UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CHARTER COMMUNICATIONS, INC.,
Petitioner,

v.

IARNACH TECHNOLOGIES LTD.,
Patent Owner.

Case IPR: Unassigned
U.S. Patent No. 9,287,982

DECLARATION OF PAUL MIN

Charter Communications, Inc. - Exhibit 1005
Charter Communications, Inc. v. Iarnach Technologies, Ltd.

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I, Paul Min, resident at 53 Arundel Place, St. Louis, MO 63105, hereby declare as follows:

I have been retained by Petitioner to provide my opinions concerning the validity of Claims 1-11 of U.S. Pat. No. 9,287,982 ("the '982 Patent"). I am being compensated for my time by the hour in preparing this Declaration, but my compensation is not tied to the outcome of this matter. I have no other affiliations with the Petitioner.

I reserve the right to supplement this Declaration if further information becomes available or if I am asked to consider additional information. I further reserve the right to consider and comment on any expert opinions, statements, or testimony offered by the Patent Owner in this matter.

I. INTRODUCTION AND QUALIFICATIONS

1. I am an expert in the field of high-speed communication and computing, and the development of electronic devices and software systems and for the related applications. I am currently a Senior Professor in the Department of Electrical and Systems Engineering at Washington University in Saint Louis.

2. I received a B.S. degree in Electrical Engineering in 1982, an M.S. degree in Electrical Engineering in 1984, and a Ph.D. degree in Electrical Engineering in 1987 from the University of Michigan in Ann Arbor. I received several academic honors, including my B.S. degree with honors, a best graduate student award and a

best teaching assistant award during my M.S. study, and a best paper award from a major international conference for reporting results from my Ph.D. thesis.

3. After receiving my Ph.D., I worked at Bellcore in New Jersey from August 1987 until August 1990. At Bellcore, I was responsible for evolving the public switched telephone network (PSTN) into a multi-services voice and data network that incorporated packet switches, optical technologies, and wireless technologies. I received an Outstanding Achievement Award for my contributions to Bellcore in 1989.

4. In September 1990, I joined the faculty at Washington University in St. Louis as an Assistant Professor. Upon arriving at Washington University, I developed a communication and computer curricula in the School of Engineering and Applied Science. I regularly have taught undergraduate and graduate courses. In July 1996, I was promoted to an Associate Professor of Electrical Engineering with tenure. I am currently a Senior Professor of Electrical and Systems Engineering at Washington University. I have served as the Chair of the Graduate Curriculum (2000–2002) and the Chair of the Undergraduate Curriculum (2011–2014) for the Department of Electrical and Systems Engineering.

5. At Washington University, I have conducted research in communication, computing, and related electronic hardware and software. My research group has pioneered a new paradigm for computing and communication systems that can

alleviate the speed and performance mismatch in the electronic technology against the optical technology. I have received several grants from U.S. Federal Agencies, including the National Science Foundation (NSF), the Defense Advanced Research Project Agency (DARPA), and the Air Force Office of Scientific Research (AFOSR), and numerous contracts from companies and organizations around the world.

6. My research group has significantly contributed to development of future generations of wireless technology. I developed methods that enable coordinated transmission and reception of wireless signals among multiple base stations. Previously, radio signals from multiple base stations were considered as interference. Leveraging my research, a cluster of base stations can work together as a single resource enhancing the quality of radio signals across extremely noisy wireless channels.

7. I developed and implemented a number of semiconductor integrated circuit chips. These integrated circuit chips include switch fabrics, processors, high speed interfaces, protocol transposers, controllers, content search engines, look up table processors, and memory cells and arrays.

8. Specifically related to the technology matters in this litigation, I have been working in the optical technology since the time at Bellcore in the Synchronous Optical Network (SONET) technology, and later in fields of the Optical Transport

Network (OTN) and the wave division multiplexing (WDM). I have researched a variety of technologies for the packet switches and routers including packet scheduler, traffic shaper, traffic policing, buffer management, and interposer. In addition, I have researched and implemented various look-up table configurations for fast packet processing, which is particularly applicable to the broadcast technology including the cable television networks. Since mid-1990s, I have been also researching and developing various security technologies such as the deep packet inspection, content searching and matching, regular expression processing, etc.

9. As a faculty member at Washington University, I have taught a number of courses in electronics, communication, and computing at both the undergraduate and graduate levels. For example, I have taught Communication Theory (Washington University ESE 471), Transmission and Multiplexing (Washington University ESE 571), and Signaling and Control of Communication Networks (Washington University ESE 572).

10. I have directly supervised numerous graduate students, a number of whom received a doctoral degree under my guidance. A number of doctoral theses that I have supervised relate specifically to the aforementioned-communication and computing technologies related to this litigation. My students and I have published a number of peer-reviewed articles in these topics.

11. In addition to my responsibilities as a university faculty member, I have founded two companies. In May 1997, I founded MinMax Technologies, Inc., a fabless semiconductor company that developed switch fabric integrated circuit chips for the Internet. In March 1999, I founded Erlang Technology, Inc., a fabless semiconductor company that focused on the design and development of integrated circuit chips and software for the Internet. One of Erlang's products received a best product of the year award in 2004 from a major trade journal for the electronics industry.

12. Outside my own start-up companies, I have also served in various technology and business advisor roles for other companies and organizations around the world. I was the main technical author for one of two winning proposals to the Korean government for CDMA wireless service licenses (1996). I was responsible for designing a commercial scale IS-95 CDMA cellular network, which I understand to be one of the earliest such networks deployed in the world. I worked with numerous engineers and scientists around the world to implement this commercial-scale cellular network before IS-95 CDMA was widely accepted. This provided me with extensive insight into various components of commercial-scale communication technology used today. I have also been involved in a semiconductor company that specializes in semiconductor memories, such as flash EEPROMs, as a board member and as a technical advisor (2007–2011).

13. I am a named inventor on eleven U.S. patents. I have authored and co-authored numerous technical papers and memoranda, many of which have appeared in various peer-reviewed international journals and conferences. I have given more than 100 seminars and invited talks around the world. I have organized several international conferences and served as an international journal editor.

14. I am a member of, and have been actively involved in, a number of professional organizations. I have served as the Chair of the St. Louis Section of the IEEE, which has more than 3,000 members (2014), and a member of the Eta Kappa Nu Honor Society for electrical engineers. I have also been an Ambassador of the McDonnell International Scholars Academy (2007–2013).

15. I was a member of the Presidential Business Advisors Committee (to President George W. Bush) and was named 2002 Businessman of the Year by the Wall Street Journal for the State of Missouri, for my entrepreneurial efforts.

16. I have received multiple awards for my publications and contributions to technical communication systems. In 1988, I received the Best Paper Award at 18th ISATA Award of Technical Excellence in Florence, Italy. I was also a Rockwell Fellow at the University of Michigan in Ann Arbor in 1988 and 1989. I received a Research Initiation Award in 1993 from the Defense Advance Research Project Agency (DARPA). I received the Best Paper Award at MOBILITY 2011 in Barcelona, Spain. In my more than 30 years of experience with

telecommunications technology, I have acquired significant knowledge about telecommunications systems industry standards and standard setting organizations such as ANSI, IEEE, ITU, IETF, DOCSIS, and 3GPP.

17. Additional details of my education and work experience, awards and honors, and publications that may be relevant to the opinions I have formed are set forth in my curriculum vitae, which includes a list of cases in which I have testified as an expert at trial or by deposition, attached hereto as Exhibit 1.

18. Because of my background, training and experience, I consider myself an expert in the area of networking communications generally, implementations of DOCSIS systems on various underlying hardware platforms and passive optical networks (PONs).

II. UNDERSTANDING OF THE LAWS

19. My opinions are informed by my understanding of the governing law.

20. I understand that the patentability analysis is conducted on a claim-by-claim basis.

21. I understand that there are two types of U.S. patent claims: 1) independent claims and 2) dependent claims. I understand that dependent claims include the limitations stated in that dependent claim, as well as the limitations of the other claims from which they depend.

22. I understand that a claim is invalid if it is obvious. I understand that obviousness of a claim requires that the claim be obvious from the perspective of a person of ordinary skill in the relevant art ("POSA"), at the time the invention was made. In analyzing obviousness, I understand that it is important to understand the scope of the claims, the level of skill in the relevant art, the scope and content of the prior art, the differences between the prior art and the claims, and any secondary considerations.

23. I also understand that if a technique has been used to improve one device, and a POSA would recognize 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. For instance, I understand that the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement is obvious.

24. I understand that secondary (or objective) considerations are relevant to the determination of whether a claim is obvious. Such secondary (or objective) considerations can include evidence of commercial success caused by an invention, evidence of a long-felt need that was solved by an invention, evidence that others copied an invention, or evidence that an invention achieved a surprising result. I understand that such evidence must have a nexus or causal relationship to the elements of a claim, in order to be relevant to the obviousness or non-obviousness

of the claim. I am unaware of any such secondary considerations in relation to Claims 1-11 of the ’982 Patent.

25. I understand that the ’982 Patent claims priority to a provisional application that was filed on April 13, 2011. I take no position at this time on whether Claims 1-11 of the ’982 Patent are actually entitled to claim priority to this April 2011 application. For the purposes of this Declaration, I have analyzed obviousness from the perspective of a POSA prior to the date of that filing.

III. BASIS FOR MY OPINION

26. In forming my opinion, I have relied on the ’982 Patent claims and its disclosure (EX1001), the prosecution history of the ’982 patent (EX1002), the prior art and other documents discussed herein and in the Petition (1006-1008) as well as my own experience and expertise in this field.

27. For any documents cited in this Declaration that are written in a language other than English, I have reviewed both the drawings contained in the non-English document, the corresponding English-language translation cited herein, and the declaration of the translator.

IV. LEVEL OF ORDINARY SKILL

28. Prior to the filing date of the provisional application, I believe that a person having ordinary skill in this art (“POSA”) would have at least a bachelor’s degree in electrical engineering, computer science or comparable degree or 2-3

years industry experience designing and/or maintaining back-end networking equipment

29. In forming my opinion of the characteristics of a POSA, I considered the educational level of the individuals working in the field of passive optical networks and/or DOCSIS networks, the communications infrastructure in which networks are employed, as well as the type of problems encountered by those in those fields, and the prior art solutions to those problems, the rapidity of innovation, and the sophistication of the technology.

30. I have extensive hands-on experience in the development of servers and networking equipment including switches and routers and transmission equipment. Since early 1990s, I have been developing these equipments as prototypes and/or commercial grade products. I have developed various hardware and software that could be utilized in the broadcast network such as the cable television distribution network based on the DOCSIS standard. I have also worked on various optical-to-electrical conversion technologies that are used in the SONET, the passive optical network (PON), and the OTN. My experience in these technologies includes the development of software programs that support various functions required to operate these technologies.

31. Based upon that experience, I believe I can provide an expert opinion in the field of the ’982 Patent, including what one of ordinary skill in the art would have understood from the prior art in this field at that time.

V. OVERVIEW OF ’982 PATENT AND PROSECUTION

32. The ’982 Patent concerns cable systems. Cable systems employing optical fiber for a portion of their transmissions are generally referred to as hybrid fiber cable (HFC) networks. Use of passive optical networks for this purpose is well-known.

33. Originally, cable systems only distributed television and similar video programming to subscribers. With the advent of the internet, cable systems evolved to carry data and digital voice communications (VoIP) in both downstream and upstream directions. Typically, in these HFC cable networks, subscriber associated equipment, such as cable modems and optical network units (ONUs) or optical network terminals (ONTs), communicated with upstream equipment associated with the cable provider, such as Cable Modem Termination Systems (CMTSs) and optical line terminals (OLTs).

34. To effect communications between these subscribers-associated and cable provider-associated devices, communications standards have been developed. For example, cable network communications have long been accomplished using Data Over Cable Service Interface Specification (DOCSIS). To enable communications,

both the subscriber-associated and provider-associated equipment must necessarily be configured with compatible parameters.

35. The ’982 Patent describes a method of using a conventional passive ethernet optical network (PON) as part of the deployment of conventional services using the Data Over Cable Service Interface Specification (DOCSIS), a system commonly known as DOCSIS Provisioning over Ethernet (DPoE).

36. The ’982 Patent acknowledges that DPoE networks and systems were known. EX1001, 1:7-2:47. Cable systems employing DPoE included a back-office system that handled administrative functions, such as recording the identity of subscribers and the services to which they subscribed. These systems also employed a communication network transmitting and receiving packets of information via electrical signals in accordance with the DOCSIS specifications. Additionally, these networks employed fiber optic cables, together with devices at each end of that fiber to translate these electrical signals into optical signals and back again.

37. PONs and DOCSIS, however, use different protocols, control messages and addressing methods for sending a data packet from one location to another. To bridge this divide, a virtual cable modem is established upstream of the optical fiber to receive DOCSIS communications from the CMTS and translate those signals into optical transmissions Figure 1 of the ’982 Patent illustrates a “typical DPoE network,” which includes three components: (1) a “back-office management

system" [PURPLE] consisting of known DOCSIS technologies such as a Trivial File Transfer Protocol (TFTP); (2) a "DPoE system" [GREEN] including inter alia a software emulation of a traditional cable modem (CM) (i.e. a virtual cable modem or vCM), an OLT [BLUE]; and (3) an ONU [ORANGE] connected to customer premise equipment:

ADMIT-TED PRI-OR ART

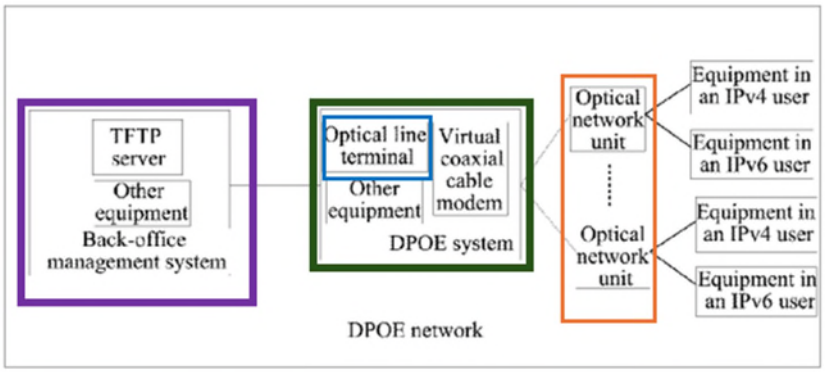


FIG. 1

Id., Fig. 1 (annotated).

