmitted data symbols from a received signal, the apparatus comprising: [10A] at least one processor; and [10B] a non-transitory computer-readable memory	[19Pre] A computer program product for operating a transmitter in a wireless communication network that employs a first set of complex-valued codes to encode data symbols to be transmitted, and employs a second set of complex-valued codes to recover transmitted data symbols from a received signal, the computer program product comprising a non-transitory computer readable storage device having computer

communicatively coupled to the at least one processor, the non-transitory computer-readable memory including a set of instructions stored thereon and executable by the at least one processor for:	readable program code stored therein, said program code containing instructions executable by one or more processors of a computer system for:
[10Ci] selecting a plurality of subcarriers to be transmitted;	[19A] selecting a plurality of subcarriers to be transmitted;
[10Cii] encoding the data symbols with the first set of complex-valued codes to produce encoded data symbols;	[19B] encoding the data symbols with the first set of complex-valued codes to produce encoded data symbols;
[10Ciii] applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal; and	[19C] applying the encoded data symbols to the plurality of subcarriers to produce a spread-Orthogonal Frequency Division Multiplexing (OFDM) signal; and
[10Civ] transmitting the spread-OFDM signal;	[19D] transmitting the spread-OFDM signal;
[10Cv] wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes.	[19E] wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes.

229. Specifically, the “selecting,” “encoding,” “applying,” and “transmitting” steps recited in claim 10 are identical to the instructions for “selecting,” “encoding,” “applying,” and “transmitting” recited in claim 19. Furthermore, both claim 19 and claim 10 conclude with the same wherein clause, as follows: “*wherein the first set of complex-valued codes are complex conjugates of the second set of complex-valued codes.*”

230. As noted above in Section §XI(A), Dowling further discloses that its transmitter may be implemented as “**a computer program which executes on a**

processor.” EX1042, 19:14-15. Furthermore, as established above in §XI(A), it would have been obvious to a POSITA, in a software implementation, software is stored in memory, and is provided from memory to a processor for execution. Accordingly, just as the processor and memory recited in claim 10 would have been obvious over Kaiser in view of Bury and Dowling, the “*computer program product*” recited in claim 19 is rendered obvious by Kaiser in view of Bury and Dowling. Thus, claim 19 is obvious over Kaiser in view of Bury and Dowling for the same reasons as set forth for claim 10 above. §XI(B).

D. Claims 11 and 20: “wherein selecting is responsive to spectrum allocation or is configured to provide for orthogonal frequency division multiple access”

231. Claims 11 and 20 are substantially the same as claim 2. Below is comparison of claims 2, 11, and 20.

Claim 2	Claim 11	Claim 20
2. The method of claim 1,	11. The apparatus of claim 10,	20. The computer program product of claim 19,
wherein selecting is responsive to spectrum allocation or is configured to provide for orthogonal frequency division multiple access.	wherein selecting is responsive to spectrum allocation or is configured to provide for orthogonal frequency division multiple access.	wherein selecting is responsive to spectrum allocation or is configured to provide for orthogonal frequency division multiple access.

232. Accordingly, claims 11 and 20 are obvious for same reasons as claim 2. *See* Section X(C).

E. Claims 15 and 24: “wherein the plurality of subcarriers are contiguous subcarriers or interleaved subcarriers”

233. Claims 15 and 24 are substantially the same as claim 6. Below is comparison of claims 6, 15, and 24.

Claim 6	Claim 15	Claim 24
6. The method of claim 1,	15. The apparatus of claim 10,	24. The computer program product of claim 19,
wherein the plurality of subcarriers are contiguous subcarriers or interleaved subcarriers.	wherein the plurality of subcarriers are contiguous subcarriers or interleaved subcarriers.	wherein the plurality of subcarriers are contiguous subcarriers or interleaved subcarriers..

234. Accordingly, claims 15 and 24 are obvious for same reasons as claim 6. *See* Section X(D).

F. Claims 16 and 25: “wherein encoding comprises multiplying a vector or matrix of data symbols with a vector or matrix comprising the first set of complex-valued codes”

235. Claims 16 and 25 are substantially the same as claim 7. Below is comparison of claims 7, 16, and 25.

Claim 7	Claim 16	Claim 25
7. The method of claim 1,	16. The apparatus of claim 10,	25. The computer program product of claim 19,
wherein encoding comprises multiplying a vector or matrix of data symbols with a vector or matrix comprising the	wherein encoding comprises multiplying a vector or matrix of data symbols with a vector or matrix comprising the	wherein encoding comprises multiplying a vector or matrix of data symbols with a vector or matrix comprising the

first set of complex-valued codes.	first set of complex-valued codes.	first set of complex-valued codes.
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236. Accordingly, claims 16 and 25 are obvious for same reasons as claim

7. *See* Section X(E).

G. Claims 17 and 26: “wherein applying comprises modulating the encoded data symbols onto the plurality of subcarriers”

237. Claims 17 and 26 are substantially the same as claim 8. Below is comparison of claims 8, 17, and 26.

Claim 8	Claim 17	Claim 26
8. The method of claim 1,	17. The apparatus of claim 10,	26. The computer program product of claim 19,
wherein applying comprises modulating the encoded data symbols onto the plurality of subcarriers.	wherein applying comprises modulating the encoded data symbols onto the plurality of subcarriers.	wherein applying comprises modulating the encoded data symbols onto the plurality of subcarriers.

238. Accordingly, claims 17 and 26 are obvious for same reasons as claim

8. *See* Section X(F).

H. Claims 18 and 27: “further comprising adding a cyclic prefix to the spread-OFDM signal before transmitting the spread-OFDM signal”

239. Claims 18 and 27 are substantially similar to claim 9. Below is comparison of claims 8, 17, and 26.

Claim 9	Claim 18	Claim 27
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9. The method of claim 1, further comprising	18. The apparatus of claim 10, wherein the non-transitory computer-readable memory further includes instructions stored thereon and executable by the processor for	27. The computer program product of claim 19, wherein said program code further includes instructions executable by the one or more processors of the computer system for
adding a cyclic prefix to the spread-OFDM signal before transmitting the spread-OFDM signal.	adding a cyclic prefix to the spread-OFDM signal before transmitting the spread-OFDM signal.	adding a cyclic prefix to the spread-OFDM signal before transmitting the spread-OFDM signal.

240. Accordingly, claims 18 and 27 are obvious for same reasons as claim

9. *See* Section X(G).

XII. DECLARATION IN LIEU OF OATH

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 or imprisonment, or both, under § 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon. If called to testify as to the truth of the matters stated herein, I could and would testify competently.

I declare under penalty of perjury that the foregoing is true and correct.

April 2, 2025

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

Harry V. Bims, Ph. D.

Dr. Harry V. Bims
Protocomm Systems, LLC
2665 Marine Parkway, Suite 1140
Mountain View, CA 94043
harrybims@me.com
650-283-4174

PROFESSIONAL SUMMARY

Harry Bims, PhD, EE, provides expert witness support services for telecommunications-related intellectual property litigation. These services include deposition and court testimony, expert reports, and infringement research, for patent, copyright, and trade secret litigation matters. He has 30+ years of telecommunications industry experience, and holds twenty-two US patents in network architecture and chip design for wireless communications.

EMPLOYMENT HISTORY

12/2001 - 05/2004 AirFlow Networks, Inc. • Sunnyvale, California

Position: *CEO/CTO & Founder*

As the sole founder of the company, created the original business plan, raised venture capital, and hired the core engineering team. Grew the company to 32 people and shipped products for revenue in the US and overseas. Fifteen patents on the core technology have issued. These patents, which relate to wireless network infrastructure based on the 802.11 specification, have been sold to Broadcom.

03/2001 - 12/2001 Bay Partners LLC • Cupertino, California

Position: *Entrepreneur in Residence*

Reported to the partners of this VC firm as a technology expert on a range of wireless and networking subjects. Reviewed business plans and participated in due diligence activities related to several startups seeking funding. Developed a business plan for a startup that builds network infrastructure for 802.11 enterprise networks.

09/1999 - 03/2001 Symmetry Communications Systems Inc • San Jose, California

Position: *Director, Software Architecture*

Reporting to the CEO, responsible for the software architecture of their core SGSN and GGSN products for the GPRS market. Formulated a software technology roadmap, showing the evolution from 2.5G to 3G SGSN and GGSN products. Management responsibility for Firmware, Hardware, Performance, and Systems Engineering Groups. Provided management support of early field trials of the system on a global basis.

07/1999 - 09/1999 **T-SPAN Systems Corporation • Palo Alto, California**

Position: *Member of Technical Staff*

Designed a wireless home LAN protocol for the company. Also designed and built a PC-based platform to demonstrate their technology. Company is now publicly traded as Atheros Communications.

07/1992 - 12/1998 **Glenayre Technologies-Wireless Access Group • San Jose, California**

Position: *Member of Technical Staff; Sr. Member of Technical Staff; Manager of NOC Systems*

Employee #6 at the company, which was acquired by Glenayre Technologies, Nov 1997. Designed and built a 4-channel ReFLEX50 pager demonstration in 1 week. Participated in early field trials and feasibility studies, culminating in a Pioneer's Preference license award from the FCC to SkyTel Corporation for Narrowband PCS development.

Invented, designed, and built from concept through full implementation, a patented two-way pager test system for the ReFLEX50 and ReFLEX25 protocols. This system was used throughout company operations for performance testing of the ReFLEX pager designs from Wireless Access, and Motorola. Over 16 systems were deployed around the country for manufacturing tests, engineering protocol tests, antenna tests, and pager repair tests.

The project required technical skills in PC hardware design, C++, object-oriented programming, signal processing techniques, NT device driver development, Win32 user interface development, real-time, multi-threaded control, and proficiency with wireless communications lab equipment. Three patents have been issued based on technical inventions in this capacity.

Co-developed a wireless application protocol for sending and receiving encrypted email messages over the paging channel. Led the project team that deployed a software encryption module based on this protocol for government agencies.

10/2012 – Present **BoughtStuff, Inc • Palo Alto, California**

Position: *Founder*

The company has developed a mobile application for storage and delivery of product information to smartphones over wireless networks.

Bims Laboratories, Inc Work History

6/2009 – 7/2009 **Eastman Kodak Company • Rochester, NY**

Position: *Technology Consultant*

Providing technology assessment on certain wireless communication patents.

10/2009 – 1/2017 **IEEE 802.16 Working Group**

Position: *Task Group Secretary, Task Group Vice-Chair, Task Group Chair, Working Group Vice-Chair & Secretary, IEEE 802.16 Expert*

Served in several leadership capacities within this group that is working on improvements to the IEEE 802.16 standard, otherwise known as WiMAX. The 802.16 Working Group entered hibernation on March 2018. From that time until the present, I am on the roster of Experts designated by the Chair to answer questions and provide clarification about the 802.16 standards.

2/2014 – Present **Access Network Protocol Development**

Position: *Technical Lead Developer*

Developing a C++17-based DES of SDRs for wired and wireless network protocols, that includes IMT-2020 channel models. Implementations of the IEEE 802 and LTE protocol families, plus PTP, PPoE, IPv6, digital cable, Bluetooth, DSL, frame relay and many other managed node models for smart grid and vertical IoT applications. Used for technical analysis of emerging wireless standards amendments.

Protocomm Systems, LLC Consulting History

04/1999–07/1999 **Gigabit Wireless, Inc. • San Jose, California**

Position: *Technical Leader*

Technical leader for the Wireless MAC design group. Responsible for

comparative analysis of competing wireless MAC protocol standards.
Responsible for the creation of a proprietary MAC protocol specification document, simulation of the protocol, and implementation in a prototype.
Participated in early 802.16 protocol standards. This company was acquired by Intel Corporation.

3/2007 – 10/2009 **Apple, Inc. • Cupertino, CA**

Position: *Technology Consultant*

Participating in IEEE 802.16 standards meetings as an affiliate of the client.

7/2003 – Present **Various expert witness engagements (see below)**

Position: *Technical Expert Witness*

Testified as a wireless technology expert in patent infringement cases. For a list of such cases, see below.