38. When a subscriber associated ONU first connects to the DPoE network it must be registered, and both it and the OLT must be configured to provisions services appropriate to that subscriber. Figure 2 depicts the "typical" initialization process of an ONU component. First, an ONU powers on and registers with the DPoE system (step S201), and the DPoE system authenticates the ONU and completes registration (steps S202-S203) [GREEN]. *Id.*, 1:33-39). Next, the OLT and ONU are configured, beginning with issuance by a vCM of a request for configuration information from a back-office system. Specifically, the vCM issues

a request to a trivial file transfer protocol (TFTP) server for a configuration file, and then downloads the appropriate file (steps S204-S205) [PURPLE]. *Id.*, 1:43-47. The configuration file includes attributes and parameters about services to be provided to subscribers via the ONU. *Id.*, 1:40-53. The vCM and OLT process the file (step S206) [DARK GREEN], using it to configure the OLT/ONU, by among other things, translating the configuration information into messages understandable by the ONU and communicating those messages to the ONU via an Operations and Management (OAM) channel (step S207) [ORANGE]. *Id.*, 1:40-53).

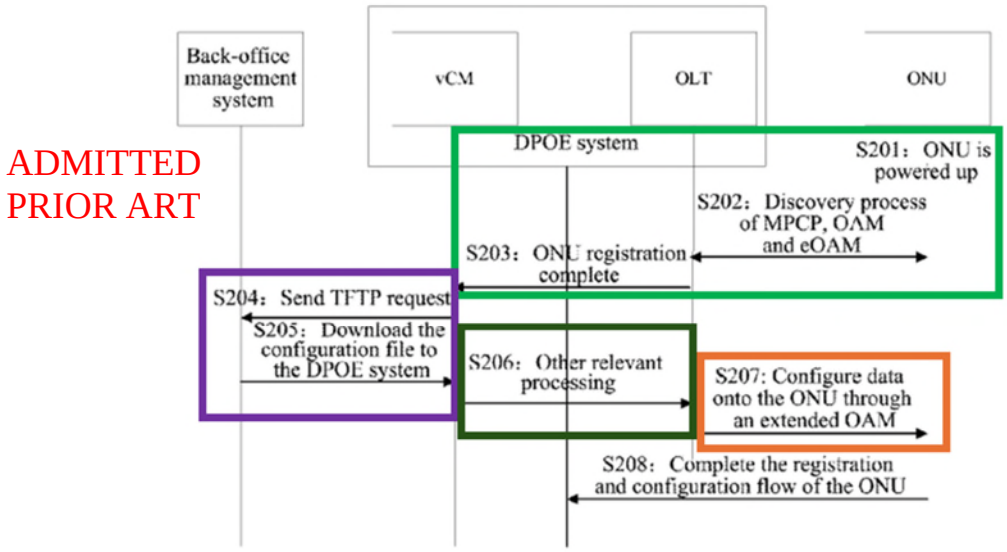


FIG. 2

Id., Fig. 2 (annotated).

39. In seeking to establish the novelty of its invention, the Applicant emphasized that the invention automatically configured the OLT at the same time as the corresponding ONU. *Id.*, 1:65-2:2. Applicant contended that previously, "generally speaking, the configuration on the OLT need [*sic*] to be performed by hand individually, or performed through a command line, or performed through a simple network management protocol (SNMP) interface between and Element Management System (EMS and the OLT)." *Id.*, 1:57-64.

40. In Figures 3 and 4, Applicants depicted its method for purportedly "auto-configurating" ONUs and OLTs. Applicants' "auto-configuration" method, however, merely duplicates the prior art, where the DPoE system authenticates the ONU (steps S401-S403) [LIGHT GREEN], a vCM requests and downloads a configuration file from a back-office management system (steps S406-S407) [PURPLE] and the vCM processes the file (step S408) [DARK GREEN], using information from the file to configure the ONU through a management channel ("extended OAM") [ORANGE].

41. Applicant's DPoE system purportedly expands the prior art process through inclusion in the configuration file of information used to also configure aspects of the OLT's operation (Step 409 shown in BLUE) (noting if file contains "a configuration message for the OLT" then "configuration message is enabled to

be effective in the OLT locally"). This so-called "expanded" process is shown in Figs. 3 and 4:

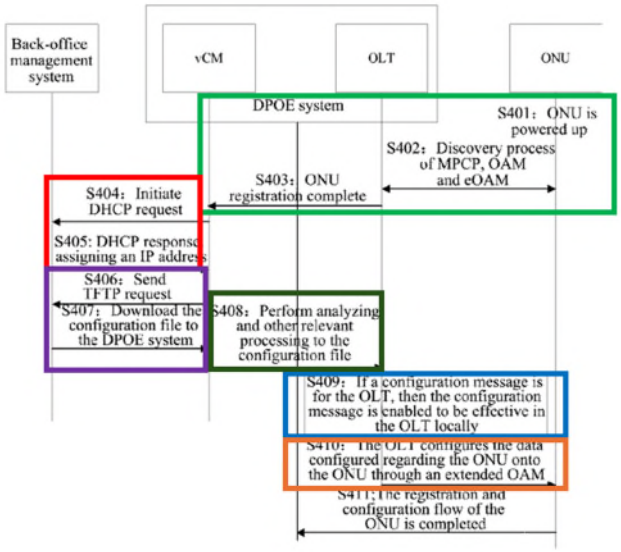


FIG. 4

Id., Fig. 4 (annotated).

42. Fig. 4 also shows an unclaimed process by which the DPoE system requests an IP address for the ONU (shown in RED). *Id.*

43. During prosecution, the examiner rejected the claims as anticipated by CN 101997725 A to Wang ("Wang"). EX1002, CHARTER_198-203 and CHARTER_214-227. The examiner determined Wang disclosed an autoconfiguration method for a DPoE system. EX1002, CHARTER_201-202 and CHARTER_214. Specifically, among other things, Wang disclosed the acquisition of a configuration file by a DPoE system from a back-office management system. *Id*., CHARTER_222. The configuration file comprised configuration information

of an ONU and an OLT. *Id*., CHARTER_222. Wang taught a DPoE system that analyzed the acquired configuration file to obtain configuration information of both the ONU and the OLT. *Id*., CHARTER_222-24. Wang's DPoE system thereafter configured the OLT locally, while configuring the ONU via an OAM management channel. *Id*., CHARTER_223. Wang's DPoE system also was found to convert the ONU configuration information into a message format that could be identified by the ONU, and which converted the configuration information of the OLT into a message format that could be identified by the OLT. *Id*. Wang taught performance of its method during ONU initialization. *Id*., CHARTER_221-22.

44. Applicant did not expressly dispute the examiner's rejections. Instead, Applicant amended each pending independent claim, *inter alia*, to include requirements of a rejected dependent claim that the OLT is configured, and "meanwhile" the ONU is configured. *Id*., CHARTER_273-276. While not recited in the claims, Applicant argued its amendment required both the OLT and ONU be configured "at the same time," a limitation Applicant argued was absent from Wang. *Id*., CHARTER_281.

45. Ignoring the Applicant's purported distinction, the examiner issued a further, final rejection based on U.S. Patent Application Publication No: 2008/0069564 Al ("Bernard"). *Id*., CHARTER_288-293; EX1003. The examiner noted Bernard, like Wang, taught auto-configuring a DPoE system. The examiner

declared Bernard disclosed the elements of Applicant's amended Claims 1-3. EX1002, CHARTER_290-91.

46. However, the examiner indicated he would allow Claim 4 if re-written in independent form. *Id*. Claim 4 merely recited the additional unremarkable conversion of the ONU/OLT configuration information contained in the configuration file into message formats that could be identified by those respective devices. *Id*., CHARTER_274.[1] In response, the Applicant incorporated the limitations of Claim 4 into an independent claim, and the patent issued with 11 claims. *Id.*, 312-318; EX1001, Claims 1-11.

VI. PRIOR ART

A. Bernstein

47. U.S. Patent No. 8,831,425 ("Bernstein") issued September 9, 2014, and is entitled "A Data Over Cable Service Interface Specifications (DOCSIS) Passive Optical Network (PON) system." EX1006, Abstract. Bernstein issued from an application filed January 9, 2008. Bernstein is prior art pursuant to the applicable version of 35 U.S.C. §102(e). Bernstein discloses PON networks, including Ethernet PON (EPON) networks. *Id*., 1:66-2:29.

[1] The examiner further allowed claims 6-13. *Id*.

48. Figure 3 of Bernstein depicts a system consisting of a back-office management MSO network 16 [PURPLE], a DOCSIS PON system [GREEN] with OLT [BLUE], communicating with one or more ONUs [ORANGE].

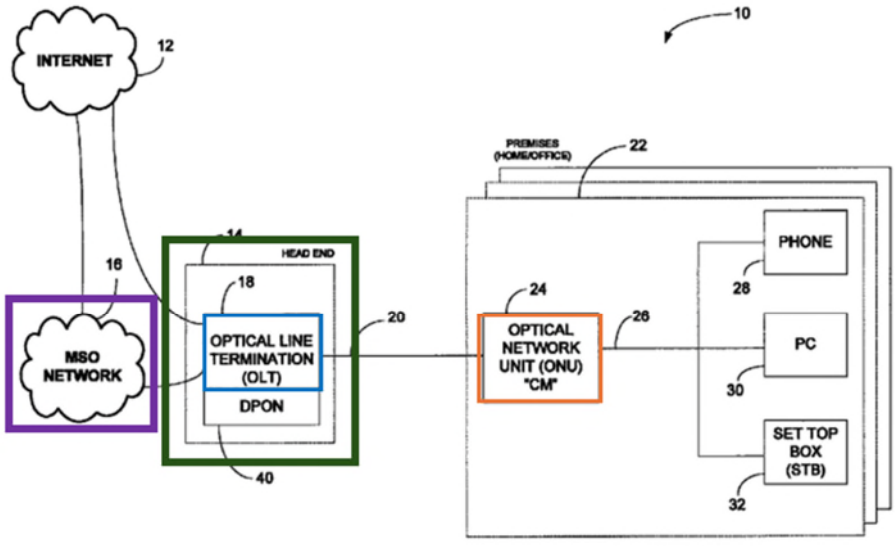


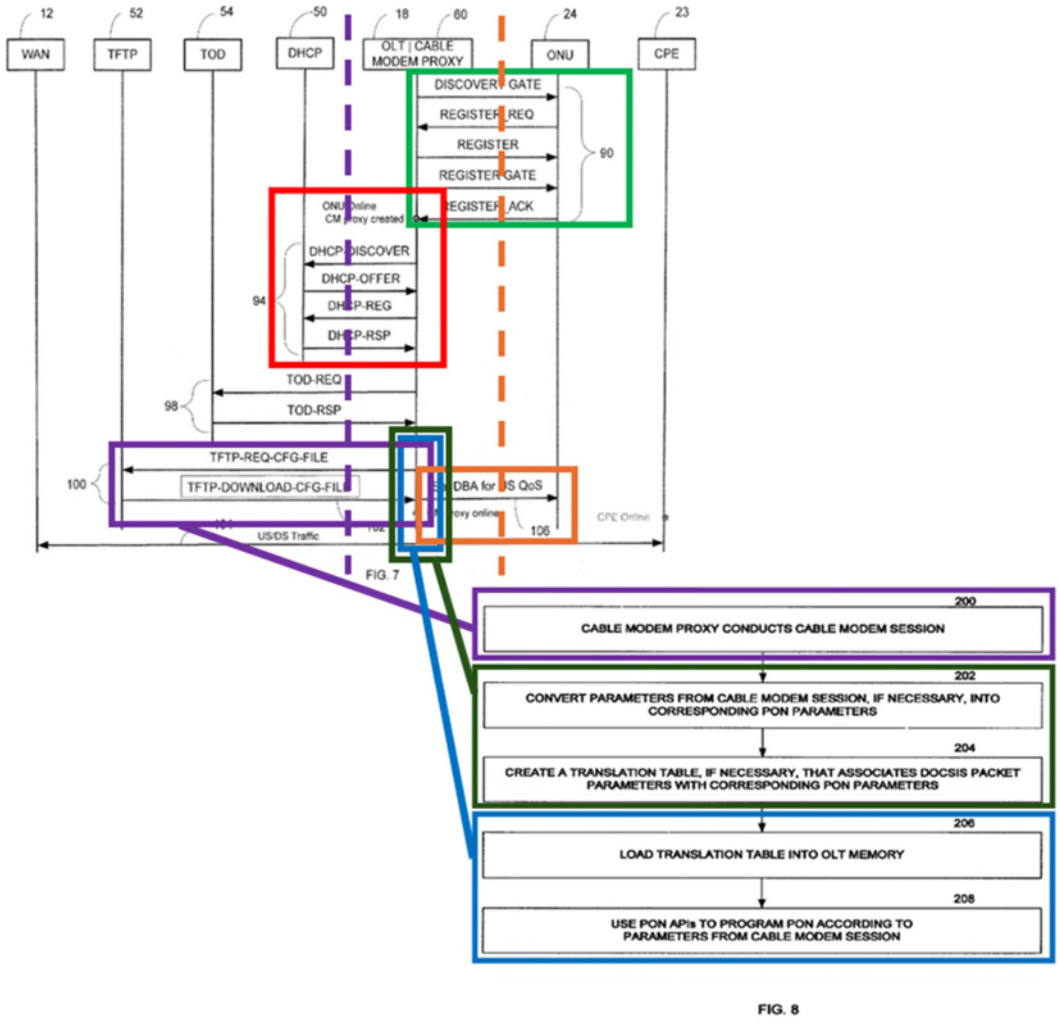
FIG. 1

Id., Fig. 1 (annotated).

49. Bernstein's system uses software as a cable modem proxy (*i.e.* virtual cable modem) to simulate the functionality of conventional DOCSIS CMTS and CM hardware components. *Id.*, 3:37-63). In the embodiment shown in FIG.3, this software is executed on the OLT. *Id*. The cable modem proxy may communicate with any of the back-office MSO servers to "effectively allow any of the services normally supported in a cable network to also be used in PON 10." *Id.*

50. Bernstein describes an initialization process that begins on ONU power-on and continues through the opening of DOCSIS services between an ONU and

OLT. A key aspect of the Bernstein DPoE system is its concurrent use of information from a single configuration file downloaded from a TFTP server to configure aspects of both the OLT's operation as well as that of the ONU. These aspects are illustrated in FIGS. 3, 7 and 8, which shows a method in which an ONU registers with a cable modem proxy [LIGHT GREEN], which in turn obtains an IP address for an ONU [RED], downloads a configuration from a back-office system [PURPLE], processes the single configuration file to extract configuration for the OLT and ONU [DARK GREEN], and uses the extracted configuration information to configure both the OLT [BLUE] and ONU [ORANGE] at the same time:



Id., Figs. 7 and 8 (annotated).

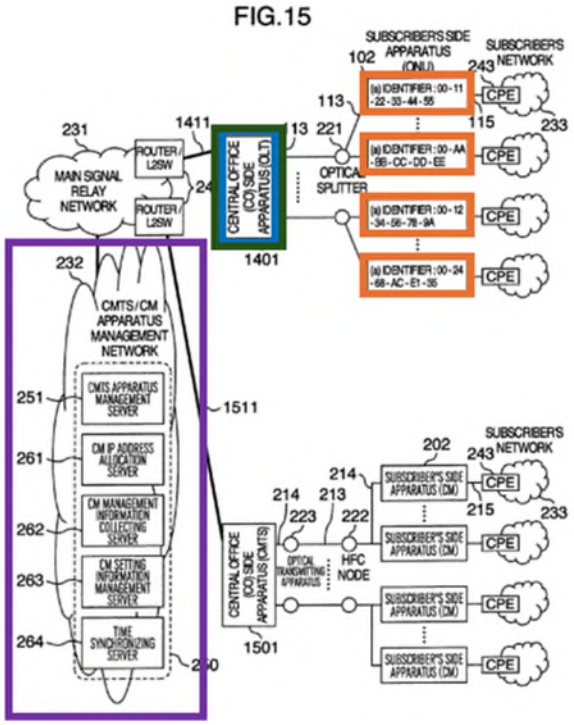
51. More specifically, Bernstein describes a "DOCSIS-to-PON translator 84" that processes the configuration file and convert[s] any of the parameters contained therein "into associated PON parameters 63 that can be used by the OLT 18 and ONU 24." *Id.*, 3:53-63. Bernstein explains that "the ONU 24 gets programmed through the OAM channel," or the Operation and Maintenance Channel [ORANGE]. *Id.*, 5:49-58. Configuration file information relevant to the OLT (*e.g.*

bandwidth allocation and service priority information) is converted into a format appropriate to the OLT [DARK GREEN] and loaded into and thereafter used by the OLT for communications with the ONU [BLUE].

B. Tsuge

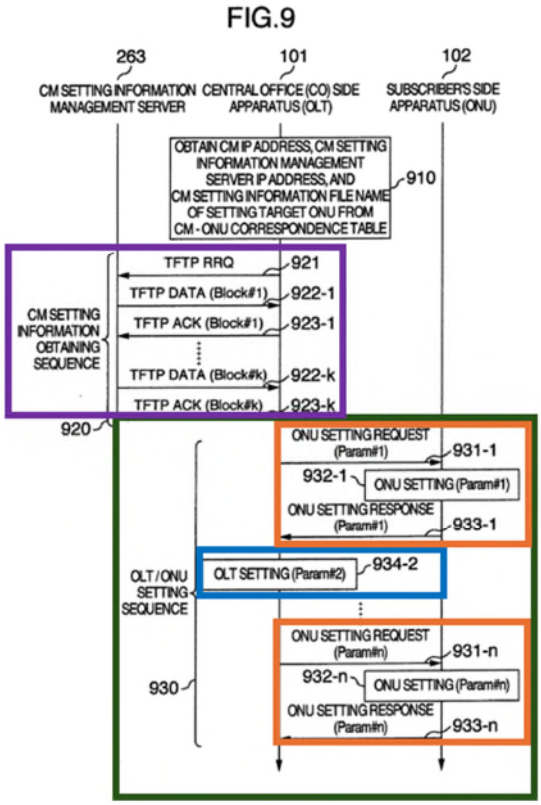
52. U.S. 8,160,448 ("Tsuge") issued on April 17, 2012, and is entitled "Communication system using passive optical network and passive optical network." prior art under § 102(e). EX1008, cover page. Tsuge issued from an application filed on March 17, 2009. Tsuge is prior art pursuant to the applicable version of 35 U.S.C. §102(e).

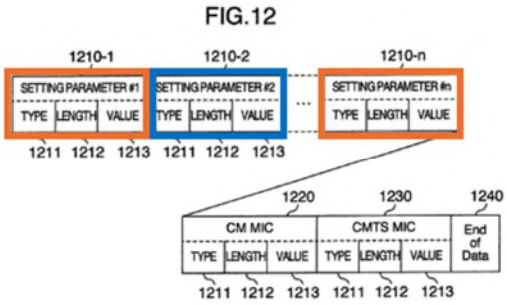
53. Tsuge discloses a DPoE system (illustrated in FIG. 15), that includes a "CMTS/CM Apparatus Management Network 232" comprising a conventional DOCSIS back-office management system [PURPLE] that, inter alia, stores and provides DOCSIS configuration files used for configuring communications between a DPoE System/OLT [DARK GREEN/BLUE] and one or more an ONU [ORANGE]:



Id. FIG. 15 (annotated).

54. Tsuge explains the OLT sends a request to the back-office service ("CM setting information management server 263"), which [a]ccording to the DOCSIS standard … is executed … by the TFTP" and, in response, receives the configuration file (step 920 [PURPLE]). The configuration file consists of both configuration information of an optical network unit (ONU) [ORANGE] and configuration information of an optical line terminal (OLT) [BLUE], as shown on the right side in the image below:





Id., FIG. 9, FIG. 12 (annotated).

55. As shown in the diagram's left, Tsuge explains that "[t]he contents of the setting parameters are converted into the ONU setting information signal 543 or the settings to the OLT itself or into both of them …. In the case where they are converted into the settings to the OLT itself, the settings are reflected to the OLT (step 934) [BLUE]. In the case where they are converted into the ONU setting information signal 543, an ONU setting request message is transmitted to the ONU 102 as a setting target (step 931)") [ORANGE]. EX1008, 15:5-9 (emphasis added).

C. MEF 6. 1 Ethernet Services Specification

56. The Metro Ethernet Forum's MEF 6.1, Ethernet Services Definitions - Phase 2 ("ESD") was published in April 2008. EX1007, 1. The ESD is prior art pursuant to the applicable version of 35 U.S.C. §102(b). ESD discloses definitional frameworks for several types of generic Ethernet services that "Service Providers" may provide over a Metro Ethernet Network to "subscribers." *Id.*, 7 and fn. 1.

57. The 2008 EDS discloses E-LINE, E-TREE and E-LAN services, described as "three generic service constructs called Ethernet Service types … defined based on the service attributes that might appear in a Service Level Agreement (SLA) or Service Level Specification (SLS)" between data service providers and its subscribers. *Id*. EDS further notes that these Ethernet services "are agnostic of the underlying network infrastructure" and are suitable for a variety of underlying networks technologies, including HFCs and PONs.

VII. GROUND 1: 1: CLAIMS 1-2, 4-9 AND 11 ARE OBVIOUS OVER BERNSTEIN IN VIEW OF TSUGE

58. Bernstein discloses each and every limitation recited in Claims 1-2, 4-9 and 11 and are thereby anticipates them. To the extent not anticipated by Bernstein, these claims would have been obvious to a person of ordinary skill based upon the disclosures of Bernstein in view of Tsuge and in light of the knowledge of one of skill in the art.

1. Independent Claim 1

Preamble: 1. A service auto-configuration method of a DOCSIS Provisioning Of EPON (DPoE) system, comprising:

59. To the extent the preamble is limiting, Bernstein discloses this element. Bernstein discloses "A Data Over Cable Service Interface Specifications (DOCSIS) Passive Optical Network (PON) system[.]" EX1006, Abstract. Bernstein also explains that his system is implemented on an "Ethernet PON (EPON)." *Id*., 2:2-5, 2:44-3:36). In Figure 3, Bernstein depicts a DPoE system comprising OLT 18 including DPON 40 and Cable Modem Proxy 60 (a virtual cable modem.) *Id.*, 3:37-46.

Element 1[a]: the DPoE system acquiring a configuration file from a back-office management system, wherein the configuration file comprises both configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPoE system;

60. Bernstein discloses this element. As described above, Bernstein discloses a DPoE system at least because it discloses OLT 18 inclusive of DPON 40 and Cable Modem Proxy 60. *Id.*, Abstract, 2:2-5, 2:44-3:36). Further, as shown in FIGS. 3 and 7, the Bernstein's DPoE system acquires a configuration file from a back-office management system. *Id*.

61. Bernstein explains that the DPON 40 and its Cable Modem Proxy 60 may "conduct a Trivial File Transfer Protocol (TFTP) session with a TFTP provisioning server 52 to obtain different DOCSIS service definitions." *Id*. (citing EX1006,

3:18-20). The "TFTP server 52" is part of "A MSO network or 'back-office' 16" (shown in PURPLE).

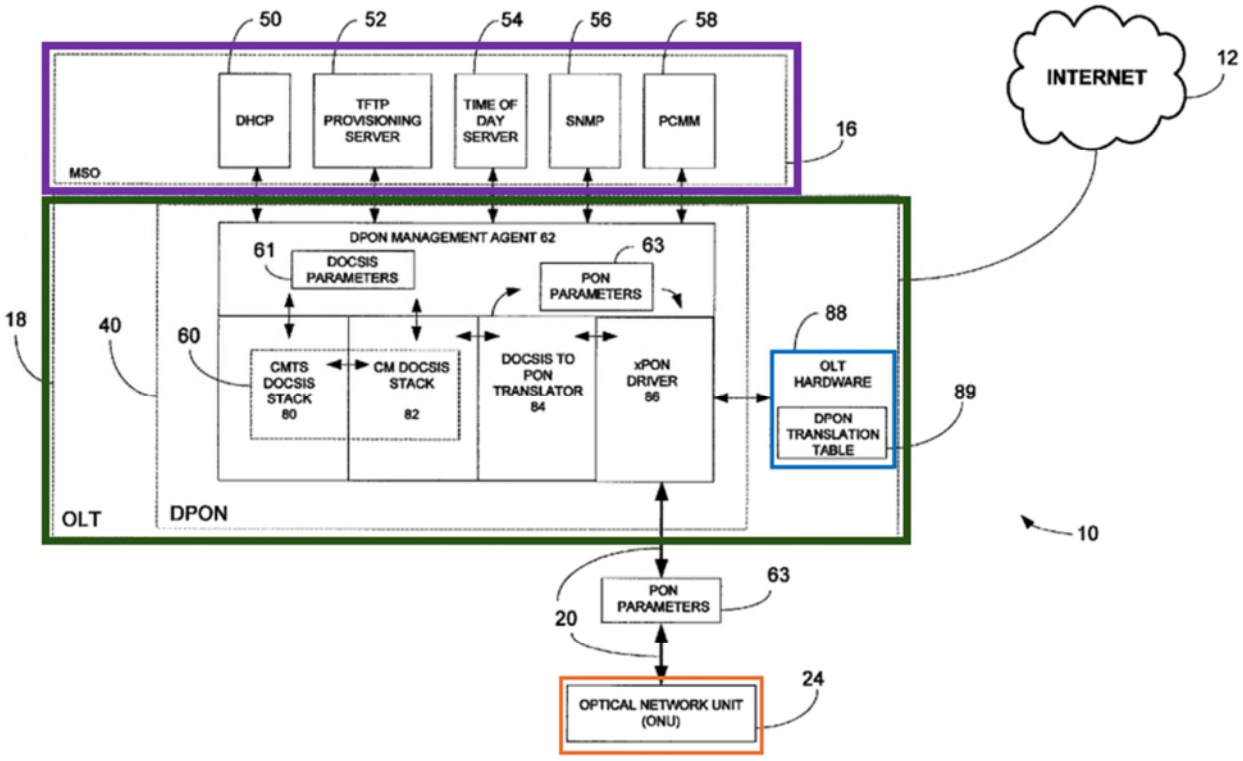


FIG. 3

Id., 2:44-3:36, FIG. 3 (annotated).

62. Cable Modem proxy 60 issues a request to the TFTP for a configuration file. *Id.*, 5:31-32 ("[T]he CM proxy 60 may send a TFTP request for a DOCSIS configuration file download") and FIG. 7 (100, "TFTP-REQ-CFG-FILE")). In response, the TFPT replies with the configuration file. *Id.*, 5:32-34 ("The TFTP

server 52 replies with a TFTP download configuration file 102") and FIG. 7 (102, "TFTP-REQ-CFG-FILE")).