Technical Expert Witness Experience

10/2024 – Present **Fish & Richardson LLP (representing Apple)**

Case: Resonant Systems, Inc. d/b/a RevelHMI v. Apple Inc.

Civil Action No. 7:23-cv-00077-ADA

Location: UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT OF TEXAS, MIDLAND-ODESSA DIVISION

Testifying expert in this patent case involving haptic technology

For Plaintiff:

For Defendant: Fish & Richardson, LLP

Attorneys:

Status: Case ongoing

03/2024 – Present **Client: Fish & Richardson, LLP (representing General Motors Company, and General Motors LLC (“GM”), Tesla Inc., and American Honda Motor Co., Inc., and Honda Development & Manufacturing of America, LLC (“Honda”))**

Client: DLA Piper LLP (representing Toyota Motor North America, Inc., Toyota Motor Sales, U.S.A., Inc., and Toyota Motor Engineering & Manufacturing North America, Inc., and Toyota Motor Credit Corporation (“Toyota”))

Client: Venable LLP (representing FCA US LLC)

Client: Brooks Kushman LLP (representing Ford Motor Co.)

Client: Jenner & Block LLP (representing Nissan North America Inc. and Nissan Motor Acceptance Corporation A/K/A Nissan Motor Acceptance Company LLC (“Nissan”))

Case: Neo Wireless, LLC v GM, Tesla, Honda, Toyota, FCA US LLC, Ford Motor Co., and Nissan, Civil Action No. 2:22-MD-03034-TGB (E.D. Mich)

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF MICHIGAN SOUTHERN DIVISION

Testifying expert in this District Court matter involving 5G communications.

Expert Report:

March 28, 2024 Opening Expert Report on Invalidity

April 25, 2024 Rebuttal Expert Report on Non-Infringement

May 23, 2024 Expert Deposition

Attorneys: For Plaintiff:

For Defendant: Fish & Richardson, LLP, DLA Piper LLP, Venable LLP, Brooks Kushman LLP, Jenner & Block LLP

Status: Case ongoing

3/2024 – Present **Client: Finnegan, Henderson, Farabow, Garrett, & Dunner, LLP (representing Motorola Mobility LLC)**

Case: Lenovo (UNITED STATES) Inc. and Motorola Mobility LLC (Petitioners) v. Headwater Research LLC. (Patent Owner)

IPR Petition relating to Headwater Research LLC v Motorola Mobility LLC and Lenovo (United States) Inc. Case No. 4:23-cv-04496-JST (N.D. Cal.)

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARDa

Testifying expert in these matters involving application-level prioritization across networks.

April 17, 2024 9,198,076	Expert Declaration ISO IPR Petition regarding US Patent
July 17, 2024 10,749,700	Expert Declaration ISO IPR Petition regarding US Patent
July 15, 2024 9,198,076	Expert Declaration ISO IPR Petition regarding US Patent
August 8, 2024	Expert Declaration regarding US Patent 9,198,076

Attorneys: For Patent Owner:
For Petitioner: Finnegan

Status: Case ongoing

2/2024 – Present **Client: Bookoff McAndrews LLP (representing Motorola Mobility, LLC)**

Case: Patent Litigation between Ericsson and Motorola/Lenovo in Colombia

Location Testifying expert in these matters involving 5G networking technology.

Expert Declaration:

March 4, 2024 (COLOMBIA) Non-Essentiality and Non-Infringement
Technical Opinion regarding CO38083

March 20, 2024 (COLOMBIA) Invalidity Technical Opinion regarding
CO38001

March 27, 2024 (COLOMBIA) Non-Infringement Technical Opinion regarding
CO38001

March 27, 2024 (COLOMBIA) Non-Infringement Technical Opinion regarding
CO36031

March 27, 2024 (COLOMBIA) Non-Infringement Technical Opinion regarding
CO37362

April 16, 2024 (COLOMBIA) Non-Infringement and Non-Essentiality
Technical Opinion regarding CO37550

April 19, 2024 (COLOMBIA) Non-Essentiality Technical Opinion regarding
CO38002

July 19, 2024 (COLOMBIA) Invalidity Technical Opinion Regarding
CO38457

Attorneys: For Plaintiff:

For Defendant: Bookoff McAndrews, LLP

Status: Case ongoing

2/2024 – Present **Client: Fish & Richardson, LLP (representing Lenovo (United States))**

Case: Certain Cellular Base Station Communication Equipment, Components Thereof,
and Products Containing Same

U.S. Int'l Trade Commission Inv. No. 337-TA-1388

U.S. Int'l Trade Commission Inv. No. 337-TA-1397

Location: UNITED STATES INTERNATIONAL TRADE COMMISSION –
Administrative Law Judge Hon. Bryan F. Moore

Testifying expert in this patent case involving 5G networking technology

August 7, 2024 Declaration Regarding Claim Construction

August 21, 2024 Rebuttal Declaration Regarding Claim Construction

September 10, 2024 Initial Expert Report Regarding Infringement and
Domestic Industry

September 25, 2024 Rebuttal Expert Report Regarding Validity

October 4, 2024 Expert deposition testimony

December 9-10, 2024 Live testimony at 1397 trial.

Attorneys: For Plaintiff:

For Defendant: Fish & Richardson

Status: ITC case ongoing

2/2024 – Present **Greenberg Traurig LLP (representing Samsung)**

Case: Samsung Electronics Co., Ltd., (Petitioner) v. Asus Technology Licensing Inc.
(Patent Owner), IPR2024-00614

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE
PATENT TRIAL AND APPEAL BOARD

Testifying expert in this patent case involving LTE networking technology

March 8, 2024: PTAB Declaration ISO IPR petition

August 12, 2024: PTAB Declaration ISO IPR petition – US Patent 10,785,759

Attorneys: For Patent Owner:
For Petitioner: Greenberg Traurig LLP
Status: Case ongoing

7/2022 – Present **Client: Fish & Richardson LLP (representing LG Electronics, Inc.)**

Case: LG Electronics, Inc. v Invention Investment Fund I, L.P., Invention Investment Fund II, LLC, Intellectual Ventures I, LLC, and Intellectual Ventures II, LLC., Civil Action No. N22C-11-145-SKR-CCLD

Location: SUPERIOR COURT FOR THE STATE OF DELAWARE

Testifying expert in these matters relating to a breach of a License Agreement

April 19, 2024: Opening Expert Report

October 10 – 15, 2024: Live trial testimony

Attorneys: For Plaintiff: Fish & Richardson LLP
For Defendant:
Status: Jury award

1/2024 – Present **Client: Kramer Levin Naftalis & Frankel, LLP (representing Acceleration Bay, LLC.)**

Case: Acceleration Bay, LLC v Amazon Web Services, Inc.
Civil Action No.: 22-904-RGA-SRF

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE
– Hon. Richard G. Andrews

Testifying expert in this patent case involving internet data broadcasting.

Expert Declaration:

February 12, 2024: Expert Report Regarding Technology Tutorial of Asserted Patents

May 28, 2024 Live Deposition Testimony

September 23, 2024 Live trial testimony

Attorneys: For Plaintiff: Kramer Levin, Naftalis, & Frankel LLP
For Defendant: Fisch Sigler LLP
Status: Jury Award

12/2023 – Present **Kirkland & Ellis LLP (representing Motorola Mobility LLC & Lenovo)**

Case: Certain Mobile Phones, Components Thereof, and Products Containing the Same
U.S. Int'l Trade Commission Inv. No. 337-TA-1375

Certain Electronic Devices, including Mobile Phones, Tablets, Laptops,
Components Thereof, and Products Containing the Same
U.S. Int'l Trade Commission Inv. No. 337-TA-1376

Telefonaktiebolaget LM Ericsson v Lenovo (United States), Inc.
Civil Action No. 5:23-cv-569 (E.D.N.C.)

Lenovo (United States) v Telefonaktiebolaget LM Ericsson
Civil Action No. 5:23-cv-570 (E.D.N.C.)

IPR Petition Lenovo (United States) Inc. (Petitioner) v Telefonaktiebolaget LM
Ericsson (Patent Owner)

Location: UNITED STATES INTERNATIONAL TRADE COMMISSION
Administrative Law Judge Hon. MaryJoan McNamara

Testifying expert in this patent case involving 5G networking technology.

March 15, 2024 IPR Declaration ISO Petition for IPR Review

April 30, 2024 Expert Report on Invalidity

May 14, 2024 Rebuttal Expert Report Regarding Non-Infringement

May 31, 2024 Deposition Testimony

July 12-15, 2024 Live Testimony at Trial

February 24, 2025 IPR Declaration ISO Petitioner's Reply to Patent Owner's
Response

Attorneys: For Plaintiff:

For Defendant: Kirkland & Ellis LLP

Status: Decision pending

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF
NORTH CAROLINA

Attorneys: For Plaintiff:

For Defendant: Kirkland & Ellis LLP

Status: Case ongoing

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF NORTH CAROLINA

Testifying expert in this patent case involving establishing point-to-point connections between mobile devices.

Attorneys: For Plaintiff: Kirkland & Ellis LLP

For Defendant:

Status: Case ongoing

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD
Case IPR2024-TBD

March 15, 2024: Declaration in support of Petition for IPR

Attorneys: For Petitioner: Kirkland & Ellis LLP

For Patent Owner:

Status: Case ongoing

12/2023 – Present **Fish & Richardson LLP (representing Reolink)**

Case: IPR Petition Shenzhen Reolink Technology Co., Ltd., Reolink Innovation Inc., Reolink Innovation Co., Ltd. (China) (Patent Owner) v Throughtek, Co., Ltd. (Patent Owner), Attorney Docket No. 52472-0005IP1

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD

January 29, 2024: PTAB Declaration ISO IPR petition

Attorneys: For Patent Owner:

For Petitioner: Kirkland & Ellis LLP

Status: Case ongoing

7/2023 – Present **Client: Finnegan, Henderson, Farabow, Garrett, & Dunner, LLP (representing MediaTek)**

Case: U.S. Int'l Trade Commission Inv. No. 337-TA-1367

Certain Electronic Devices and Semiconductor Devices having Wireless Communication Capabilities and Components Thereof

Location: UNITED STATES INTERNATIONAL TRADE COMMISSION –

Administrative Law Judge Hon. Bryan F. Moore

Testifying expert in this patent case involving IEEE 802.11 technology.

Expert Reports:

January 18, 2024 Rebuttal expert Report regarding Non-infringement

Videotaped Deposition:

February 15, 2024 Videotaped expert deposition

ITC Trial testimony:

March 24, 2024 Non-infringement witness statement

Attorneys: For Plaintiff:

For Defendant: Finnegan

Status: ITC case ongoing

8/2023 – Present **Kirkland & Ellis LLP (representing TP-Link Technologies Co Ltd.)**

Case: U.S. Int'l Trade Commission Inv. No. 337-TA-1361

In the Matter of Certain Wi-Fi Routers, Wi-Fi Devices, Mesh Wi-Fi Network Devices, and Hardware and Software Components Thereof (ICC Case No. 27699/PDP)

Location: UNITED STATES INTERNATIONAL TRADE COMMISSION –
Administrative Law Judge Doris Johnson Hines

Testifying expert in these matters involving base station and wireless mesh technology.

November 9, 2023: Expert report concerning Invalidity

November 30, 2023: Expert rebuttal report on Non-Infringement and Technical Domestic Industry

January 22, 2023: Live testimony at ITC trial

Attorneys: For Plaintiff: LLP

For Defendant: Kirkland & Ellis LLP

Status: Trial verdict pending

5/2023 – Present **Client: Fish & Richardson LLP (representing Samsung Electronics, Co. Ltd.)**

Case: In the Matter of an Arbitration Pursuant to the Rules of the International Court of Arbitration of the International Chamber of Commerce (ICC Case No. 27699/PDP)

Location: INTERNATIONAL CHAMBER OF COMMERCE

Testifying expert in these matters involving international patent arbitration between Interdigital and Samsung.

January 8, 2024 Rebuttal expert report

June 18, 2024 Second expert report

Attorneys: For Plaintiff: Alston & Bird LLP

For Defendant: Fish & Richardson LLP

Status: Case ongoing

10/2022 – 2/2023 **Client: Finnegan, Henderson, Farabow, Garrett & Dunner LLP (representing Samsung Electronics, Co. Ltd.)**

Case: IPR Petition relating to Apex Beam Technologies, LLC v. Samsung Electronics, Co. Ltd., Civil Action No. 2:22-cv-00188)

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD

Testifying expert in these matters involving smart antenna technology.

February 27, 2023: Expert Declaration ISO petition for Inter Partes review

February 28, 2023: “Xia” Expert Declaration ISO petition for Inter Partes review

February 28, 2023: “Liu” Expert Declaration ISO petition for Inter Partes review

Attorneys: For Patent Owner:

For Petitioner: Finnegan, Henderson, Farabow, Garrett & Dunner LLP

Status: Case settled

7/2022 – Present **Client: Russ, August & Kabat LLP (representing Vivato, Inc.)**

Case: XR Communications, LLC d/b/a Vivato Technologies v D-Link Systems, Inc., Civil Action No. 8:17-cv-00596-DOC(JDE)

Location: UNITED STATES DISTRICT COURT FOR THE CENTRAL DISTRICT OF CALIFORNIA – Hon. David O. Carter

Testifying expert in these matters involving smart antenna technology.

Expert Declaration:

August 23, 2022: Rebuttal Expert Report on Validity

August 31, 2022: Deposition testimony

Attorneys: For Plaintiff: Russ, August & Kabat LLP

For Defendant:

Status: Case ongoing

6/2022 – 1/2024 Client: Fish & Richardson LLP (representing Samsung Electronics, Co. Ltd.)

Case: G+ Communications, LLC v Samsung Electronics Co. Ltd. et. al, Civil Action No. 2:22-cv-78

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS – Hon. Rodney Gilstrap

Testifying expert in these matters involving smart antenna technology.

March 13, 2023: Expert Declaration ISO Samsung Defendants' Claim Construction Proposals

June 28, 2023: Opening Expert Report on Invalidity

December 18, 2023: PTAB Declaration ISO IPR Petition

Attorneys: For Plaintiff: Russ, August & Kabat LLP

For Defendant: Fish & Richardson

Status: Jury trial verdict

5/2022 – 6/2023 Client: Kilpatrick Townsend LLP (representing Apple, Inc.)

Case: IPR Petition relating to Apple, Inc. v. Mullen Industries LLC, Civil Action No. 6:22-cv-00145

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD

Testifying expert in these matters involving remote notification devices.

August 8, 2022: Expert Declaration

May 23, 2023: Expert Deposition

Attorneys: For Patent Owner: Mintz, Levin, Cohn, Ferris, Glovsky, and Popeo, P.C.
For Petitioner: Kilpatrick Townsend LLP
Status: Case settled

3/2022 – 9/2023 Client: Kirkland & Ellis LLP (representing Samsung Electronics Co. Ltd.)

Case: California Institute of Technology v Samsung Electronics Co. Ltd., Civil Action No. 2:21-cv-00446

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS – Hon. Rodney Gilstrap

Testifying expert in these matters involving LDPC codes.

November 22, 2022: Declaration regarding claim construction

December 20, 2022: Rebuttal Declaration regarding claim construction

May 22, 2023: Rebuttal expert report on non-infringement

May 31, 2023: Deposition testimony

Attorneys: For Petitioner: Kirkland & Ellis LLP

For Plaintiff: Mintz, Levin, Cohn, Ferris, Glovsky, and Popeo, P.C.

Status: Case settled

2/2022 – 12/2022 Client: Fish & Richardson LLP (representing Apple, Inc.)

Case: Litigation between Ericsson and Apple in Belgium, Brazil, Germany, Netherlands, and Colombia, and US matters:

Ericsson Inc. et. al. v. Apple Inc., Civil Action No. 6:22-cv-00061-ADA

Ericsson Inc., et. al. v. Apple Inc., Civil Action No. 2:21-cv-00376

Apple Inc. v. Telefonaktiebolaget LM Ericsson, et. al., Civil Action No. 2:21-cv-00460

In the Matter of Certain Mobile Phones Tablet Computers, Smart Watches, Smart Speakers, and Digital Media Players, and Products Containing Same.

U.S. Int'l Trade Commission Inv. No. 337-TA-3596

Location: UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT OF TEXAS WACO DIVISION – Hon. Alan D. Albright

UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS

UNITED STATES INTERNATIONAL TRADE COMMISSION

Testifying expert in these matters involving 5G networking technology.

Expert Declaration:

May 18, 2022 COLOMBIA: Invalidity and Non-Infringement Technical Opinion regarding certain Colombia patents

April 27, 2022 COLOMBIA: Invalidity and Non-Infringement Technical Opinion regarding certain Colombia patents #1

April 27, 2022 COLOMBIA: Invalidity and Non-Infringement Technical Opinion regarding certain Colombia patents #2

March 28, 2022 COLOMBIA: Invalidity and Non-Infringement Technical Opinion regarding certain Colombia patents

March 9, 2022 BRAZIL: Invalidity Technical Opinion regarding Brazil patents

May 26, 2022 BRAZIL: Response to Ericsson Statement regarding Brazil patents

August 25, 2022 BRAZIL: Live testimony before the Brazil Patent and Trademark Office regarding invalidity

November 15, 2022 (COLOMBIA) Invalidity and Non-Infringement Technical Opinion regarding CO37550

Attorneys: For Plaintiff:

For Defendant: Fish & Richardson, LLP

Status: Case settled

1/2022 – 3/2023 **Client: Finnegan LLP (representing Toyota Motor Corp., et. al.)**

Case: Intellectual Ventures I LLC, et. al. v. Toyota Motor Corp., et. al., Civil Action No. 2:21-cv-389

Toyota Motor Corp. (Petitioner) v. Intellectual Ventures II, LLC (Patent Owner)
Case No. IPR2022-01355

Location: UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT OF TEXAS MARSHALL DIVISION –

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

Testifying expert in this District Court and PTAB matter involving IEEE 802.11 wireless networking.

Expert Declaration:

January 13, 2023: Marshall Division Declaration on Invalidity

August 25, 2022: PTAB Declaration ISO Petition for IPR

April 8, 2024: PTAB Declaration ISO Petition for IPR2022-00973

Attorneys: For Plaintiff:

For Defendant/Petitioner: Finnegan, LLP

Status: Case settled

9/2021 – Present **Client: Schulte, Roth & Zabel LLP (representing TrackThings LLC)**

Case: TrackThings LLC v. NETGEAR, Inc. Civil Action No. 22-981-RGA-JLH

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

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Testifying expert in this District Court matter involving wireless network reconfiguration.

July 9, 2024 Expert Rebuttal report regarding Validity of US Patent Nos. 9,642,017, 9,332,442, and 10,107,893

August 15, 2024 Reply Expert Report regarding infringement

July 9, 2024 Rebuttal Expert Report regarding Validity

October 17, 2024 Deposition testimony

Attorneys: For Plaintiff: Schulte, Roth, and Zabel

For Defendant: Quinn Emanuel

Status: Case ongoing

9/2021 – Present **Client: Stroock LLP/Schulte, Roth & Zabel (representing TrackThings LLC)**

Case: TrackThings LLC v. Amazon.com, Inc. and Amazon.com Services LLC, and eero LLC., Civil Action No. 6:21-cv-00720; Civil Action No. 6:23-cv-00133-ADA

Location: UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT OF TEXAS WACO DIVISION – Hon. Alan D. Albright

Testifying expert in this District Court matter involving wireless network reconfiguration.

March 17, 2023: Expert declaration ISO claim construction responses

February 24, 2023 Rebuttal Expert report regarding Validity
January 25, 2024 Expert report on Infringement
February 9, 2024 Expert report regarding Infringement
March 8, 2024 Rebuttal Expert report regarding Validity
March 29, 2024 Live deposition testimony
Attorneys: For Plaintiff: Schulte, Roth, and Zabel
For Defendant: Quinn Emanuel
Status: Case ongoing

12/2020 – Present **Client: BlankRome (representing Samsung Electronics Co., Ltd)**

Case: TOT Power Control, S.L. v. Samsung Elecs. Co., Ltd and Samsung Elecs. Am. Inc., Civil Action No. 1:21-cv-01305-MN

IPR Petition relating to TOT Power Control, S.L. v. Samsung Elecs. Co., Ltd and Samsung Elecs. Am. Inc., Civil Action No. 1:21-cv-01305-MN

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE
– Hon. Maryellen Noreika

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

Testifying expert in this district court and IPR proceeding involving power control methods in wireless systems.

September 12, 2022 Expert Declaration regarding IPR for 865 patent

August 23, 2024 Expert Report on Invalidity

October 1, 2024 Expert report on Non-infringement

October 22, 2024 Reply Expert Report on Invalidity

November 8, 2024 Live deposition testimony

Attorneys: For Plaintiff: DLA Piper
For Defendants: Blank Rome

For Patent Owner: Hausfeld, LLP

For Petitioner: Blank Rome

Status: Case ongoing

5/2024 – Present **Client: BlankRome (representing Samsung Electronics Co., Ltd)**

Case: Secure Wi-Fi LLC v. Samsung Elecs. Co., Ltd and Samsung Elecs. Am. Inc.,
Civil Action No. 2:24-cv-00047

IPR Petition relating to TOT Power Control, S.L. v. Samsung Elecs. Co., Ltd and
Samsung Elecs. Am. Inc., Civil Action No. 1:21-cv-01305-MN

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF
TEXAS

Testifying expert in this IPR proceeding involving randomizing MAC addresses in
Wi-Fi networks.

September 3, 2024 Expert Declaration regarding IPR for 384 patent

September 3, 2024 Expert Declaration regarding IPR for 005 patent

September 3, 2024 Expert Declaration regarding IPR for 552 patent

Attorneys: For Petitioner: Blank Rome, LLP

Status: Case ongoing

10/2021 – 5/2022 **Client: Finnegan, Henderson, Farabow, Garrett & Dunner, LLP
(representing MediaTek Inc.)**

Case: NXP USA, Inc. v. MediaTek Inc., et. al., Civil Action No. 2:21-cv-000318-JRG –
Hon. Rodney Gilstrap

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF
TEXAS MARSHALL DIVISION

Testifying expert in this District Court matter involving 802.11n, 802.11ac, and
802.11ax chipsets.

Expert Report:

February 3, 2022 Declaration ISO Defendant's Claim Construction Brief

Attorneys: For Plaintiff: Duane Morris, LLP

For Defendant: Finnegan, LLP

Status: Case settled

09/2021 – 9/2024 **Client: Fish & Richardson, LLP (representing Samsung Electronics Co., Ltd., et. al.)**

Case: Smart Mobile Technologies, LLC v. Samsung Electronics Co., Ltd., et. al., Civil Action No. 6:21-cv-00701-ADA. Hon. Alan D. Albright

Location: UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT OF TEXAS WACO DIVISION

Testifying expert in this District Court matter involving wireless voice and data transfer.

Expert Report:

June 8, 2022 Declaration ISO Defendant's Claim Construction Brief

Attorneys: For Plaintiff: Hagens Berman Sobol Shapiro, LLP

For Defendant: Fish & Richardson, LLP

Status: Case closed

05/2021 – 6/2021 **Client: Sidley Austin (representing HP Inc. and Microsoft Corporation)**

Case: SynKloud Technologies, LLC v. HP Inc., Civil Action No. 1:19-cv-01360-RGA and Microsoft Corporation v. SynKloud Technologies, LLC, Civil Action No. 1:20-cv-00007-RGA

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

Testifying expert in this District Court matter involving wireless cloud storage.