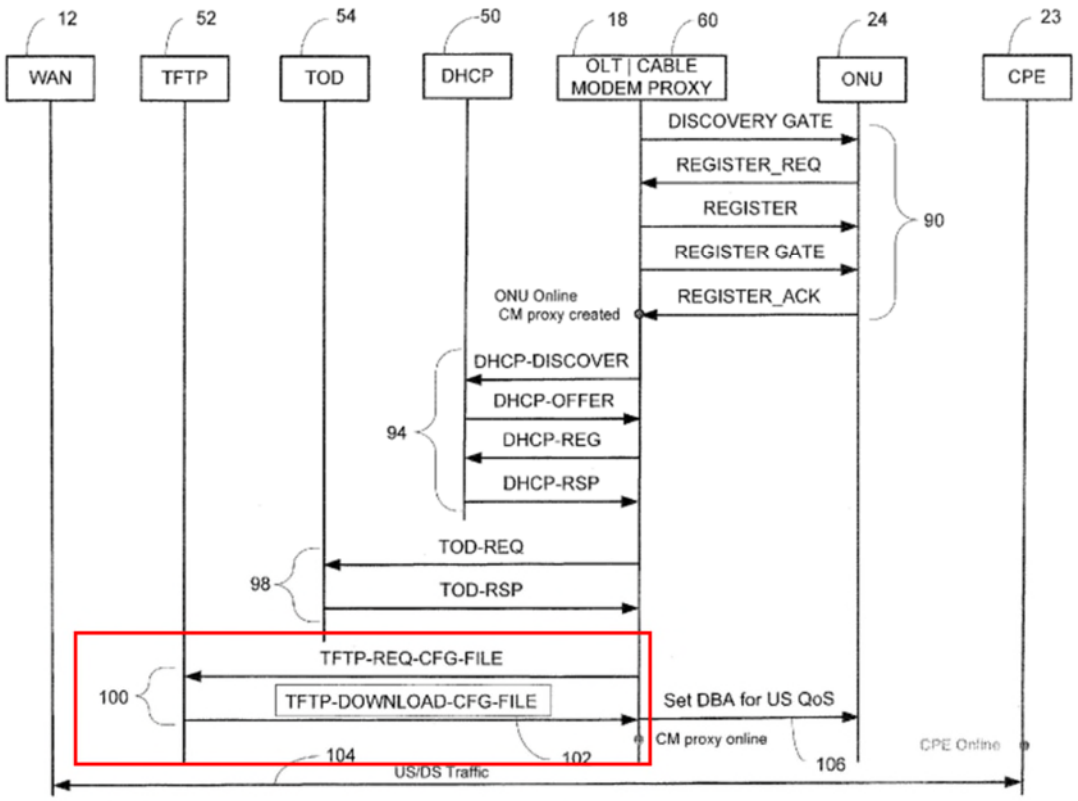


FIG. 7

Id. FIG. 7 (annotated).

63. The configuration file consists of both configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT). Bernstein states that "[t]he information in the TFTP file 102 is then translated and **used for configuring** schedulers/classifiers or other features on **the OLT 18 and ONU 24**.") *Id*., 5:31-40 (emphasis added). A "DOCSIS-to-PON translator 84" is used to convert parameters contained in the configuration file

"into associated PON parameters 63 that can be used by **the OLT 18 and ONU 24.**" *Id*., 3:53-63; *see also* EX1001, 2:8-38 (acknowledging service definitions include parameters for configuring both the OLT and the ONU, such as logical link (LLID) and/or virtual local area network (VLAN) information, and the like).

64. The configuration information included in file 102 concerns services opened by the ONU. For example, the information in TFTP configuration file 102 may be used to configure Dynamic Bandwidth Allocation (DBA) 106 for Upstream (US) Quality of Service (QoS) between the OLT 18 and ONU 24." EX1006, 5:34-40 and 3:49-52 (noting that the configuration of the OLT ***"effectively allow[s] any of the services normally supported in a cable network to also be used in PON 10."***)) "For example, certain DOCSIS QoS and security information may be used by the OLT 18 for transmitting or denying service for certain types of packet data received over Internet 12" EX1006, 4:6-9.

65. For the foregoing reasons, Bernstein discloses "the DPoE system acquiring a configuration file from a back-office management system, wherein the configuration file comprises both configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPoE system."

Element 1[b]: the DPoE system analyzing the acquired configuration file, and obtaining both the configuration information of the ONU and the configuration information of the OLT; and

66. Bernstein discloses that its DPOE system analyzes the acquired configuration file and obtains both configuration information for the ONU and configuration information for the OLT. Following downloading of the configuration file, Bernstein describes that DPON 40 includes a "DOCSIS-to-PON translator 84" that analyzes the configuration file, obtaining configuration information of both the OLT and ONU, that it then converts "into associated PON parameters 63 that can be used by the OLT 18 and ONU 24." EX1006, 3:53-63.

67. Bernstein explains this information is used to configure both the ONU and OLT: "[s]ome of the translated PON parameters 63 are programmed into a PON driver 86 [of the OLT 18] for either communicating with the ONU 24 or sent over the optical cable 20 for configuring the ONU 24." *Id*. Bernstein further explains that "[t]he translated PON parameters 63 may also be used for operating or configuring OLT hardware 88." *Id*. Specific parameters used for configuring the OLT and/or ONU relating to services requested to be opened by the ONU are further described below in elements 1[c]-[d].

68. For the foregoing reasons, Bernstein discloses "the DPoE system analyzing the acquired configuration file, and obtaining both the configuration information of the ONU and the configuration information of the OLT."

Element 1[c]: the DPoE system configuring the OLT locally according to the configuration information of the OLT,

69. Bernstein discloses this element. The OLT in Bernstein is configured locally according to the configuration information of the OLT. Bernstein explains the PON parameters derived by Bernstein's DPON's 40 DOCSIS-to-PON translator 84 are "programmed into a PON Driver 86" residing locally on the OLT 18. EX1006, 3:53-59, Fig. 3. For example, in Figure 3 below, the PON Driver 86 [RED], OLT hardware 88 and the DPON translation table 89 [BLUE] are all shown residing on the OLT 18 [GREEN]:

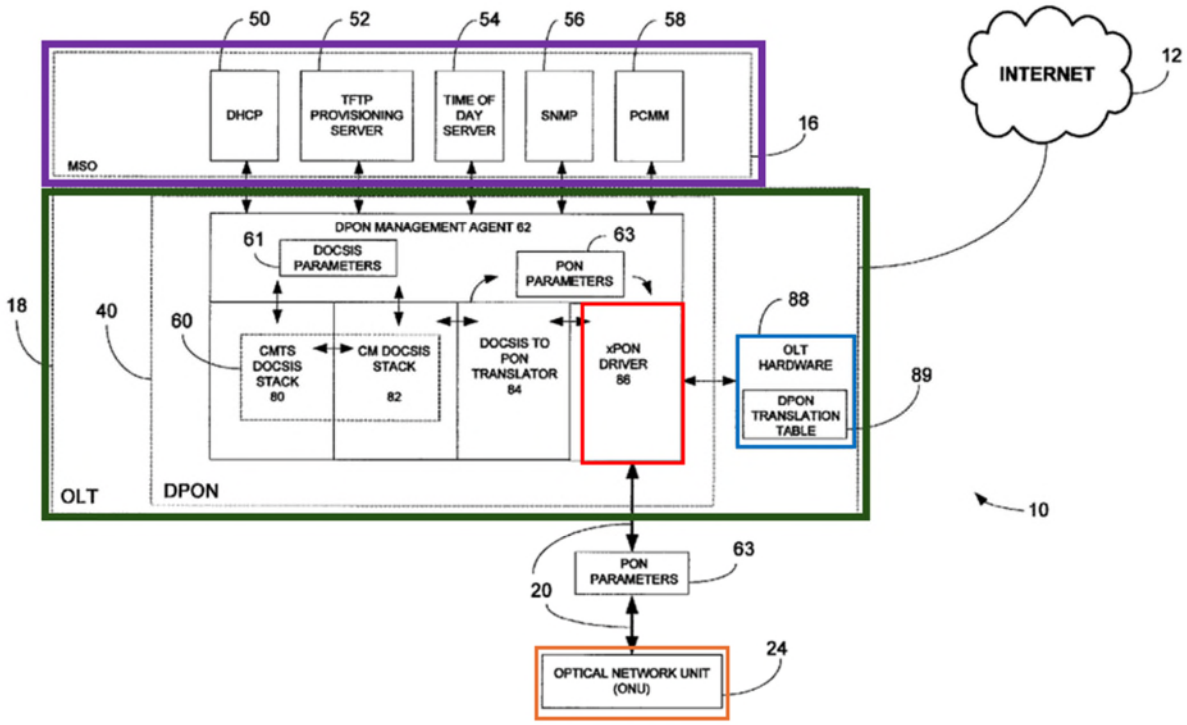


FIG. 3

EX1006, FIG. 3 (annotated).

70. These "translated PON parameters 63 may also be used for operating or configuring OLT hardware 88." EX1006, 3:61-63. "The translator 84 in operation 208 uses PON Application Programmers Interfaces (APIs) to program the OLT 18 according to the different translated PON parameters 63." EX1006 6:40-47. Figure 8 depicts loading these parameters into OLT Memory. Fig. 8 (step 206 "Load Translation Table int OLT Memory"). The OLT uses this translation table for handling packets directed to the ONU 24.

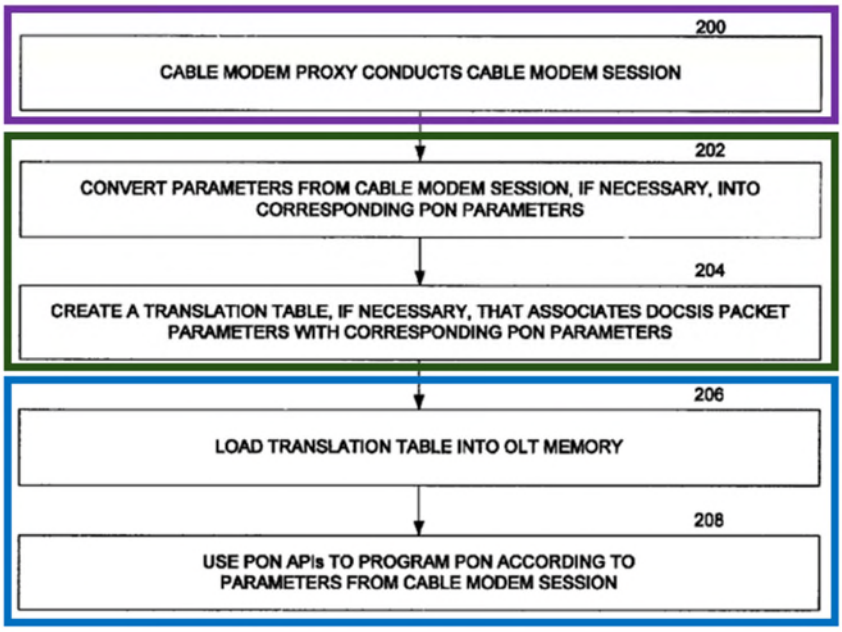


FIG. 8

EX1006, Fig. 8 (annotated).

71. For example, the embodiments shown in FIGs. 3, 7 and 8, show an OLT being configured locally with OLT configuration information from a downloaded configuration file. Bernstein explains that EPON systems use the conventional

Ethernet model for managing quality of services requirement, such that instead of individual "pipes," each service is assigned a "priority" within a shared "pipe." EX1006, 5:59-6:6. In one example, the downloaded configuration file "may contain a request for a video service at 10 million bits per second (Mbps), a voice service of 100 thousand bps (Kbps), and data service of 50 million bits per second (Mbps)." *Id*. 6:7-16. Bernstein's system translates these requirements into an overall bandwidth requirement for the "pipe" to a given ONU, along with priorities for each service. *Id*. (citing EX1006, 6:17-31). This information is formatted into the translation table referenced above and loaded into the OLT to be used when communicating with a given ONU. *Id*. (citing 6:32-57).

72. For the foregoing reasons, Bernstein discloses "the DPoE system configuring the OLT locally according to the configuration information of the OLT."

Element 1[d]: and meanwhile configuring the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU

73. Bernstein discloses that the ONU is meanwhile configured according to the configuration information of the ONU. For example, Bernstein explains that at the same time the OLT is configured locally by DPON 40 from PON parameters obtained by Proxy 60, the ONU 24 is also configured by DPON 40 using PON parameters 63 translated by the DOCSIS-to-PON translator 84 from the

configuration file 102. EX1006, 3:55-56 ("PON parameters 63 that can be **used by the OLT 18 and ONU 24**.") (emphasis added.)

74. FIG. 7 shows an ONU being configured at the same time as an OLT with information from the same downloaded configuration file. Bernstein explains "[t]he information in the TFTP file 102 is then translated and used for configuring schedulers/classifiers or other features on the OLT 18 and ONU 24. For example, the information in TFTP configuration file 102 may be used to configure Dynamic Bandwidth Allocation (DBA) 106 for Upstream (US) Quality of Service (QoS) between the OLT 18 and ONU 24[.]" *Id*. 5:31-40. A POSA would have understood that the configuration of bandwidth according to the stated QoS require the configuration of the transmitting entity (i.e., the ONU in the upstream transmission) and the receiving entity (i.e., the OLT), through the exchanges of messages between them.