Expert Report:

June 25, 2021 Declaration ISO Microsoft and HP's Claim Construction Brief

Attorneys: For Plaintiff:

For Defendant: Sidley Austin

Status: Case settled

05/2021 – 5/2022 **Client: DLA Piper (representing Motorola Mobility LLC)**

Case: U.S. Int'l Trade Commission Inv. No. 337-TA-1253
Certain LTE-Compliant Cellular Communication Devices
Motorola v. Evolved Wireless LLC.

Location: UNITED STATES INTERNATIONAL TRADE COMMISSION –
Administrative Law Judge Cameron R. Elliot
Testifying expert in this ITC matter involving LTE cellular device handover.

Expert Report:

November 16, 2021 Expert Report on NonInfringement and Lack of Technical
Domestic Industry

Expert Testimony:

December 15, 2021 Deposition testimony

Attorneys: For Plaintiff: Nelson Bumgardner Albritton P.C.; Adduci, Mastriani &
Schaumberg, LLP

For Defendant: DLA Piper

Status: Case settled

04/2021 – 6/2022 **Client: Desmarais LLP (representing Google LLC and FitBit Inc.)**

Case: Cellspin Soft, Inc. v. Fitbit, Inc., No. 4-17-cv-05928-YGR

Location: UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF
CALIFORNIA

Hon. Yvonne Gonzalez Rogers

Testifying expert in this patent case involving the distribution of real-time health
data.

Expert Testimony:

October 29, 2021 Expert Report on NonInfringement

Attorneys: For Plaintiff: Garteiser Honea PLLC and Corcoran IP Law PLLC

For Defendant: Desmarais LLP

Status: Case settled. Summary Judgment for Non-Infringement.

3/2021 – 9/2021 **Client: Fish & Richardson (representing Samsung)**

Case: U.S. Int'l Trade Commission Inv. No. 337-TA-1248

Certain Cellular Communications Infrastructure Systems, Components Thereof,
and Products Containing Same

U.S. Int'l Trade Commission Inv. No. 337-TA-DN-3525

Certain Cellular Communications Infrastructure Systems, Components Thereof,
and Products Containing Same

Location: UNITED STATES INTERNATIONAL TRADE COMMISSION

Testifying expert in this ITC matter regarding 3GPP technology.

Attorneys: For Plaintiff: Winston & Strawn, LLP

For Defendant: Fish & Richardson, LLP

Status: Case terminated in its entirety based on an Initial Determination.

2/2021 – 11/2021 **Client: Fish & Richardson (representing Quectel)**

Client: Axinn, Veltrop & Harkrider LLP (representing Thales DIS AIS USA, LLC)

Client: Pearl Cohen LLP (representing Telit)

Case: U.S. Int'l Trade Commission Inv. No. 337-TA-1240

Certain UMTS and LTE Cellular Communication Modules and Products
Containing the Same

Koninklijke Philips N.V. v Quectel Wireless Solutions Co. Ltd., Thales DIS AIS
Deutschland GmbH, Thales S.A., Telit Wireless Solutions, Inc., Telit
Communications PLC, CalAmp Corp, Xirgo Technologies, LLC, Laird
Connectivity, Inc., Thales DIS AIS USA LLC

Case No. 1:20-cv-1713 (D. Del)

Location: UNITED STATES INTERNATIONAL TRADE COMMISSION –
Administrative Law Judge Hon. David P. Shaw

Testifying expert on 3GPP mobile device operation.

Expert Testimony:

July 21, 2021 Expert Report on Invalidity

August 6, 2021 Deposition Testimony

October 12, 2021 Live Testimony before ALJ David P. Shaw

Attorneys: For Plaintiff: Mayer Brown LLP

For Defendants: Fish & Richardson; Axinn, Veltrop & Harkrider LLP

Status: Case closed

11/2020– Present **Client: Orrick, Herrington & Sutcliffe LLP (representing PayPal Holdings, Inc.)**

Case: IOENGINE LLC v PayPal Holdings, Inc.

Civil Action No. 1:18-cv-00452-WCB

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

Hon. William C. Bryson

Testifying expert in this patent case involving peripheral device communication to remote servers.

Expert Testimony:

November 19, 2021 Expert Report on Invalidity

January 7, 2022 Expert Report on Non-Infringement

January 20-21, 2022 Deposition Testimony on Invalidity and Non-Infringement

Status: Case ongoing

11/2020 – Present **Client: DLA Piper (representing Apple, Inc.)**

Case: Maxell v. Apple Inc. In the Matter of Certain Mobile Electronic Devices and Laptop Computers

U.S. Int'l Trade Commission Inv. No. 337-TA-1215

Location: UNITED STATES INTERNATIONAL TRADE COMMISSION –
Administrative Law Judge Hon. Dee Lord

Testifying expert on 3GPP mobile device operation.

Expert Testimony:

February 25, 2021: Opening Expert Report Regarding Invalidity

March 11, 2021: Rebuttal Expert Report regarding NonInfringement and Lack of Technical Domestic Industry

March 24, 2021: Videotaped deposition

Attorneys: For Plaintiff: Mayer Brown LLP

For Defendant: DLA Piper LLP

Status: Case settled

11/2020– 11/2020 **Client: Folio Law Group PLLC (representing Dali Wireless)**

Case: Dali Wireless, Inc. v. John Mezzalingua Associates, LLC d/b/a JMA Wireless and Teko Telecom SRL (an Italian Corporation)

Civil Action No. 19-2367-RGA

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

Testifying expert in this patent case involving distributed antenna system networks.

Expert Testimony:

November 6, 2020: Declaration Regarding Interpretation of Asserted Claims

Status: Case closed

8/2020– 8/2022 **Client: Folio Law Group PLLC (representing Dali Wireless)**

Case: Dali Wireless, Inc. v. Corning Optical Communications, LLC,

Civil Action No. 3:20-cv-06469-EMC

Location: UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT OF TEXAS – Hon. Edward M. Chen

Testifying expert in this patent case involving distributed antenna system networks.

Expert Testimony:

February 12, 2021: Declaration Regarding Interpretation of Asserted Claims

June 29, 2022: Expert Report on Infringement

August 22, 2022: Deposition Testimony

October 11, 2022: Supplemental Expert Report on Infringement

Status: Case closed

3/2020– 8/2021 **Client: Folio Law Group PLLC (representing Dali Wireless)**

Case: Dali Wireless, Inc. v. CommScope Technologies, LLC and CommScope Holding Company, Inc..

Civil Action No. 1:19-cv-00952-MN

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE – Hon. Maryellen Noreika

Testifying expert in this patent case involving distributed antenna system networks.

Expert Testimony:

June 23, 2021: Expert report on infringement.

August 17, 2021: CORRECTED Reply Expert report on infringement of '338 Patent

Status: Case closed

03/2020 – 8/2022 **Client: Sidley Austin LLP (representing Lenovo and Motorola)**

Case: InterDigital Technology Corporation, IPR Licensing, Inc., InterDigital Communications, Inc., InterDigital Holdings, Inc., and InterDigital, Inc. v. Lenovo Holding Company, Inc., Lenovo (United States) Inc., and Motorola Mobility LLC

Civil Action No. 19-1590-LPS

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE
Hon. Leonard P. Stark

Testifying expert in this patent case involving 3G and 4G cellular standards.

Expert Testimony:

April 16, 2022 Expert report on Invalidity of '665 and '954 patents

June 16, 2022 Expert Report on Invalidity of 8,675,612 and 9,456,449 patents

June 16, 2022 Rebuttal Expert Report on Invalidity of 8,085,665 and 8,427,954 patents

July 17, 2022 Rebuttal expert report regarding non-infringement of '612 and '449 patents

July 18, 2022 Rebuttal expert report on non-infringement of '665 and '954 patents

August 8, 2022 Rebuttal Expert Report on Invalidity of '612 and '449 patents

August 31, 2022 Videotaped expert Deposition

Status: Case closed

3/2020– 5/2022 **Client: Finnegan, Henderson, Farabow, Garrett & Dunner LLC (representing Google)**

Case: IPR Petition Google LLC, v. Sonos, Inc., Case No. IPR2021-01563

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE
PATENT TRIAL AND APPEAL BOARD

Testifying expert in this IPR proceeding involving wireless home speaker
systems.

Expert Testimony:

September 27, 2021: Declaration ISO petition for Inter Partes Review

May 10, 2022: Supplemental declaration ISO petition for Inter Partes Review

June 29, 2022: Videotaped deposition testimony

Status: Case closed

08/2019 – 6/2021 **Client: Fish & Richardson (representing Finjan, Inc.)**

Case: Finjan, Inc. v. Cisco, Inc.

Civil Action No. 5:17-cv-00072-BLF-SVK

Location: UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF
CALIFORNIA SAN DIEGO DIVISION – Hon. Susan Van Keulen

As a testifying expert, provided a technology tutorial in this patent case involving
internet security technology.

Expert Testimony:

August 14, 2019 Tutorial expert report on network security technology.

September 4, 2019 Deposition Testimony

Attorneys: For Plaintiff: Fish & Richardson

For Defendant:

Status: Case settled

8/2019 – 5/2020 **Client: Fish & Richardson (representing LG Electronics, Inc.)**

Case: Bell Northern Research, LLC v. LG Electronics, Inc., et. al.

USDC-SDCA Civil Action No. 18-cv-2864-CAB-BLM

Location: UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF
CALIFORNIA – Hon. Cathy Ann Bencivengo, Magistrate Judge: Hon. Barbara
L. Major

Testifying expert on wired/wireless communication in gaming systems.

Expert Testimony:

November 20, 2019 Declaration ISO motion for summary judgment

Attorneys: For Plaintiff: Skiermont Derby LLP

For Defendant: Fish & Richardson

Status: Case closed

7/2019 – 05/2021 **Client: O'Melveny & Myers LLP (representing Apple Inc.)**

Case: Maxell, Ltd. v. Apple Inc.,

Case No. 5:19-cv-00036-RWS.

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS TEXARKANA DIVISION – Hon. Robert W. Schroeder III

Testifying expert on 3G cellular telephone technology.

Expert Testimony:

May 7, 2020: Opening Expert Report Regarding Invalidity

June 4, 2020: Rebuttal Expert Report on Non-Infringement

Deposition Testimony: June 24, 2020

Attorneys: For Plaintiff: Mayer Brown LLP

For Defendant: O'Melveny & Myers LLP

Status: Case settled.

4/2019 – Present **Client: Perkins Coie (representing Nintendo of America, Inc.)**

Case: Genuine Enabling Technology LLC v. Nintendo Company Ltd., and Nintendo of America, Inc., W.D. Wash.,

Civil Action No. 2:19-cv-00351-RSM

Location: UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT OF WASHINGTON – Hon. Ricardo S. Martinez

Testifying expert on wired/wireless communication in gaming systems.

Expert Declarations:

October 23, 2019 Declaration ISO claim constructions

November 26, 2019 Sur-reply declaration ISO claim constructions

January 23, 2020 Declaration ISO motion for summary judgment

April 20, 2020 Opening Expert Report Regarding Invalidity

Expert Depositions:

December 19, 2019

Claim Construction Hearing Testimony:

February 24, 2020 Tutorial testimony on the technology of the Asserted Patents

Attorneys: For Plaintiff: Bayard, P.A.

For Defendant: Perkins Coie

Status: Case ongoing

12/2019 – 12/2019 **Client: Erise IP (representing Apple Inc.), Haynes and Boone, LLP (representing Ericsson Inc)**

Case: Ericsson Inc. (Petitioner) v. Uniloc 2017, LLC (Patent Owner)

Apple Inc. (Petitioner) v. Uniloc 2017, LLC (Patent Owner) Case No. IPR2020-00224

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD

Testifying expert in this IPR proceeding involving ARQ data exchange on LTE networks.

Expert Declarations:

December 16, 2019 Declaration ISO Petition for Inter Partes Review of U. S. Patent No. 7,075,917

Attorneys: For Petitioner: Erise IP; Haynes and Boone, LLP

For Patent Owner:

Status: Case closed

6/2019 – 7/2020 **Client: Fish & Richardson (representing Microsoft Corporation)**

Case: Microsoft Corp. (Petitioner) v. Uniloc 2017, LLC (Patent Owner)

Uniloc 2017, LLC v. Microsoft Corp.

USDC Central District of California, Case Nos. 8:18-cv-2053, 8:18-cv-2054, 8:18-cv-2224; 8:19-cv-0428, 8:19-cv-0477, 8:19-cv-0196

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD

Testifying expert in this IPR proceeding involving 3GPP transport formats and

channels.

Expert Declarations:

August 6, 2019 Declaration in support of claim construction

Attorneys: For Plaintiff: Feinberg Day LLP

For Defendant: Fish & Richardson

Status: Case settled

2/2019 – 5/2020 **Client: Klarquist Sparkman, LLP (representing Microsoft Corporation)**

Case: Uniloc 2017, LLC v. Microsoft Corp.

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE
PATENT TRIAL AND APPEAL BOARD

Testifying expert in this IPR proceeding involving ARQ data exchange on LTE
networks.

Expert Declarations:

April 14, 2019 Declaration ISO Petition for Inter Partes Review of U. S.
Patent No. 7,075,917

Attorneys: For Plaintiff:

For Defendant: Klarquist LLP

Status: Case settled

10/2018 – 6/2021 **Client: Kramer Levin Naftalis & Frankel, LLP (representing Finjan, Inc.)**

Case: Finjan, Inc. v. Eset, Inc.

Civil Action No. 3:17-cv-00183-CAB-BGS

Location: UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF
CALIFORNIA SAN DIEGO DIVISION – Hon. Cathy Ann Bencivengo

As a testifying expert, provided a technology tutorial in this patent case involving
internet security technology.

Expert Declaration:

October 5, 2018 Tutorial expert report on network security technology.

March 11, 2020 Jury trial testimony.

Attorneys: For Plaintiff: Kramer Levin, Naftalis, & Frankel LLP

For Defendant:

Status: Jury Trial Mistrial due to COVID-19.

Case closed.

9/2018 – 6/2021 **Client: Kramer Levin Naftalis & Frankel, LLP (representing Finjan, Inc.)**

Case: Finjan, Inc. v. Juniper, Inc.

Civil Action No. 15-cv-03295-BLF-SVK

Location: UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA SAN JOSE DIVISION – Hon. Beth L. Freeman

As a testifying expert, provided a technology tutorial in this patent case involving internet security technology.

Expert Declaration:

September, 11, 2018 Tutorial expert report on network security technology.

Videotaped Deposition:

November 7, 2018

Attorneys: For Plaintiff: Kramer Levin, Naftalis, & Frankel LLP

For Defendant:

Status: Case closed

9/2017 – 9/2018 **Client: (Covington & Burling representing Huawei Device USA, Inc.)**

Case: Optis Wireless Technology, LLC, et. al. v. Huawei Technologies Co. Ltd, et. al.

Civil Action No. 2:17-cv-123-JRG-RSP

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS MARSHALL DIVISION – Hon. Roy S. Payne

Testifying expert regarding 3G and LTE technology.

Expert Declarations and Reports:

November 3, 2017: Declaration regarding Claim Construction.

March 26, 2018: Initial Expert Report Regarding Invalidity

April 23, 2018: Rebuttal Expert Report on Non-Infringement

April 27, 2018: Rebuttal Expert Report on Secondary Considerations

Videotaped Deposition: May 10, 2018

May 14, 2018: Declaration in support of Motion for Partial Summary Judgment

Jury Trial Testimony: August 22, 2018 and August 23, 2018

Attorneys: For Plaintiff: McKool Smith
For Defendant: Covington & Burling

Status: Jury award

6/2017 – 4/2018 **Client: Kramer Levin Naftalis & Frankel, LLP (representing Finjan, Inc.)**

Case: Finjan, Inc. v. Symantec, Inc.

Civil Action No. 4:14-cv-02998-HSG

Location: UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA OAKLAND DIVISION

As a testifying expert, provided a technology tutorial in this patent case involving internet security technology.

Expert Declaration:

July 27, 2017 Tutorial expert report on security technology.

Videotaped Deposition:

August 29, 2017

Attorneys: For Plaintiff: Kramer Levin, Naftalis, & Frankel LLP
For Defendant: Quinn Emmanuel

Status: Case settled

5/2017 – 3/2018 **Client: Barnes & Thornburg, LLP (representing Ooma, Inc.)**

Case: Ooma, Inc. (Petitioner) v. Deep Green Wireless, LLC (Patent Owner)

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD

As a testifying expert, provided a technology tutorial in this patent case involving voice and data communications over wireless networks.

Expert Declaration:

June 8, 2017 Expert report on prior art wireless network technology.

Videotaped Deposition:

February 15, 2018

Attorneys: For Petitioner: Barnes & Thornburg LLP
For Defendant: Mischcon De Reya New York, LLP
Status: Case closed

3/2017 – 6/2019 **Client: Fish & Richardson (representing Apple, Inc.) / Gibson, Dunn & Crutcher LLP (representing Compal Electronics, et. al.)**

Case: Apple Inc. v. Qualcomm Inc.

Qualcomm Inc. v. Compal Electronics, Inc., et. al.

Civil Action No. 3:17-cv-00108 / Civil Action No. 3:17-cv-01010

Location: UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF CALIFORNIA – Hon. Gonzalo P. Curiel, Magistrate Judge: Hon. Mitchell D. Dembin

Testifying expert regarding LTE technology.

Expert Declaration:

December 11, 2017: Declaration regarding Claim Construction.

Expert Report:

June 29, 2018: Opening Expert Report regarding invalidity

August 3, 2018: Expert Report on infringement

October 2, 2018: Rebuttal Expert Report on Invalidity

Videotaped Deposition:

October 25, 2018

None

Attorneys: For Apple: Fish & Richardson
For Qualcomm: Quinn Emanuel Urquhart & Sullivan LLP / Cravath, Swaine & Moore LLP
For Compal Electronics, Inc., et. al: Gibson, Dunn & Crutcher LLP
Status: Case settled.

3/2017 – 1/2018 **Client: Kramer Levin Naftalis & Frankel, LLP (representing Finjan, Inc.)**

Case: Finjan, Inc. v. Blue Coat Systems, LLC

Civil Action No. 15-cv-03295-BLF-SVK

Location: UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF

CALIFORNIA SAN JOSE DIVISION – Hon. Beth L. Freeman

As a testifying expert, provided an opening technology tutorial at trial in this patent case involving internet security technology.

Expert Declaration:

March 29, 2017 Tutorial expert report on security technology.

Videotaped Deposition:

May 2, 2017

October 31 – November 2, 2017: Jury Trial Testimony

January 8-10, 2018: Jury Trial Testimony (retrial after mistrial):

Live Testimony on Network Security Technology Tutorial

Attorneys: For Plaintiff: Kramer Levin, Naftalis, & Frankel LLP

For Defendant: Morrison & Forrester & Quinn Emmanuel

Status: Jury award

1/2017 – 7/2017 **Client: Foster Pepper LLP (representing Dali Wireless)**

Case: Dali Wireless, Inc. (Petitioner) v. CommScope Technologies, LLC (Patent Owner)

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD

Testifying expert in this patent case involving RF transport networks.

Expert Reports:

4-26-17 Declaration ISO petition for IPR

6-30-17 Declaration ISO Opening claim construction brief

Videotaped Deposition:

July 24, 2017

Status: Case closed

1/2017 – 6/2019 **Client: Dorsey & Whitney LLP (representing Dali Wireless)**

Case: CommScope Technologies, LLC (Plaintiff/Counterclaim Defendant) v. Dali Wireless, Inc. (Defendant/Counterclaim Plaintiff)

Civil Action No.: 3:16-cv-477

Location: UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF

TEXAS DALLAS DIVISION

– Hon. Barbara M. G. Lynn

Testifying expert in this patent case involving RF transport networks.

Expert Reports:

8-24-18 Expert Report regarding Invalidity of CommScope patents

8-24-18 Expert Report regarding Infringement of Dali Wireless patents

11-5-18 Expert Report regarding Validity of Dali Wireless patents

11-5-18 Expert Report regarding Non-Infringement of CommScope patents

1-9-19 Declaration ISO opposition to MSJ

1-18-19 Declaration ISO partial MSJ on Non-infringement and Invalidity

5-2-19 Declaration ISO Motion for Sanctions

Videotaped Deposition:

November 20, 2018

Live Testimony at Jury Trial:

June 10-13, 2019

Attorneys: For Plaintiff: Dorsey & Whitney, LLC

For Defendant: Carlson Caspers, P.A.

Status: Jury award.

11/2016 – 4/2019 **Client: Boies, Schiller & Flexner LLP (representing Apple Inc.)**

Case: Evolved Wireless, LLC v. Apple, Inc.

Civil Action No.: 1:15-cv-00542-SLR

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

– Hon. Sue L. Robinson

Testifying expert in this patent case involving LTE wireless networks.

Expert Reports:

11-06-17 Declaration ISO Summary Judgment of Validity

10-05-17 Declaration ISO Summary Judgment of Non-Infringement

10-03-17 Supplemental Expert Report on Non-Infringement

07-24-17 Supplemental Expert Report on Secondary Considerations of Non-Obviousness

6-26-17 Expert Report on Non-Infringement

5-22-17 Expert Report on Invalidity

Videotaped Deposition:

August 11, 2017

Live Testimony at Jury Trial:

March 29 - April 1, 2019

Attorneys: For Plaintiff: Boies, Schiller & Flexner LLP

For Defendant: Robins Kaplan LLP

Status: Jury verdict of non-infringement.

7/2016 – 4/2018 **Client: Jackson Walker LLP (representing D&M Holdings, Inc., et. al.)**

Case: Sonos, Inc., v. D&M Holdings, d/b/a The D+M Group, D&M Holdings U.S. Inc., and Denon Electronics (USA), LLC

Civil Action No.: 16-0141-RGA

D&M Holdings Inc., d/b/a The D+M Group, D&M Holdings U.S. Inc. v. Sonos, Inc.

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE
– Hon. Richard G. Andrews

Testifying expert in this patent case involving wireless speaker networks.

Expert Testimony:

9-11-17 Expert Report on Infringement

6-29-22 Remote Videotaped Deposition

Attorneys: For Plaintiff: Jackson Walker LLP

For Defendant: Potter Anderson & Corroon LLP

Status: Case settled

7/2016 – 1/2018 **Client: Kramer Levin Naftalis & Frankel, LLP (representing Finjan, Inc.)**

Case: Palo Alto Networks, Inc. (Petitioner) v. Finjan, Inc. (Patent Owner)

Case IPR2015-02001, Case IPR2016-00157. US Patent No. 8,225,408 B2

Case IPR2015-01974

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE
PATENT TRIAL AND APPEAL BOARD

Testifying expert in this patent case involving wireless speaker networks.

Expert Declaration:

8-9-16 Expert Declaration, Patent 7,647,633

8-9-16 Expert Declaration, Patent 8,225,408

8-30-16 Supplemental Expert Declaration, 7,647,633

Status: Case settled

5/2016 – 7/2018 **Client: (Winston & Strawn LLP representing Atlantic Broadband Group, LLC, et. al.)**

Case: ChanBond LLC v. Atlantic Broadband Group, LLC, et. al.

Civil Action No: 15-842-RGA, 15-843-RGA, 15-844-RGA, , 15-845-RGA, , 15-846-RGA, , 15-847-RGA, , 15-848-RGA, , 15-849-RGA, , 15-850-RGA, , 15-851-RGA, , 15-852-RGA, , 15-853-RGA, , 15-854-RGA

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE
– Hon. Richard G. Andrews

Testifying expert regarding digital cable technology.

Expert Report:

10-24-17 Expert Report on Invalidity

Videotaped Deposition:

None

Attorneys: For Plaintiff: Bayard, P.A.