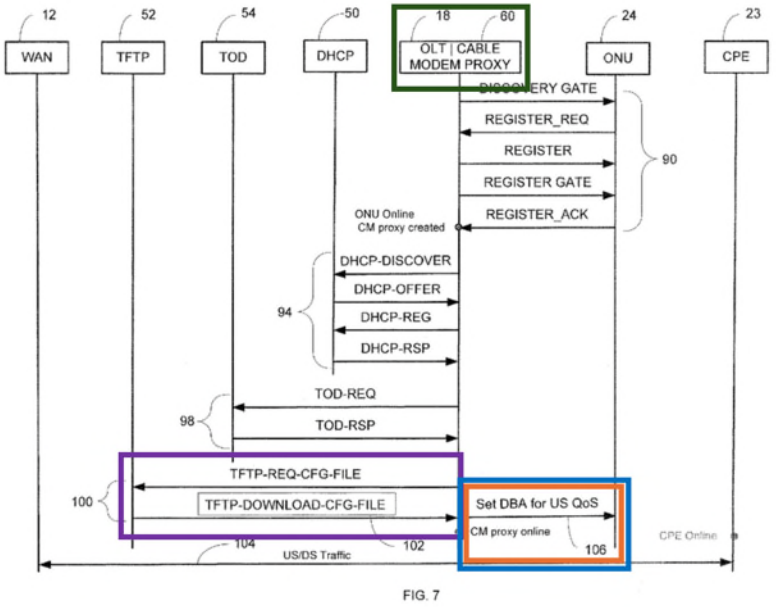


FIG. 7

Id. (citing FIG. 7) (annotated).

75. That is to say, that the single description in Figure 7 of "Set DBA for US QoS" requires configuration parameters be set on both the OLT and ONU in order to enable upstream communications between the two devices. The figure discloses this occurs as a single step. *Id.*

76. Bernstein elsewhere confirms that the ONU and OLT are configured at the same time. In describing the process illustrated in FIG. 8, Bernstein notes that a single file--configuration file "102"—is used to configure both the OLT and ONU. *Id.*, 6:7-28 ("Referring both to FIGS. 3 and 8, in operation 200, the CM proxy 60 participates in **a TFTP session 100 as described above in FIG. 7**. The CM proxy 60 **obtains a TFTP configuration file 102 (FIG. 7)** from the TFTP server 52 that contains DOCSIS parameters 61. … The translator 84 may then

assign different priorities for each of the different types of voice, video and data identified in **the TFTP file 102 (FIG. 7).**")).

77. Bernstein further explains that the ONU is configured via a management channel between the OLT and the ONU. Bernstein states "the ONU 24 gets programmed through the OAM channel," or the Operation and Maintenance Channel between the OLT and ONU. *Id.*, 5:49-58.

78. For the foregoing reasons, Bernstein discloses configuring the OLT "and meanwhile configuring the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU.

79. To the extent that this element is found to not be fully disclosed in Bernstein, it would have been obvious to a POSA at least as of April 13, 2011, to "meanwhile configure" the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU," as claimed for the reasons set forth below.

80. As shown above, Bernstein shows the contemporaneous configuration of both the ONU and the OLT with information from the same downloaded configuration file. A POSA would have been motivated to automatically configure both the OLT and the ONU at the same time because to do so would have been more efficient given that the configuration information for each is acquired at the same time form the same file and translated from that file at the same time into a

format suitable and immediately available for automatic configuration of both. In addition, the configuration information for both OLT and ONU is communicated to the OLT, which controls passing of that information via a management channel to the ONU, facilitating contemporaneous application of configuration information to both. The alternative would require unnecessary storage of translated configuration information for the OLT and/or ONU for later application.

81. In addition, as Bernstein notes, to provision services for a subscriber, and to enable corresponding communications between OLT and ONU, requires each be first configured appropriately. A POSA would have been motivated to eliminate delays in configuration each device, including those resulting from manual intervention, and to complete configurations simultaneously, or reasonably contemporaneously, so as to enable these services as soon as possible.

82. A person of skill in the art would also have been motivated by Bernstein's description of an alternative embodiment shown in Figure 4 to automatically configure both OTL and ONU contemporaneously. Bernstein explains that both the OTL and the ONU are configured in the same MSO registration session:

> A first DOCSIS-to-PON translator 84A converts some of the DOCSIS parameters 61 obtained from the **MSO registration sessions** that are used by the OLT 18. For example, certain DOCSIS QoS and security information may be used by the OLT 18 for transmitting or denying service for certain types of packet data received over Internet 12. **These OLT related DOCSIS parameters 61 are sent to translator 84A and converted into PON parameters 63 that are then programmed into the OLT 18**. Accordingly, the OLT 18 operates according to these particular QoS and security parameters 63.

> **… <u>The MSO registration session may complete</u>** with one or more DOCSIS parameters 61 being obtained by the CM DOCSIS stack 82. The DOSCIS parameters 61 are sent to a DOCSIS-to-PON translator 84B in ONU 24 for converting into corresponding ONU parameters. The converted ONU parameters are then programmed into the ONU 24 by translator 84B.

EX1006, 4:4-41.

83. In addition, the disclosures in Tsuge would have motivated a POSA to automatically configure both OLT and ONU contemporaneously. Tsuge is from the same field as Bernstein (DPoE networks and systems) and reasonable pertinent to the problem of configuring OLT and ONU devices for the provisioning of services in a DPoE network. EX1008 at 1:21-5:35.

84. Tsuge discloses the configuration of an optical network unit (ONU) and an optical line terminal (OLT) at the same time using information from a single downloaded DOCSIS configuration file. For example, Tsuge explains:

> The contents of the setting parameters [*i.e.* the unitary configuration file] are converted into the ONU setting information signal 543 or the settings to the OLT itself or into both of them …. In the case where they are converted into the settings to the OLT itself, the settings are reflected to the OLT (step 934). In the case where they are converted into the ONU setting information signal 543, an ONU setting request message is transmitted to the ONU 102 as a setting target (step 931)."

EX1008, 15:4-12 (emphasis added). As discussed more fully below in Ground 4, elements 1[c]-[d], Figure 9 of Tsuge teaches the contemporaneous setting of parameters in both OLT [BLUE] and ONU [ORANGE]:

FIG.9

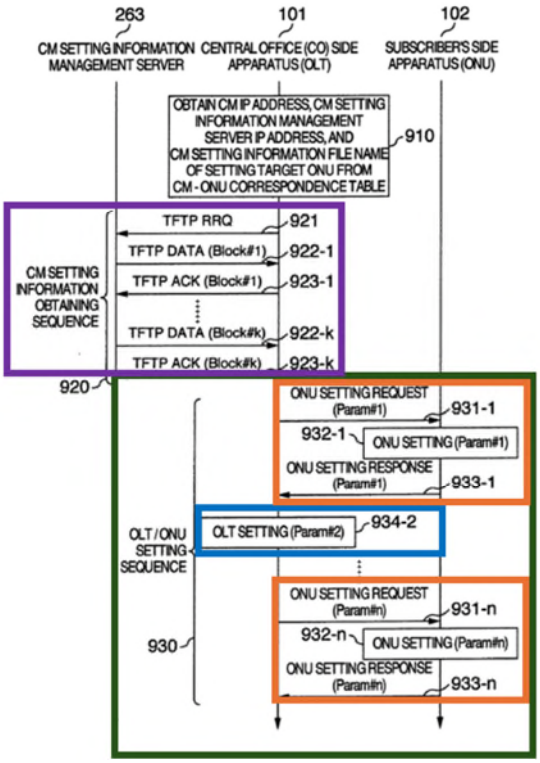
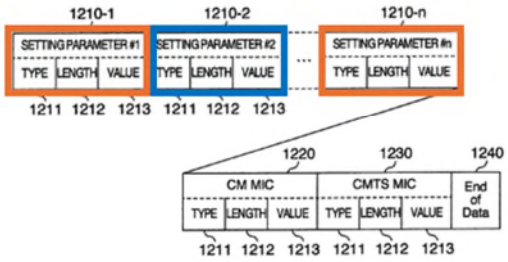
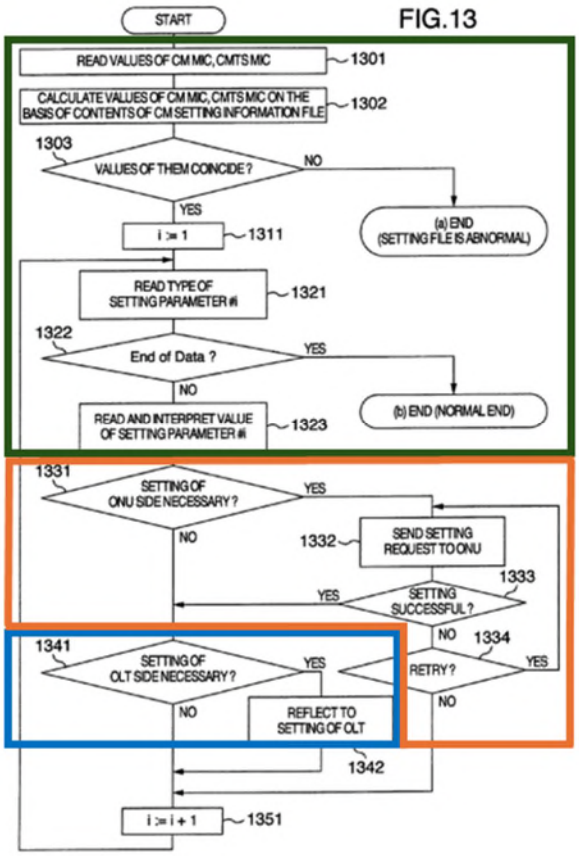


FIG.12



85. After the "CM setting information file" (configuration file) is obtained, the system "sequentially read[s] the setting parameters" and extracts each parameter specified in the file (steps 1311-1323 and 1351) and calls an appropriate subroutine to change settings on the ONU (step 1332) or OLT (step 1342) based on the extracted parameter. *Id.*, 16:53-17:24. This sequential process is illustrated in Tsuge's Figure 13:



Id., FIG. 13 (annotated).

86. A POSA would have been motivated to utilize the contemporaneous ONU/OLT configuration suggested in Tsuge at least because both systems analyze a single DOCSIS configuration file containing configuration information for both the OLT and ONU to identify and translate those settings and parameters into configurations for both the OLT and ONU. A POSA would have recognized that Tsuge's approach had the advantages described above with respect to greater efficiency and faster opening of services.

87. A POSA would have reasonably expected, as of April 13, 2011, that the OLT and ONU in Bernstein's system could have been contemporaneously configured successfully.

88. For the foregoing reasons, it would have been obvious to configure the OLT "and meanwhile configuring the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU."

Element 1[e]: wherein, the method is performed in a process of ONU initialization; and

89. Bernstein's method satisfies this element. The configuration of the OLT and ONU is performed as part of the ONU initialization process. Bernstein explains that the above configuration steps are performed "during registration" of the ONU. EX1006, 3:31-34 ("A translation function shown in Fig. 3 then translates the information obtained by the cable modem proxy 60 **during the registration** or post registration sessions into corresponding PON parameters.")) A POSA would have understood that the registration is a process that the ONU lets the DPoE system know its presence, i.e., part of the initialization process.

90. Figure 7 confirms the configuration of the OLT and ONU occurs as part of the process of initially registering the ONU on the DPoE system. The ONU 24 communicates a registration request to DPoE System [DARK GREEN] which responds with Register and Register Gate messages. EX1006, 4:62-66; Fig. 7 (90)

(shown in LIGHT GREEN)). The ONU 24 acknowledges these Registration messages, establishing a physical layer connection, following which address registration 94 (shown in RED) occurs through which an IP address is assigned to ONU 24 for the OLT's use when communicating with ONU 24. *Id.*, 3:12-17. Next, services requested by the ONU are initialized using a process entailing acquisition of the configuration file 102 (step 100) [PURPLE] and programming of the OLT [BLUE] and ONU [ORANGE] (step 106). *Id.*, 5:41-47 (noting that the operating parameters for communications links 104 are established between OLT 18 and ONU 24 during sessions 94, 98 **and 100**.))

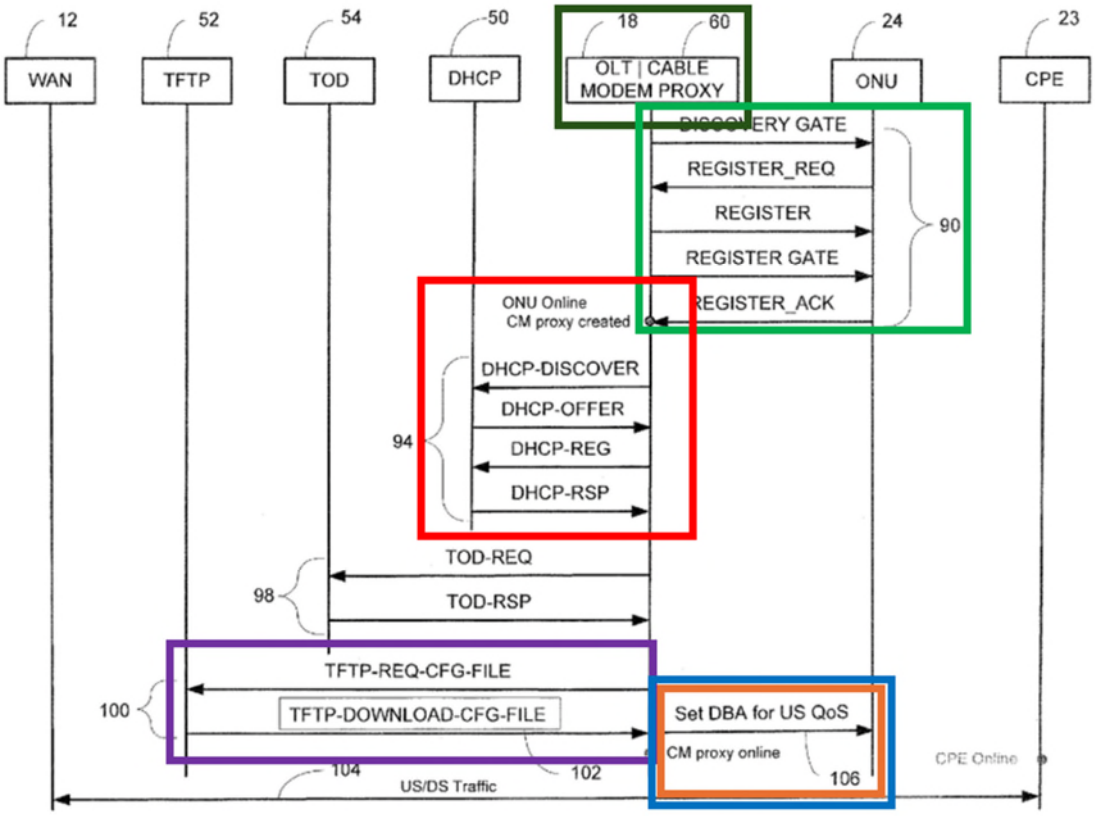


FIG. 7

Id., Fig. 7 (annotated)).