For Defendant: Winston & Strawn LLP

Status: Case settled

5/2016 – 11/2019 **Client: (Torys LLP representing Telus, Bell, and Rogers)**

Case: Wi-LAN Inc. v Telus Communications Company, Rogers Communications Canada Inc., and Bell Mobility Inc.

Court File No. T-301-16; Court File No. T-303-16; Court File No. T-304-16

Location: CANADIAN FEDERAL COURT – Hon. Mandy Aylen

Testifying expert regarding LTE technology.

Expert Report:

June 14, 2019 Expert Report regarding invalidity

Videotaped Deposition:

None

Attorneys: For Plaintiff: Torys LLP

For Defendant:

Status: Case settled

12/2015 – 4/2016 **Client: Kramer Levin Naftalis & Frankel, LLP (representing Acceleration Bay, LLC.)**

Case: Activision Blizzard, Inc., Electronic Arts Inc., Take-Two Interactive Software, Inc., 2K Sports, Inc., Rockstar Games, Inc., and Bungie, Inc., Petitioner v. Acceleration Bay, LLC, Patent Owner.

Case IPR2015-01951, Case IPR2015-01953, Case IPR2015-01964, Case IPR2015-01970, Case IPR2015-01996, Case IPR2016-00724, Case IPR2016-00747

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD

Testifying expert in this IPR patent case involving internet data broadcasting.

Expert Declaration:

January 4, 2017 Supplemental Declaration ISO Patent Owner's Response -- Case IPR2016-00724

January 4, 2017 Supplemental Declaration ISO Patent Owner's Response -- Case IPR2016-00747

December 7, 2016 Declaration ISO Patent Owner's Response – Case IPR2016-00724; Secondary Considerations of Non-Obviousness

December 7, 2016 Declaration ISO Patent Owner's Response – Case IPR2016-00747; Secondary Considerations of Non-Obviousness

July 17, 2016 Declaration ISO Patent Owner's Response – Patent 6,714,966; Secondary Considerations of Non-Obviousness

July 17, 2016 Declaration ISO Patent Owner's Response – Patent 6,829,634; Secondary Considerations of Non-Obviousness

July 17, 2016 Declaration ISO Patent Owner's Response – Patent 6,701,344; Secondary Considerations of Non-Obviousness

Videotaped Deposition:

February 7, 2017 and February 8, 2017

Attorneys: For Plaintiff: Kramer Levin, Naftalis, & Frankel LLP
For Defendant: Winston & Strawn
Status: Cased closed

4/2016 – Present **Client: Kramer Levin Naftalis & Frankel, LLP (representing Acceleration Bay, LLC.)**

Case: Acceleration Bay, LLC v Activision Blizzard, Inc., Electronic Arts Inc., Take-Two Interactive Software, Inc.

Civil Action No.: 14-453 (RGA), 16-454 (RGA), 16-455 (RGA)

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE
– Hon. Richard G. Andrews

Testifying expert in this patent case involving internet data broadcasting.

Expert Declaration:

September 24, 2017: Expert Report Regarding Technology Benefits of the Asserted Patents

Videotaped Deposition: January 4, 2018

July 17, 2018: Reply Report Regarding Technology Benefits of the Asserted Patents

April 29 – May 3, 2024 Live Tutorial Testimony at Trial about benefits of Asserted Patents

Attorneys: For Plaintiff: Kramer Levin, Naftalis, & Frankel LLP
For Defendant: DLA Piper

Status: Jury Award

12/2015 – 9/2016 **Client: Kramer Levin Naftalis & Frankel, LLP (representing Finjan, Inc.)**

Case: Finjan, Inc. v. Sophos, Inc.

Civil Action No. 3:14-cv-01197-WHO

Location: UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA SAN FRANCISCO DIVISION – Hon. William H. Orrick

As a testifying expert, provided a technology tutorial in this patent case involving internet security technology.

Expert Declaration:

December 21, 2015 Tutorial expert report on network security technology.

Videotaped Deposition:

February 22, 2016

September 5 – 9, 2016 Jury Trial:

Live Testimony at Jury Trial regarding tutorial on network security

Attorneys: For Plaintiff: Kramer Levin, Naftalis, & Frankel LLP

For Defendant: DLA Piper

Status: Jury Trial

9/2015 – 2/2016 **Client: Brinks Gilson & Lione (representing LifeWatch Services, Inc., and Card Guard Scientific Survival, Ltd.)**

Case: Card Guard Scientific Survival Ltd.

Reexam Control No. 12/706,541

Location: UNITED STATES PATENT AND TRADEMARK OFFICE

Provided testimony in this Patent Office re-examination appeal.

Expert Declaration:

November 13, 2015 Declaration under 37 C.F.R §1.132.

February 13, 2016 Declaration ISO petition for IPR.

Attorneys: For Plaintiff: Brinks Gilson & Lione

Status: Re-examination appeal decision invalidated the patent.

9/2015 – 1/2017 **Client: Kramer Levin Naftalis & Frankel, LLP (representing Finjan, Inc.)**

Case: Finjan, Inc. v. Proofpoint, Inc. and Armorize Technologies, Inc.

Civil Action No. 13:cv-03999-BLF

Location: UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA SAN JOSE DIVISION – Hon. Howard R. Lloyd, Hon. Haywood S. Gilliam, Jr.

As a testifying expert, provided an opening technology tutorial report in this patent case involving internet security technology.

Expert Declaration:

October 7, 2015 Tutorial expert report on network security technology.

Videotaped Deposition:

November 6, 2015

Attorneys: For Plaintiff: Kramer Levin, Naftalis, & Frankel LLP
For Defendant: Quinn Emanuel
Status: Case settled

8/2015 – 12/2015 **Client: Brinks Gilson LLP (representing ZTE Corporation and ZTE (USA), Inc.)**

Case: Inter-System Handover of a Mobile Terminal Operable with a First and a Second Radio Access Network
ZTE v. Vringo Infrastructure, Inc.

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD

Testifying expert in this IPR proceeding involving 3GPP cellular technology.

Expert Declarations:

08-28-15 Declaration ISO Petition for Inter Partes Review of U. S. Patent No. 7,126,940

09-04-15 Declaration ISO Petition for Inter Partes Review of U. S. Patent No. 7,242,943

09-04-15 Declaration ISO Petition for Inter Partes Review of U. S. Patent No. 7,558,283

09-04-15 Declaration ISO Petition for Inter Partes Review of U. S. Patent No. 8,812,000

09-04-15 Declaration ISO Petition for Inter Partes Review of U. S. Patent No. 7,724,720

10-12-15 Declaration ISO Petition for Inter Partes Review of U. S. Patent No. 7,242,933

Videotaped Deposition:

None

Attorneys: For Plaintiff:
For Defendant: Brinks Gilson, LLP
Status: Case settled.

11/2014 – 3/2024 **Client: Fish & Richardson (representing Regents of the University of Minnesota)**

Case: Regents of the University of Minnesota v. AT&T Mobility, LLC, Sprint Solutions, Inc., T-Mobile USA, Inc., Cellco Partnership d/b/a Verizon Wireless
Civil Action No. 14-cv-4666

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF MINNESOTA
– Hon. Tony N. Leung

Testifying expert on 3GPP error correction coding, precoding, and modulation.

February 10, 2023 Expert Report regarding Objective Indicia relating to Validity

May 12, 2023: Expert Deposition

April 14, 2023: Rebuttal Expert Report regarding Validity

September 25, 2024 Supplemental Rebuttal Expert Report regarding Validity

October 2, 2024 Expert Deposition

Attorneys: For Plaintiff: Fish & Richardson
For Defendant:

Status: Case settled

10/2014 – 2/2015 **Client: Alston & Bird (representing Microsoft Corporation)**

Case: Microsoft Corporation. v. IPR Licensing, Inc.

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD

Testifying expert in this IPR proceeding involving cellular technology.

Expert Declarations:

October 16, 2014 Supplemental Declaration ISO Petition for Inter Partes Review of U. S. Patent No. 8,380,244

September 25, 2024 Supplemental Rebuttal Expert Report regarding Validity

Attorneys: For Plaintiff: Fish & Richardson LLP
For Defendant:

Status: Case settled

9/2014 – 4/2015 **Client: Reed & Scardino, LLP (representing Mobile Telecommunications**

Technologies, LLC)

Case: Mobile Telecommunications Technologies LLC v. Amazon.com, Inc.

Civil Action No. 2:13-CV-883-JRG-RSP

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS MARSHALL DIVISION – Hon. Roy S. Payne

Testifying expert in this patent case involving package delivery notification systems and reliable delivery of wireless messages.

Expert Reports:

4-06-15 Second Supplemental Expert Report on Infringement

2-10-15 Expert Report on Infringement

2-24-15 Supplemental Expert Report on Infringement

Videotaped Deposition:

2-25-15

Declaration:

3-20-15 Declaration ISO Response to Opposition Motion

Attorneys: For Plaintiff: Reed & Scardino LLP

For Defendant: Greenberg Traurig LLP

Status: Case settled

5/2014 – 7/2015 **Client: Kramer Levin Naftalis & Frankel, LLP (representing Finjan, Inc.)**

Case: Finjan, Inc. v. Blue Coat Systems, Inc.

Civil Action No. 3:13-cv-03999-BLF

Location: UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA SAN JOSE DIVISION – Hon. Beth L. Freeman

As a testifying expert, provided an opening technology tutorial at trial in this patent case involving internet security technology.

Expert Declaration:

January 12, 2015 Tutorial expert report on security technology.

Videotaped Deposition:

March 18, 2015

Live Jury Trial Testimony: July 20, 2015.

Live Bench Trial on Laches Testimony: September 8, 2015

Attorneys: For Plaintiff: Kramer Levin, Naftalis, & Frankel LLP

For Defendant: Wilson Sonsini

Status: Jury award.

4/2014 – 12/2014 **Client: Reed & Scardino, LLP (representing Mobile Telecommunications Technologies, LLC)**

Case: Mobile Telecommunications Technologies LLC v. United Parcel Service, Inc.

Civil Action No. 1:12-cv-03222-AT

Location: UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION – Hon. Amy Totenberg

Testifying expert in this patent case involving package delivery notification systems.

Expert Reports:

7-3-14 Opening Expert Report regarding Infringement

8-11-14 Rebuttal Expert Report regarding Infringement

Videotaped Depositions:

10-7-14

Declaration:

11-24-14 Declaration ISO Response to MSJ

Attorneys: For Plaintiff: Reed & Scardino LLP

For Defendant: Alston & Bird LLP

Status: Case settled.

12/2013 – 9/2015 **Client: Brinks Gilson & Lione LLP (representing ZTE Corp, and ZTE (USA), Inc.)**

Case: ZTE Corporation and ZTE (USA) Inc. v. InterDigital Technology Corporation

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD

Testifying expert in this IPR proceeding involving cellular technology.

Expert Declarations:

3-21-14 Declaration in support of the Petition for Inter Partes Review of U. S. Patent No. 8,380,244

Attorneys: For Plaintiff: Brinks Gilson & Lione
For Defendant: Latham & Watkins, LLP

Status: IPR Hearing before PTAB: All disputed claims are unpatentable.

12/2013 – 4/2014 **Client: Kramer Levin Naftalis & Frankel LLP (representing Sirius XM Radio Inc.)**

Case: Catch a Wave Technologies, Inc. v. Sirius XM Radio Inc.
Case No. 3:12-cv-05791-WHA

Location: UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA SAN FRANCISCO DIVISION – Hon. William Alsup

Testifying expert in this patent case involving satellite radio systems.

Expert Reports:

2-14-2014 Expert Report regarding non-infringement

Attorneys: For Plaintiff: Freitas Tseng & Kaufman LLP
For Defendant: Kramer Levin LLP

Status: Case settled

2/2013 – 7/2016 **Client: Reed & Scardino, LLP (representing Mobile Telecommunications Technologies, LLC)**

Case: Mobile Telecommunications Technologies LLC v. BlackBerry Corporation.
Civil Action No. 3:12-cv-1652-M

Location: UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF TEXAS DALLAS DIVISION – Hon. Barbara M. G. Lynn

Testifying expert in this patent case involving package delivery notification systems.