91. Bernstein's process illustrated above fully encompasses the initialization process depicted in in FIG. 4 of the '982 Patent, including phases for ONU initial registration [LIGHT GREEN], IP address registration [RED], configuration file downloading [PURPLE] and analysis by a DPoE system [DARK GREEN], and configuration of the OLT [BLUE] and ONU [ORANGE]:

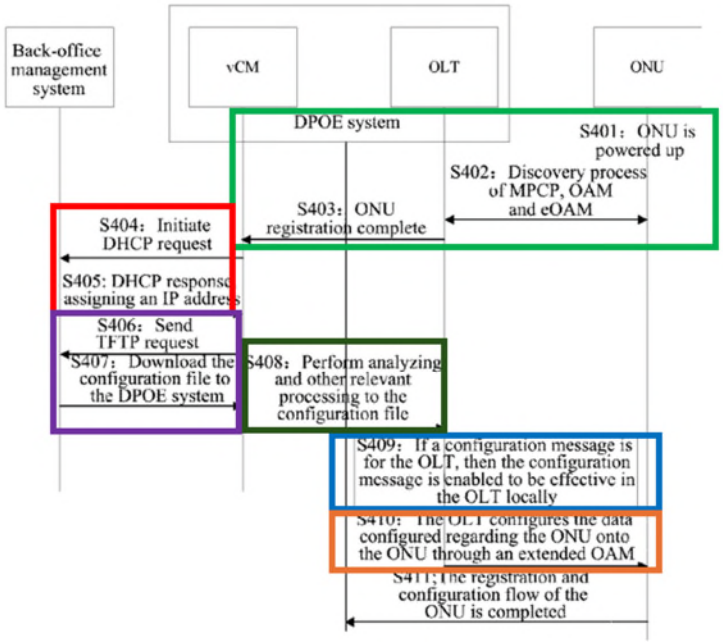


FIG. 4

EX1001, Fig. 4 (annotated).

92. Bernstein's method discloses the performance of the claimed method during the process of ONU initialization.

93. To the extent this element is found to not be fully disclosed by Bernstein, it would have been obvious to configure the OLT and ONU during an initialization process. A POSA would have desired to configure both the OLT and ONU for the provision of services, and corresponding communications needed to enable, at the earliest opportunity.

94. For the foregoing reasons, it would have been obvious to configure the OLT and ONU "in a process of ONU initialization" in light of Bernstein.

Element 1[f]: wherein, when analyzing the acquired configuration file, the DPoE system further converts the configuration information of the ONU into a message format which can be identified by the ONU, and

95. Bernstein's method includes this element. Bernstein explains that the parameters extracted from its configuration file are converted into a message format understand able by an ONU: "The OLT implements a cable modem protocol stack . . .[that] translates [shown in DARK GREEN] the data retrieved by the CM proxy [shown in PURPLE] into Optical Network Unit (ONU) recognizable commands, and sends the translated data to the ONU [shown in ORANGE]."

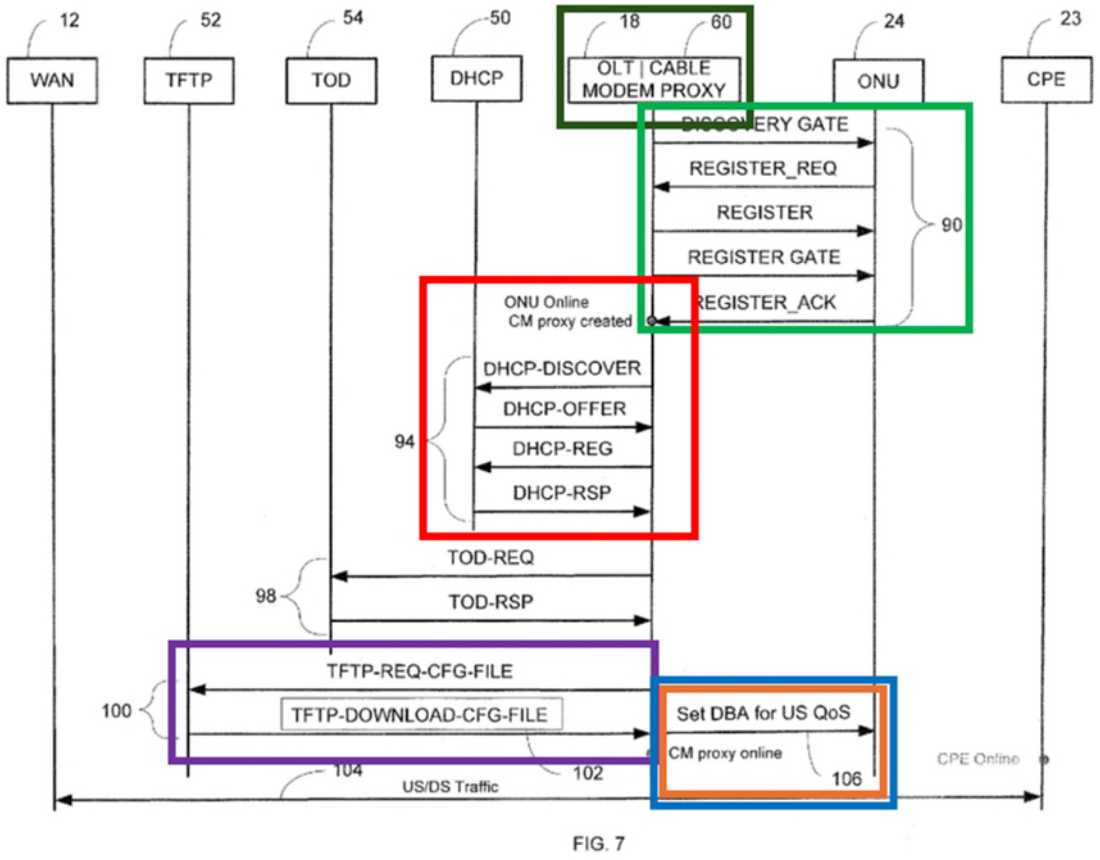


FIG. 7

EX1006, 1:52-57 and FIG. 7 (annotated).

96. Bernstein's method discloses the performance of the claimed method wherein, when analyzing the acquired configuration file, the DPoE system further converts the configuration information of the ONU into a message format which can be identified by the ONU.

Element 1[g]: converts the configuration information of the OLT into a message format which can be identified by the OLT.

97. Bernstein's system converts the configuration information of the OLT into a message format which can be identified by the OLT, or at least renders such a message format obvious, in that it translates information from DOCSIS

configuration files into PON parameters understood by the OLT. EX1006, 3:53-63 ("[t]he translated PON parameters 63 may also be used for operating or configuring OLT hardware 88.")).

98. Bernstein describes messages formatted for the OLT defining overall bandwidth and/or the relative priority of each service opened by the ONU. *Id*., FIG. 8). For example, Bernstein describes configuring the OLT to provide a "pipe" to an ONU having a bit rate of 60.1 Mbps. *Id*., 6:17-47. A "DPON translation table 89" associates different "services flows" of services opened by the ONU such that the OLT routes packets to the ONU according to the priority values in DPON translation table [DARK GREEN]. *Id*., 6:17-39. The format of this table is compatible with the OLT in light of Bernstein's disclosure that it is "loaded into OLT memory [BLUE]" using "PON Application Programmers Interfaces (APIs) to program the OLT 18 according to different translated PON parameters." *Id*., 6:40-47 and Fig. 8 (below) (annotated))

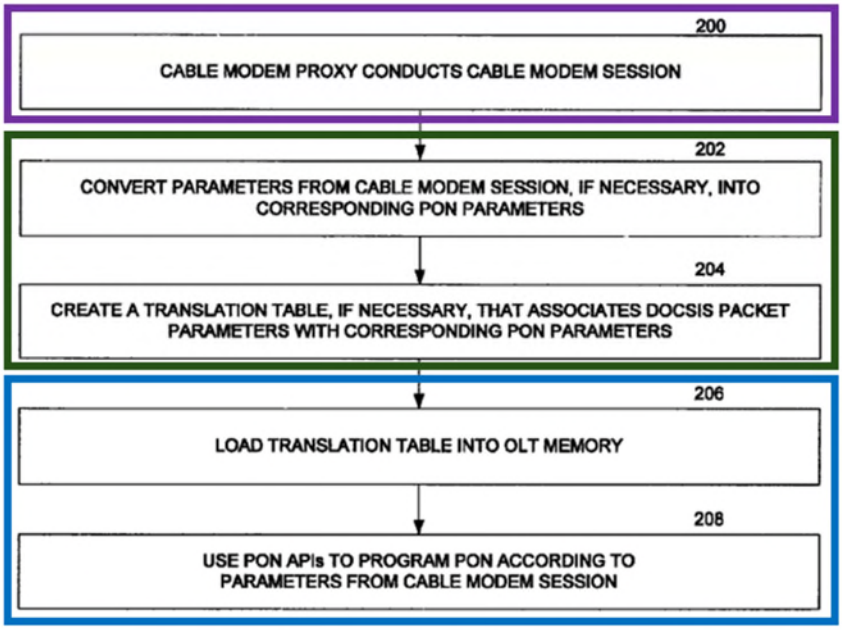


FIG. 8

Id. FIG. 8 (annotated).

99. To the extent the above functionality of Bernstein is determined to not fully disclose this limitation, it would have been obvious to a POSA to convert configuration information into a message format which can be identified by the OLT in light of Bernstein at least because Bernstein's DPoE system converts configuration into a form (i.e. translation table and/or API call) understandable by the OLT. A POSA would have been motivated to use a "message" format instead of the translation table or API call formats of Bernstein in order to be compatible with OLTs configured to receive "message"-formatted data.

100. Bernstein's method discloses the performance of the claimed method, including converting the configuration information of the OLT into a message format which can be identified by the OLT.

2. Claim 2

2. The method according to claim 1, wherein, the configuration information of the OLT is configuration information related to services opened by the ONU.

101. Bernstein discloses that "the configuration information of the OLT is configuration information related to services opened by the ONU." *See* element 1[c].

3. Independent Claim 4

Element 4[preamble]: 4. A data over cable service interface system (DOCSIS) Provisioning Of EPON (DPoE) system, comprising

102. Bernstein discloses "A data over cable service interface system (DOCSIS) Provisioning Of EPON (DPoE) system." See element 1[preamble] above.

Element 4[a]: an acquisition unit, an analyzing unit and a configuration unit; wherein, during an process of an optical network unit (ONU) initialization,

103. Bernstein discloses "an acquisition unit, an analyzing unit and a configuration unit" at least because it discloses a DPoE system comprising OLT 18 including DPON 40 and Proxy 60. See element 1[preamble]-[a] and below aspects of Claim 4.

104. Specifically, Bernstein discloses an acquisition unit by disclosing a DPoE system comprising OLT 18, including DPON 40 and its "cable modem proxy 60,"

comprising software and related hardware configured to acquire a configuration file from a back-office management system. EX1006, 3:18-20 (Cable Modem Proxy 60 may "conduct a Trivial File Transfer Protocol (TFTP) session with a TFTP provisioning server 52 to obtain different DOCSIS service definitions."). See also, element 4[b] below.

105. Bernstein discloses an analyzing unit by disclosing a DPoE system comprising OLT 18, with DPON 40 and included "DOCSIS-to-PON translator 84," comprising software and related hardware configured to analyze the acquired configuration file and obtain both the configuration information of the ONU and the configuration information of the OLT. *Id*., 3:53-63. See also, element 4[c] below.

106. Bernstein discloses a configuration unit by disclosing a DPoE system comprising OLT 18, with DPON 40 and its incorporated "xPon Driver 86," comprising software and related hardware configured to configure the OLT locally according to the configuration information of the OLT and meanwhile configure the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU. *Id*., 3:53-63, 5:49-58. See also, element 4[d]-[e] below.

107. Lastly, Bernstein also discloses that its acquisition unit, analyzing unit and configuration unit operate "during an [sic] process of an optical network unit

(ONU) initialization" at least for the reasons set forth above with respect to element 1[e].

108. Thus, Bernstein discloses "an acquisition unit, an analyzing unit and a configuration unit; wherein, during an process of an optical network unit (ONU) initialization" as recited.

Element 4[b]: the acquisition unit is configured to acquire a configuration file from a back-office management system, wherein the configuration file comprises configuration both information of the ONU and configuration information of an optical line terminal (OLT) in the DPoE system;

109. As noted above in element 1[a] and 4[a], Bernstein discloses an acquisition unit configured to acquire a configuration file from a back-office management system and that the acquired configuration file comprises configuration both information of the ONU and configuration information of an optical line terminal (OLT) in the DPoE system. See element 1[a] and 4[a].

Element 4[c]: the analyzing unit is configured to analyze the acquired configuration file and obtain both the configuration information of the ONU and the configuration information of the OLT; and

110. As noted above in element 1[b] and 4[b], Bernstein discloses an analyzing unit configured to analyze the acquired configuration file and obtain both the configuration information of the ONU and the configuration information of the OLT. *See also* element 1[b], above.

Element 4[d]: the configuration unit is configured to configure the OLT locally according to the configuration information of the OLT and meanwhile configure the ONU according to the configuration information of the ONU via a manage-

ment channel between the OLT and the ONU.

111. As noted above in elements 1[c]-[d], Bernstein discloses a configuration unit that is configured to configure the OLT locally according to the configuration information of the OLT and meanwhile configure the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU. As noted in element 1[d], above, this configuration of the OLT and ONU occurs contemporaneously.

4. Claim 5

5. The system according to claim 4, wherein, the analyzing unit is further configured to, when analyzing the acquired configuration file, convert the configuration information of the ONU into a message format which can be identified by the ONU and convert the configuration information of the OLT into a message format which can be identified by the OLT.

112. Bernstein discloses, or at least renders obvious, that its "analyzing unit is further configured to, when analyzing the acquired configuration file, convert the configuration information of the ONU into a message format which can be identified by the ONU and convert the configuration information of the OLT into a message format which can be identified by the OLT." See elements 1[f]-[g] above, explaining how the cable modem proxy 60 (i.e. analyzing unit) performs the recited functionality.

5. Claim 6

6. The press-in retainer of claim 5, wherein the flexible wing is configured to flex toward the stem during insertion through the acceptance opening of the support structure, and wherein the distal face surface is configured to press against

an interior surface of the acceptance opening to urge the retainer downwardly into the acceptance opening.

a. Element 6[preamble]

6. A service auto-configuration network of a DOCSIS Provisioning Of EPON (DPoE) system, comprising

113. Bernstein discloses "A service auto-configuration network of a DOCSIS Provisioning Of EPON (DPoE) system." See element 1[preamble] above.

Element 6[a]: a DPoE system, a back-office management system and a plurality of optical network units (ONUs);

114. Bernstein discloses "a DPoE system, a back-office management system and a plurality of optical network units (ONUs)." See element 1[a] above. For example, Figure 1 shows a DPoE system that includes "an A MSO network or 'back office' 16" (shown in PURPLE) and a plurality of ONUs (shown in ORANGE):

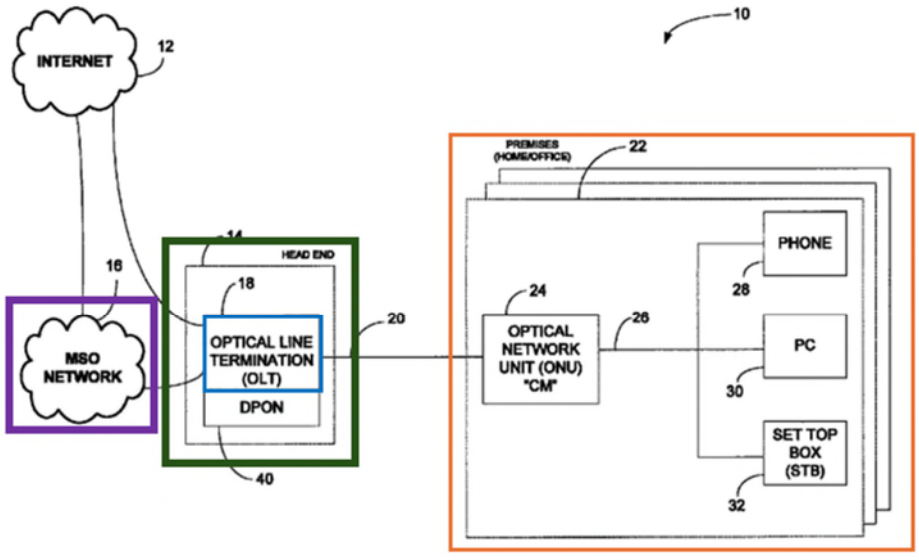


FIG. 1

EX1006, FIG. 1 (annotated).

Element 6[b]: wherein, the DPoE system comprises an acquisition unit, an analyzing unit and a configuration unit;

115. Bernstein discloses "wherein, the DPoE system comprises an acquisition unit, an analyzing unit and a configuration unit; wherein, during an process of an optical network unit (ONU) initialization." See element 4[a] above.

Element 6[c]: wherein, during a process of an optical network unit (ONU) initialization, the acquisition unit is configured to acquire a configuration file from a back-office management system, wherein the configuration file comprises configuration both information of the ONU and configuration information of an optical line terminal (OLT) in the DPoE system;

116. Bernstein discloses "the acquisition unit is configured to acquire a configuration file from a back-office management system, wherein the configuration file comprises configuration both information of the ONU and configuration information of an optical line terminal (OLT) in the DPoE system." See element 4[b] and 4[e], above.

Element 6[d]: the analyzing unit is configured to analyze the acquired configuration file and obtain both the configuration information of the ONU and the configuration information of the OLT; and

117. Bernstein discloses "the analyzing unit is configured to analyze the acquired configuration file and obtain both the configuration information of the ONU and the configuration information of the OLT." See element 4[c], above.

Element 6[e]: the configuration unit is configured to configure the OLT locally according to the configuration information of the OLT and meanwhile configure the ONU according to the configuration information of the ONU via a manage-

ment channel between the OLT and the ONU; and

118. Bernstein discloses "the configuration unit is configured to configure the OLT locally according to the configuration information of the OLT and meanwhile configure the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU." See elements 1[c], 1[d], 4[d], above.

Element 6[f]: the back-office management system is configured to: save the configuration file, and download the configuration file to the DPoE system, wherein the configuration file comprises the configuration information of the ONU and the configuration information of the OLT in the DPoE system.

119. Bernstein discloses that "the back-office management system is configured to: save the configuration file, and download the configuration file to the DPoE system, wherein the configuration file comprises the configuration information of the ONU and the configuration information of the OLT in the DPoE system." As explained in more detail above in element 1[a] above, Bernstein discloses a conventional DOCSIS back-office TFTP server that (1) saves configuration files that contain both configuration information of the ONU and of the OLT, and (2) downloads that file to the DPoE system in response to a request for the configuration file. See element 1[a] above. The '982 Patent also is evidence of POSA's knowledge that the use of conventional DOCSIS TFPT servers to save and download configuration files was well known and that applicant itself uses the

very same back-office systems. EX1001, 1:16-56 and claims 1, 4 and 6 (claiming "DOCSIS Provisioning. . ."⟩).

6. Claim 7

7. The network according to claim 6, wherein, the back-office management system comprises a trivial file transfer protocol (TFTP) server configured to: receive a TFTP request initiated by the DPoE system, respond to that TFTP request, and download the configuration file to the DPoE system.

120. Bernstein discloses a network wherein "the back-office management system comprises a trivial file transfer protocol (TFTP) server configured to: receive a TFTP request initiated by the DPoE system, respond to that TFTP request, and download the configuration file to the DPoE system." As explained in more detail above in element 1[a] above, Bernstein discloses a TFTP server that receives a TFTP request initiated by the DPoE system, responds to that TFTP request, and downloads the configuration file to the DPoE system. See element 1[a] above.

7. Claim 8

8. The network according to claim 7, wherein, the configuration information of the OLT is configuration information related to services opened by the ONU.

121. Bernstein discloses a network "wherein, the configuration information of the OLT is configuration information related to services opened by the ONU." See element 2 above.

8. Claim 9

9. The network according to claim 6, wherein, the configuration information of

the OLT is configuration information related to services opened by the ONU

122. Bernstein discloses a network "wherein, the configuration information of the OLT is configuration information related to services opened by the ONU." See element 2 above.

9. Claim 11

11. The network according to claim 6, wherein, the analyzing unit is further configured to, when analyzing the acquired configuration file, convert the configuration information of the ONU into a message format which can be identified by the ONU and convert the configuration information of the OLT into a message format which can be identified by the OLT.

123. Bernstein discloses a network "wherein, the analyzing unit is further configured to, when analyzing the acquired configuration file, convert the configuration information of the ONU into a message format which can be identified by the ONU and convert the configuration information of the OLT into a message format which can be identified by the OLT." See elements 1[f], 1[g], 5 above.

VIII. GROUND 2: CLAIMS 3 AND 10 ARE OBVIOUS OVER BERNSTEIN IN VIEW OF TSUGE AND THE KNOWLEDGE OF ONE OF SKILL IN THE ART AND IN FURTHER VIEW OF MEF 6.1

1. Claim 3

3. The method according to claim 2, wherein, the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to the services opened by the ONU.

124. Claim 3 would have been obvious to one of skill in the art based upon the Bernstein's disclosures alone or in view of Tsuge and the knowledge of one of skill in the art, in further view of MEF 6.1. As noted above, the elements of Claim 2 would have been obvious to one of skill in the art. *See* Ground 2, Claim 2, above.

125. The disclosures in MEF 6.1 would have motivated a POSA to employ the systems and methods disclosed in Bernstein for Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services, and use of configuration information of the OLT comprising one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to these Ethernet services would have been obvious in light of those disclosures. MEF 6.1 is from the same field as Bernstein (Ethernet based optical network services) and reasonable pertinent to the problem of configuring such a network to provide for such services. EX1007 12-14.

126. At the time of the invention, April 13, 2011, it was conventional to provide Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services. *Id.*

127. For example, the MEF Technical Specification, MEF 6.1, Ethernet Services Definitions – Phase 2, published in April 2008, explained that "Ethernet Service types are generic constructs used to create a broad range of services." *Id*.,

12. MEF 6.1 defined Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services. *Id*. at 12-21.

MEF Ethernet Services Definitions, Phase 2 – MEF 6.1



Figure 1: Ethernet Service Definition Framework

This document defines three Ethernet Service type generic constructs, namely, Ethernet Line (E-Line) Service type (refer to Section 6.1), Ethernet LAN (E-LAN) Service type (refer to Section 6.2) and Ethernet Tree (E-Tree) Service type (refer to Section 6.3), and their associated service attributes and parameters. The key differentiator is the type of connectivity provided, as indicated by the 'EVC Type' service attribute. The UNI and EVC service attributes and parameters are normatively defined in [2].

More than one Ethernet Service is defined for each of the three Ethernet Service types. These are differentiated by the method for service identification used at the UNIs. Services using All to One Bundling UNIs (port-based) are referred to as 'Private', while services using UNIs that are that are Service Multiplexed (VLAN-based), are referred to as 'Virtual Private'. This relationship is shown in Table 2 below.

Service Type	Port-Based (All to One Bundling)	VLAN-Based (EVC identified by VLAN ID)
E-Line (point-to-point EVC)	Ethernet Private Line (EPL)	Ethernet Virtual Private Line (EVPL)[1]
E-LAN (multipoint-to-multipoint EVC)	Ethernet Private LAN (EP-LAN)	Ethernet Virtual Private LAN (EVP-LAN)
E-Tree (rooted multipoint EVC)	Ethernet Private Tree (EP-Tree)	Ethernet Virtual Private Tree (EVP-Tree)

Id., 13. Specifically, E-LINE services are "any services based on Point-to-Point Ethernet Virtual Connection (EVC)" between devices, while E-LAN services relate to any service "based upon a Multipoint-to-Multipoint EVC" and E-TREE services are "based upon a Rooted-Multipoint" EVC. *Id*., 14-18.

128. It was equally well-known that the definitions for these services entailed user port information, virtual local area network information and user media access control (MAC) information. As shown above, the definition of those services

explicitly identified configuration parameters associated with those services to include a virtual local area network (VLAN), a user port and/or a user media access control (MAC) address of the OLT related to the services opened by the ONU. *Id*., 13-21.

129. Bernstein explains that his system may be used on an "Ethernet PON" and "ONUs 24 convert the optical signals into digital Ethernet packets that are sent over an Ethernet cable 26 to different Customer Premise Equipment (CPE)." *Id*., 1:66-2:29. It would have been obvious to a POSA at least as of April 13, 2011, to provide E-LINE, E-TREE and/or E-LAN services—as defined in the MEF 6.1 specification—over the DPoE system of Bernstein because Bernstein describes the use of Ethernet protocols to communicate with ONUs and the E-LINE, E-TREE and E-LAN services were conventional services specifically designed to provide protocols for Ethernet-based communications between devices.

130. POSAs would have reasonably expected, at least as of April 13, 2011, that the conventional E-LINE, E-TREE and/or E-LAN services protocols would be suitable and successful for providing Ethernet communications between devices because each of these services were long-established, widely utilized, off-the-shelf solutions for doing just that. *Id*., 12. For example, "With the introduction of Metro Ethernet services [in 2004], Service Providers started using this Ethernet 'connectivity' technology to provide Ethernet 'services'" *Id.*, 12 and fn. 1. In 2008,

MEF introduced the claimed services, which were described as "three generic service constructs called Ethernet Service types and specifies their associated service attributes and parameters used to create Point-to-Point, Multipoint-to-Multipoint, and Rooted-Multipoint Ethernet services" "and are defined based on the service attributes that might appear in a Service Level Agreement (SLA) or Service Level Specification (SLS)" between data service providers and its subscribers. *Id*. A POSA would also understand that the recited services "are agnostic of the underlying network infrastructure" and thus could be used on a variety of underlying networks technologies, such as HFCs, PONs and the like.

2. Claim 10

10. The network according to claim 9, wherein, the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to the services opened by the ONU.

131. Claim 10 would have been obvious to one of skill in the art based upon the Bernstein's disclosures alone or in view of Tsuge and the knowledge of one of skill in the art, in further view of MEF 6.1. as noted above with respect to Claim 3. *See also* Ground 1, element 9.