Expert Reports:

9-3-15 Expert Report on Infringement

Videotaped Depositions:

November 18, 2015

Live Testimony at Jury Trial: July 13, 2016.

Attorneys: For Plaintiff: Baker Botts, LLP
For Defendant: Reed & Scardino LLP
Status: Jury verdict of non-infringement.

9/2013 – 1/2014 **Client: Reed & Scardino, LLP (representing Mobile Telecommunications Technologies, LLC)**

Case: Mobile Telecommunications Technologies, LLC v Clearwire Corporation
Civil Action No. 2:12-CV-308

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS MARSHALL DIVISION – Hon. Roy S. Payne

Testifying expert in this patent case involving wireless networking signals.

Expert Reports:

11-11-13 Rebuttal report regarding validity

Videotaped Depositions:

12-5-13

Declarations:

1-23-14 Declaration before the Patent Trial and Appeal Board in Case IPR2013-00306

Attorneys: For Plaintiff: Reed & Scardino LLP
For Defendant: Shook, Hardy & Bacon, LLP
Status: Case settled

10/2013 – 5/2015 **Client: Foley & Lardner, LLP (representing Motorola Mobility, LLC)**

Case: University of Florida Research Foundation Inc., and Rapid Mobile Technologies, Inc. v Motorola Mobility, LLC.

Case No. 13-cv-61120-KMM-EGT

Location: UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF FLORIDA FORT LAUDERDALE DIVISION – Hon. K. Michael Moore,
Magistrate Judge: Hon. Edwin G. Torres

Testifying expert in this patent case involving mobile device testing systems.

Expert Reports:

None.

Declarations:

11-21-13 Declaration ISO Motorola's Responsive Claim Construction Brief

Attorneys: For Plaintiff: Meltzer & Meksraitis

For Defendant: Foley & Lardner LLP

Status: Case settled

7/2013 – 6/2015 **Client: WilmerHale (representing Broadcom)**

Case: Inter Partes Review of US Patent 6,424,625; 6,772,215; and 6,466,568 owned by Ericsson

Docket No. 0111168-0240

Location: UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD

Testifying expert in this Inter Partes Review regarding ARQ mechanisms.

Expert Declarations:

9-19-13 Declaration regarding US Patent 6,772,215

9-19-13 Declaration regarding US Patent 6,466,568

9-29-13 Declaration regarding US Patent 6,424,625

Videotaped Deposition:

5-29-14, and 5-30-14

Attorneys: For Plaintiff: Meltzer & Mathis

For Defendant: Wilmer Cutler Pickering Hale and Dorr LLP

Status: IPR Petition granted. All claims invalidated

4/2013 – 4/2015 **Client: Kilpatrick Townsend & Stockton LLP (representing Google Inc. and Motorola Mobility LLC)**

Case: Fujifilm Corporation v. Motorola Mobility LLC

Case No. 3:12-cv-03587 WHO

Location: UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA SAN FRANCISCO DIVISION – Hon. Richard Seeborg

Testifying expert in this patent case involving smartphone technology and video codecs.

Expert Declarations:

4-23-14 Declaration ISO Motion for Protective Order

12-9-14 Declaration ISO MSJ

Expert Reports:

10-3-14 Opening Expert Report Regarding Invalidity

10-31-14 Rebuttal Expert Report on non-infringement

10-31-14 Appendix A to Rebuttal Report of Dr. Alan Bovik

Videotaped Deposition:

11-19-14, and 11-20-14

Trial Testimony:

April 28, 2015 Non-infringement and invalidity of '970 Patent

Attorneys: For Plaintiff: Morgan, Lewis & Bockius LLP

For Defendant: Kilpatrick Townsend & Stockton LLP

Status: Jury verdict: '970 Patent claims not infringed and invalid.

2/2013 – 10/2013 **Client: Seyfarth Shaw LLP (representing Motorola Mobility LLC)**

Case: University of Florida Research Foundation, Inc. and Rapid Mobile Technologies, Inc. v. Motorola Mobility LLC

Civil Action No. 13-cv-61120-KMM-EGT

Location: UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF FLORIDA – Hon. K. Michael Moore, Magistrate Judge: Hon. Edwin G. Torres

Testifying expert in this employment law case involving mobile device testing systems.

Expert Reports:

3-1-13 Expert Report regarding Non-Infringement

4-1-13 Declaration in Opposition to Plaintiff's MSJ

Attorneys: For Plaintiff: Meltzer & Mathis

For Defendant: Seyfarth Shaw LLP

Status: Case settled

5/2012 – 4/2013 **Client: Paul Hastings LLP (representing Apple, Inc.)**

Case: SmartPhone Technologies, LLC v Research in Motion Corporation, et. al.

Case No. 6:10-cv-00074

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS TYLER DIVISION – Hon. John D. Love

Testifying expert in this patent case involving 3GPP technology.

Expert Reports:

12-31-12 Appendix A to Rebuttal Expert Report of Dr. David Wilson

3-13-13 Appendix A to Supplemental Expert Report of Dr. David Wilson

Attorneys: For Plaintiff: Mintz Levin Cohn Ferris Glovsky and Popeo PC

For Defendant: Paul Hastings LLP

Status: Case settled

8/2012 – 9/2013 **Client: Reed & Scardino, LLP (representing EON Corp. IP Holdings, LLC)**

Case: EON Corp. IP Holdings, LLC v. SKYGUARD, LLC et. al.

Case No. 6:11-cv-00015-LED

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS TYLER DIVISION – Hon. John D. Love

Testifying expert in this patent case involving RF technology for WiFi networking.

Expert Reports:

2-15-13 Expert Report regarding Infringement

Videotaped Deposition:

4-09-13

Attorneys: For Plaintiff: Reed & Scardino, LLP

For Defendant: K&L GATES LLP

Status: Case settled

Client: Reed & Scardino LLP (representing Eon Corp. IP Holdings)

5/2012 – 6/2014

Case: Eon Corp. IP Holdings, LLC v. Landis+Gyr, Inc., et. al.

Case No. 6:09-cv-00317-LED-JDL

Location: UNITED STATES DISTRICT COURT EASTERN DISTRICT OF TEXAS
TYLER DIVISION – Hon. John D. Love

Testifying expert in this patent case involving two-way wireless networks, before Judge Love.

Expert Report:

7-8-13 Expert Report regarding Infringement by Silver Spring Networks, Inc.

7-8-13 Expert Report regarding Infringement by Itron, Inc.

Videotaped Deposition: September 12, 2013

Live Testimony at Jury Trial: June 2, 2014 – June 6-2014

Attorneys: For Plaintiff: Reed & Scardino LLP

For Defendant: Dentons, LLP

Status: Jury award. All patents found valid and infringed.

3/2012 – 3/2014 **Client: Perkins Coie (representing Intel Corporation)**

Case: Stragent LLC, et. al. v. Intel Corp.,

Case No. 6:11-cv-421-LED (E.D. Tex.)

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF
TEXAS TYLER DIVISION – Hon. Timothy Dyk, Hon. John D. Love

Testifying expert in this patent case involving the use of error detection
technology in computer networking, before Judge Dyk.

Expert Reports:

08-23-13 Expert Report regarding Invalidity

09-23-13 Expert Report regarding Non-Infringement

Videotaped Deposition:

10-08-13, and 10-09-13

Jury trial testimony:

3-13-2014 Live trial testimony on non-infringement and invalidity before Judge
Timothy Dyk

Attorneys: For Plaintiff: Nelson, Bumgardner & Casto

For Defendant: Perkins Coie

Status: Jury verdict for non-infringement and invalidity

2/2012 – 09/2015 **Client: Dewey & LeBoeuf LLP (representing Harris Corporation)**

Case: Harris Corporation v. Ruckus Wireless, Inc.

Case No. 6:11-cv-00618-CEM-CRS

Location: UNITED STATES DISTRICT COURT FOR THE MIDDLE DISTRICT OF
FLORIDA ORLANDO DIVISION – Hon. Charlene Edwards Honeywell

Testifying expert in this patent case involving RF technology for WiFi
networking.

Expert Reports:

3-5-12 Expert Report regarding Infringement

3-6-12 Supplemental Expert Report regarding Infringement

4-6-12 Expert Report regarding Validity

Declarations:

5-30-12 Declaration ISO Claim Construction

6-18-12 Declaration ISO Markman Motion

1-23-15 Declaration ISO Responsive Markman Brief

3-6-15 Supplemental Expert Report regarding Infringement

4-3-15 Rebuttal Expert Report regarding Validity

Videotaped Deposition:

4-30-12

Attorneys: For Plaintiff: Dewey & LeBeouf LLP

For Defendant: Lewis and Roca LLP

Status: Case settled

2/2012 – 2/2013 **Client: Common-Interest-Group (representing Nokia, Huawei, ZTE)**

Case: InterDigital Communications LLC, et. al. v. Huawei Tech Co., LTD., et. al.
Certain Wireless Devices With 3G Capabilities and Components Thereof
U.S. Int'l Trade Commission Inv. No. 337-TA-800

Location: UNITED STATES INTERNATIONAL TRADE COMMISSION –

Administrative Law Judge Hon. David P. Shaw and Administrative Law Judge
Hon. Theodore R. Essex

Testifying expert in this patent case involving 3G wireless, WiFi, and WCDMA
technology.

Expert Reports:

11-30-12 Expert Report regarding Non-infringement

7-31-12 Expert Report regarding Invalidity

11-19-10 Rebuttal Expert Report regarding Validity

12-6-10 Supplemental Expert Report regarding Infringement

Videotaped Deposition:

12-14-12, 12-15-12

ITC Trial testimony:

2-6 through 2-15/13 Non-infringement and Invalidity witness statements, live
testimony

Attorneys: For Plaintiff: Latham & Watkins, LLP

For Defendant: Alston & Bird, Covington & Burling, Brinks Hofer

Status: ITC hearing verdict: All patents not infringed and invalid

9/2010 – 4/2011 **Client: Reed & Scardino LLP (representing Eon Corp. IP Holdings)**

Case: Eon Corp. IP Holdings, LLC v. Sensus USA, Inc., et. al.

Case No. 6:09-cv-00116-LED-JDL

Location: UNITED STATES DISTRICT COURT EASTERN DISTRICT OF TEXAS
TYLER DIVISION – Hon. John D. Love

Testifying expert in this patent case involving two-way wireless networks

Expert Report:

10-22-10 Expert Report regarding Infringement (Sensus USA, Inc)

11-7-10 Expert Report regarding Infringement (Bell Industries)

11-19-10 Rebuttal Expert Report regarding Validity

12-6-10 Supplemental Expert Report regarding Infringement

Declaration:

12-28-10, 1-18-11

Videotaped Deposition:

12-8-10, 2-3-11

Attorneys: For Plaintiff: Reed & Scardino LLP

For Defendant: Jones Day

Status: Case settled

10/2009 – 2/2010 **Client: White & Case LLP (representing Marvell)**

Case: Marvell Semiconductor, Inc., et. al. v. Commonwealth Scientific Industrial Research Organisation

Case No. 6:07-CV-204 (LED)

Location: UNITED STATES DISTRICT COURT EASTERN DISTRICT OF TEXAS TYLER DIVISION – Hon. Leonard Davis

Testifying expert in this patent case involving wireless LAN protocols.

Expert Report:

11-24-09 Rebuttal Expert Report

Videotaped Deposition:

01-07-10

Attorneys: For Plaintiff: White & Case LLP

For Defendant: Townsend and Townsend and Crew LLP

Status: Case settled

9/2009 – 2/2010 **Client: Perkins Coie Brown & Bain PA (representing Intel)**

Case: Saxon Innovations, LLC v. Apple, Inc., et. al.

Case No. 6:08-cv-00265-LED

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS TYLER DIVISION – Hon. John D. Love

Testifying expert in this patent case involving wireless technology.

Declarations:

12-04-09 Declaration Regarding Claim Construction

Videotaped Deposition:

01-19-10

Attorneys: For Plaintiff: Susman Godfrey LLP

For Defendant: Perkins Coie Brown & Bain LLP

Status: Case settled

8/2008 – 10/2009 **Client: Reed & Scardino LLP (representing Eon Corp. IP Holdings)**

Case: Eon Corp. IP Holdings, LLC v. Verizon Clinton Center Drive Corp., et. al.

Case No. 6:08-cv-00385

Location: UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS TYLER DIVISION – Hon. John D. Love

Testifying expert in this patent case involving two-way wireless networks

Expert Report:

06-22-10 Expert Report

08-16-10 Supplemental Expert Report

Videotaped Depositions:

08-18-10, 08-26-10

Attorneys: For Plaintiff: Reed & Scardino LLP

For Defendant: Simpson Thacher & Bartlett LLP

Status: Case settled

4/2008 – 3/2009 **Client: McDermott, Will & Emery LLP (representing GE Licensing)**

Case: CIF Licensing, LLC d/b/a GE Licensing v. Agere Systems, Inc.

Case No. 07-170 (JJF)

Location: UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE – Hon. Joseph. J. Farnan, Jr.

Testifying expert in this patent case involving modem technology.

Expert Report:

09-05-08 Rebuttal Expert Report

Non-videotaped Depositions:

9-24-08, 9-26-08

Jury trial testimony:

2-04-09

Attorneys: For Plaintiff: McDermott, Will & Emery LLP

For Defendant: Townsend and Townsend and Crew LLP

Status: Jury award. 2 patents infringed and valid, remaining 2 patents non-infringed

2/2008 – 5/2010, **Client: Simpson Thacher & Bartlett LLP (representing Cisco Systems, Inc.)**
2/2011 – 4/2011

Case: Commil USA, LLC v. Cisco Systems, Inc., et. al.

Case No. 2:07-CV-341-DF-CE

Location: UNITED STATES DISTRICT COURT EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION – Hon. Charles Everingham IV

Testifying expert on invalidity regarding short range communication protocols.

Opening Expert Report

12-23-09

Videotaped Depositions:

02-09-10

Attorneys: For Plaintiff: Sayles Werbner

For Defendant: Simpson Thacher & Bartlett LLP

Status: Jury award for original trial and retrial: patents found valid and infringed.

6/2007 – 4/2009 **Client: Common Interest Group of Co-Defendants**

11/2010 – 4/2012 **Client: Common Interest Group of Co-Defendants**

Case: Commonwealth Scientific and Industrial Research Organisation v. Toshiba
America Information Systems, Inc., et. al.

Case No. 6:06-cv-00550-LED

Case No. 6:09-CV-0399 (LED)

Location: UNITED STATES DISTRICT COURT EASTERN DISTRICT OF TEXAS
TYLER DIVISION – Hon. Leonard Davis

Testifying expert in this patent case involving wireless LAN technology.

Declarations:

06-05-08 Regarding claim construction

12-17-08 Supporting opposition to summary judgment

04-05-09 Supporting motion for reconsideration

02-24-12 Supporting opposition to summary judgment

Expert Reports:

10-08-08 Rebuttal Expert Reports- Re: TI Chips, Re: Marvell Chips, Re: Airgo Chips, Re: Broadcom Chips, Re: Conexant Chips, Re: Ralink Chips, Re: Atheros Chips

01-27-12 Rebuttal Expert Reports- Re: TI Chips, Re: Broadcom Chips, Re: Ralink Chips, Re: Atheros Chips

Videotaped Depositions:

11-1-08, 11-2-08, 02-14-12

Attorneys: For Plaintiff: Townsend & Townsend LLP

For Defendant: Keker & Van Nest, LLP

Status: Jury trial: patents found valid and infringed.

10/2006 – 8/2009 **Client: Keker & Van Nest (representing Comcast Corporation)**

Case: Rembrandt Technologies, Inc. v. Comcast Corporation

Case No. 2-05-CV-000443 (TJW)

Location: UNITED STATES DISTRICT COURT EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION – Hon. T. John Ward

Testifying expert in this patent case involving physical layer and data link layer communication protocols for cable networks.

Declaration:

01-10-07 Support of Claim Construction Brief

Videotaped Deposition:

12-22-06 Regarding claim construction opinions

Attorneys: For Plaintiff: McKool Smith

For Defendant: Keker & Van Nest

Status: Case settled

3/2007 – 5/2007 **Client: Niro, Scavone, Haller and Niro (representing MLR, LLC)**

Case: MLR, LLC v. Kyocera Wireless Corporation and Novatel Wireless, Inc.

Case No. 05-CV-0935 B (AJB)

Location: UNITED STATES DISTRICT COURT SOUTHERN DISTRICT OF
CALIFORNIA

Testifying expert in this patent case involving cellular phone technology.

Expert Report:

04-20-07 Expert Report regarding infringement

Attorneys: For Plaintiff: Niro, Scavone, Haller, and Niro

For Defendant: Hogan & Hartson, LLP

Status: Case settled

6/2006 – 10/2006 **Client: Thompson & Knight (representing Ericsson, Inc.)**

Case: Fenner Investments, Ltd., v. Juniper Networks, Inc. et. al.
Case No. 2:05–CV–05 JDL

Location: UNITED STATES DISTRICT COURT EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

Testifying expert in this patent case involving wireless communications services.

Expert report regarding infringement and invalidity

5-23-06 Rebuttal expert report regarding infringement and invalidity

Attorneys: For Plaintiff: Fulbright & Jaworski

For Defendant Ericsson: Thompson & Knight

Status: Case settled

12/2003 – 5/2006 **Client: Howrey LLP/ Winston & Strawn LLP (representing McKesson Information Solutions, Inc.)**

Case: McKesson Information Solutions, Inc. vs. Bridge Medical, Inc.
Case No. CIV S-02-2669 FCD KJM

Location: UNITED STATES DISTRICT COURT EASTERN DISTRICT OF
CALIFORNIA – Hon. Peter A. Nowinski

Testifying expert in this patent case involving a patient on a patient identification
and verification system that incorporates wireless technology.

Inequitable Conduct Trial live testimony:
5-04-06

Markman Hearing live testimony:
6-29/30-05

Videotaped Depositions:

2-14-04, 6-3-05

Declarations:

12-1-03 Dec. in support of MISI's Opening/Opposition re Claim Construction

12-24-04 Dec. in support of MISI's Motion for Preliminary Injunction

3-1-04 Dec. in support of Claim Construction

6-29-04 Dec. re meaning of "Communication"

7/15/05 Dec. in support of MISI's Opposition to Bridge's Motion for Summary Judgment

Attorneys: For Defendant: Morrison & Foerster

For Plaintiff: Howrey Simon, Winston & Strawn, Morgan Lewis

Status: Bench trial on inequitable conduct: Verdict found inequitable conduct.

07/2003–02/2006 **Client: Heller Ehrman LLP (representing Texas Instruments, Inc.)**

Case: Texas Instruments, Inc. and Stanford University vs. GlobespanVirata, Inc.

Provided discovery of evidence used at trial, concerning the structure and operation of Globespan's ADSL products, and supported litigators in depositions of Globespan engineers.

Attorneys: For Plaintiff: Heller Ehrman

For Defendant: Covington & Burling, LLP

Status: Jury award.

Patents

<u>Patent Number</u>	<u>Date Issued</u>	<u>Title</u>
11,748,764	September 5, 2023	Light-based Data Entry for Personal Inventory and Product Support System
10,332,121	June 25, 2019	Light-based Data Entry for Personal Inventory and Product Support System
9,978,037	May 22, 2018	Personal inventory and product support system
8,995,996	March 31, 2015	Methods and apparatus for performance optimization of heterogeneous wireless system communities
8,935,580	January 13, 2015	Multimedia-aware quality-of-service and error correction provisioning
8,468,426	June 18, 2013	Multimedia-aware quality-of-service and error correction provisioning

8,189,538	May 29, 2012	Reconfiguration of a communication system
8,144,640	March 27, 2012	Location tracking in a wireless communication system using power levels of packets received by repeaters
8,064,380	November 22, 2011	Reconfiguration of a communication system
8,027,637	September 27, 2011	Single frequency wireless communication system
7,957,741	June 7, 2011	Token-based receiver diversity
7,876,704	January 25, 2011	Tunneling protocols for wireless communications
7,689,210	March 30, 2010	Plug-n-playable wireless communication system
7,672,274	March 2, 2010	Mobility support via routing
7,668,542	February 23, 2010	Token-based receiver diversity
7,515,557	Apr 7, 2009	Reconfiguration of a communication system
7,236,470	Jun 26, 2007	Tracking multiple interface connections by mobile stations
7,149,196	Dec 12, 2006	Location tracking in a wireless communication system using power levels of packets received by repeater
6,965,769	Nov 15, 2005	Testing Center
6,862,448	Mar 1, 2005	Token-based receiver diversity
6,788,658	Sep 7, 2004	Wireless communication system architecture having split MAC layer
6,760,318	Jul 6, 2004	Receiver diversity in a communication system
6,557,134	Apr 29, 2003	ARQ method for wireless communication
6,259,911	Jul 10, 2001	Network operations center hardware and software design

Education

<u>Year</u>	<u>College/University</u>	<u>Degree</u>
1993	Stanford University	PhD, Electrical Engineering Thesis: "Trellis Coding for Multi-Level, Partial-Response Continuous Phase Modulation with Precoding"
1988	Stanford University	MS, Electrical Engineering
1985	Rensselaer Polytechnic Institute	BS, Computer and Systems Engineering

Publications

- Goldhamer, M., Grandblaise, D., Bims, H., Feng, S., Piggin, P., Sydor, J., and Wu, X. “Coexistence between 802.16 Systems Operating in Shared Bands”, *Radio Resource Management in WiMAX*, John Wiley & Sons, 2009.
- Bims, Harry. “Surveying the Wireless LANDscape. Or Why Large Wi-Fi Networks Require Good Planning.” *Xchange*. [Online] Available <http://www.xchangemag.com/articles/391supsys1.html>, September 1, 2003.
- Bims, Harry. “Building Voice-Ready Wireless LANs” *Wireless Week*. [Online] Available <http://www.wirelessweek.com/article/CA319429.html?spacedesc=Departments>, September 1, 2003.
- Bims, Harry. “Enabling Voice over WLANs”. White Paper. [Online] Available. http://airflownetworks.com/solutions/pdf/vowlan_wp.pdf. September 2003.
- Bims, Harry. “Securing Enterprise WLANs”. White Paper. [Online] Available. http://web.archive.org/web/20040303212529/airflownetworks.com/solutions/pdf/securing_wlans_wp.pdf. August 2003.
- Bims, H. and Cioffi. J. “Trellis Coding for Full-Response CPM”, *Third Generation Wireless Information Networks*, Kluwer Academic Publishers, 1992.
- Bims, H. and Cioffi. J. “Trellis Coding for Full-Response CPM”, *WINLAB WORKSHOP*, East Brunswick, NJ. October 18-19, 1990.
- Bims, H. and Cioffi, J. “Trellis Coding for Partial-Response CPM”, *1991 International Symposium on Information Theory*, Budapest, Hungary. June 24-28, 1991.
- Bims, H. and Cioffi, J. “Trellis Coding with M-ary MSK Constraints”, *GLOBECOM '89*, Dallas TX. Nov. 1989.

Professional Associations and Achievements

- Jan 2009 – Present Vice-Chair and Board of Directors, Menlo Park Chamber of Commerce
- Nov 2007 – Sep 2010 Vice-Chair and Secretary, IEEE 802.16h License Exempt Group
- Feb 2002 – Jan 2011 Member, City of Menlo Park Planning Commission (2006 Chairperson, 2005 Vice-Chairperson)
- Feb 2012 – Present Senior Member, IEEE
- Jan 2000 – Dec 2000 Chair, IEEE Engineering Management Society – Silicon Valley Chapter
- Jun 1985 - Jun 1991 AT&T Bell Laboratories Cooperative Research Fellow