IX. GROUND 3: CLAIMS 1-2, 4-9 AND 11 ARE OBVIOUS OVER TSUGE IN VIEW OF BERNSTEIN, OR IN FURTHER VIEW OF IWASAKA AND/OR PUE

1. Independent Claim 1

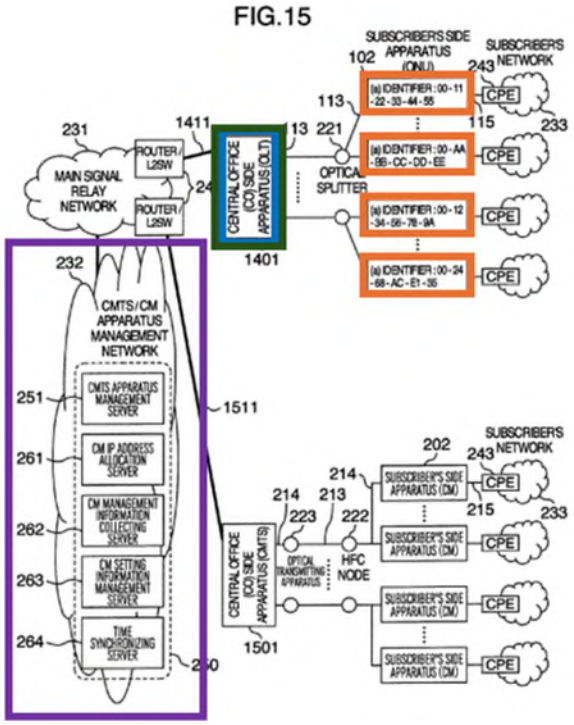
Preamble: 1. A service auto-configuration method of a DOCSIS Provisioning Of EPON (DPoE) system, comprising:

132. To the extent the preamble is limiting, as discussed herein, Tsuge discloses an auto-configuration method of a DOCSIS Provisioning Of EPON (DPoE) system. Tsuge discloses a method for provisioning DOCSIS services on ONU/OLT hardware in a "GE-PON" (*i.e.* Gigabyte Ethernet PON), or any other type of PON. EX1008, 6:47-55 and 14:40-15:22.

Element 1[a]: the DPoE system acquiring a configuration file from a back-office management system, wherein the configuration file comprises both configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPoE system;

133. Tsuge discloses a DPoE system acquiring a configuration file from a back-office management system, wherein the configuration file comprises both configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT).

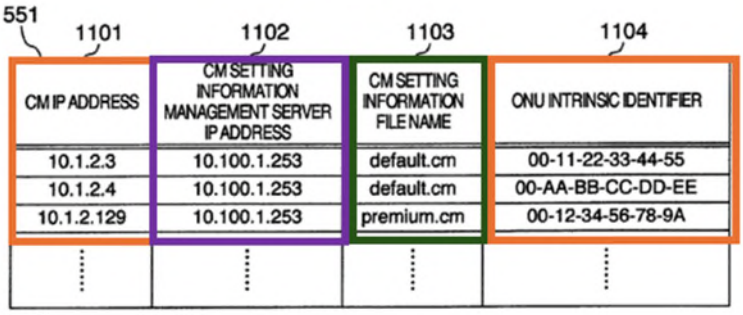
134. Tsuge discloses a "CMTS/CM Apparatus Management Network 232" that comprises a conventional DOCSIS back-office management system [PURPLE] that, *inter alia*, stores and provides DOCSIS configuration files:



Id. (citing EX1008, FIG. 15) (annotated).

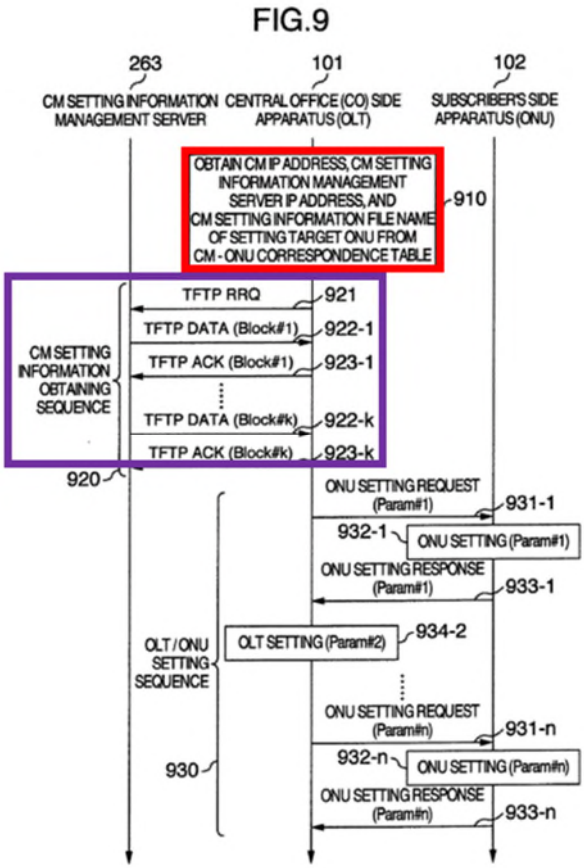
135. Tsuge's DPoE System, OLT/DPON 1401 [DARK GREEN/BLUE] may request a configuration file in the form of a "CM setting information file" from the "CM setting information management server 263[.]" EX1008, 14:40-61. Tsuge further explains that, in accordance with the DOCSIS standard, the OLT requests and obtains the file using "the TFTP." *Id*. Tsuge's OLT stores configuration file name [DARK GREEN] and back-office server address information [PURPLE] for each ONU [ORANGE] in a table, as shown in FIG. 11:

FIG.11



Id. (citing EX1008, 15:59-33).

136. Figure 9 illustrates this acquisition. The OLT constructs a request using information in "CM-ONU correspondence table 551" (step 910 [RED]). The OLT sends the request to the CM setting information management server 263, which "[a]ccording to the DOCSIS standard . . . is executed . . . by the TFTP" and, in response, receives the configuration file (step 920 [PURPLE]):



EX1008, 14:20-61, FIG. 9 (annotated).

137. The acquired configuration file consists of both configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT). Tsuge explains that "[t]he contents of the setting parameters are converted into the ONU setting information signal 543 or the settings to the OLT itself or into both of them [.]" *Id.*, 15:1-4 (emphasis added).

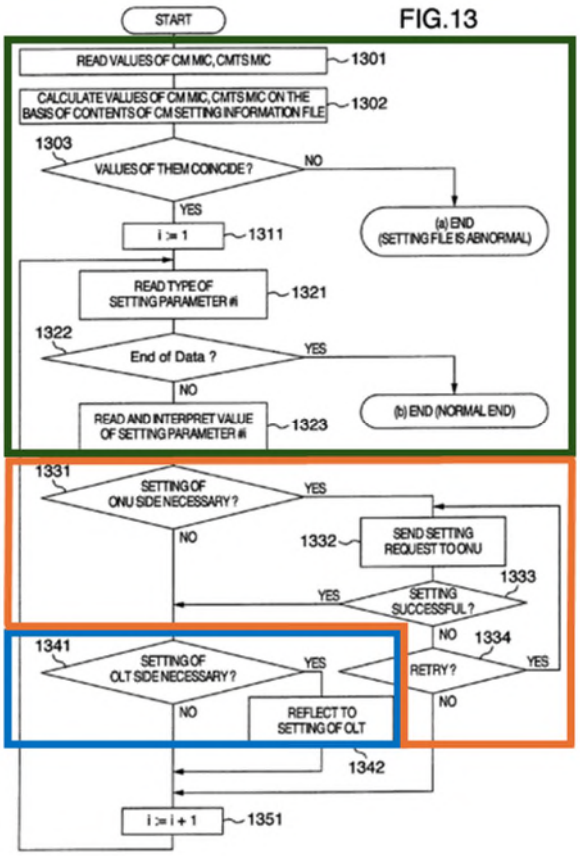
138. For the foregoing reasons, Tsuge discloses "the DPoE system acquiring a configuration file from a back-office management system, wherein the configuration file comprises both configuration information of an optical network

unit (ONU) and configuration information of an optical line terminal (OLT) in the DPoE system."

Element 1[b]: the DPoE system analyzing the acquired configuration file, and obtaining both the configuration information of the ONU and the configuration information of the OLT; and

139. Tsuge discloses that its DPOE system analyzes the acquired configuration file and obtains both configuration information for the ONU and configuration information for the OLT.

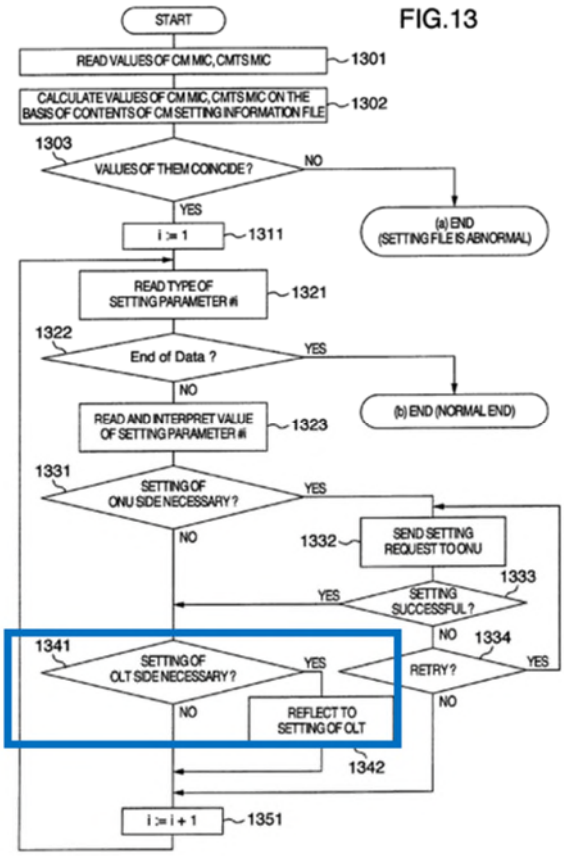
140. After the "CM setting information file" (configuration file) is obtained, the DPoE system's OLT 101 performs "CM setting obtaining/converting function 503" in which it "searches for the parameters of the CM MIC [*i.e.*, ONU parameter] and the CMTS MIC [*i.e.*, OTL parameters] from the file and reads out their values (step 1301)." EX1008, 10:60-11:3 and 16:39-52. The OLT loops through the CM setting information file, "sequentially read[ing] the setting parameters," and "read[s] out" setting parameter values and "interprets" therefrom "what kind of settings are necessary in the PON[.]" EX1008, 16:53-17:24. This process is illustrated in Figure 13:



Id., Fig. 13 (annotated).

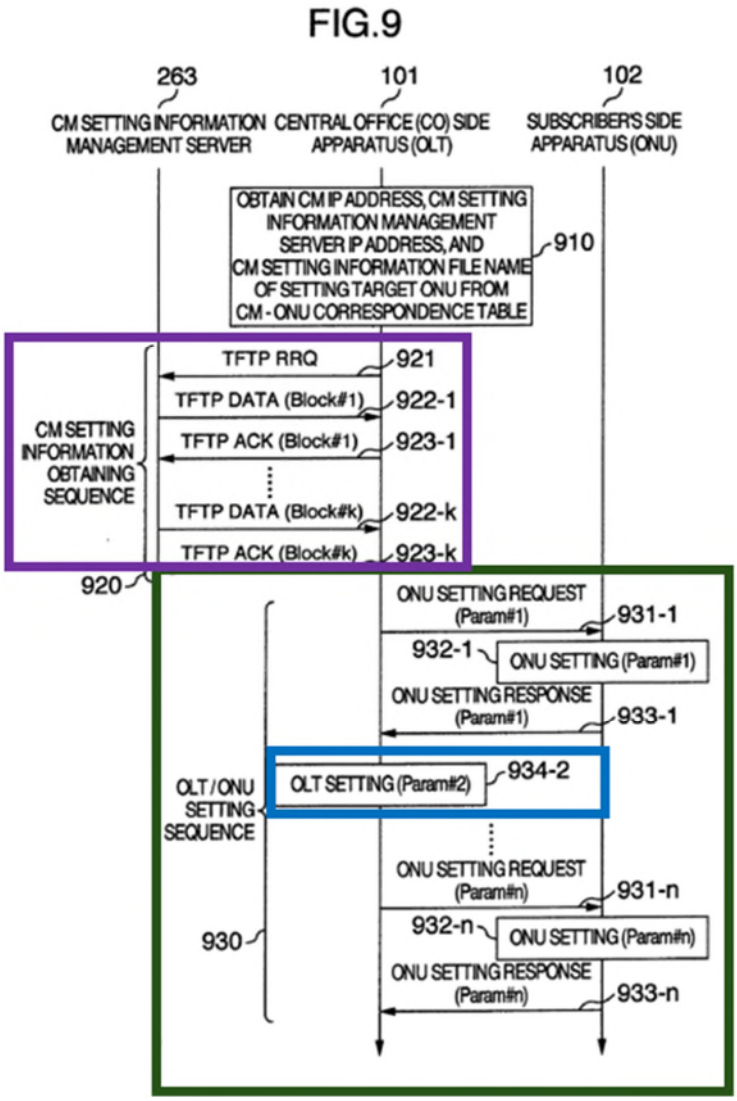
Element 1[c]: the DPoE system configuring the OLT locally according to the configuration information of the OLT

141. The OLT in Tsuge is configured locally according to the configuration information of the OLT. Tsuge discloses that, as parameters are extracted from the configuration file, "if the setting on the OLT side is necessary [based on the parameter's value], the setting is reflected to the OLT (step 1342) [BLUE]:



EX1008, 16:53-17:24, Fig. 13 (annotated); *see also* 14:62-15:22 ("In the case where they are converted into the settings to the OLT *itself*, the settings are reflected to the OLT (step 934).)"

142. Figure 9 depicts this process: following acquisition of the configuration file [PURPLE], OLT "Param#2" [DARK GREEN] is extracted, and the OLT is configured locally though the "OLT SETTING" function (step 934-2) [BLUE]:



Id., FIG. 9 (annotated).

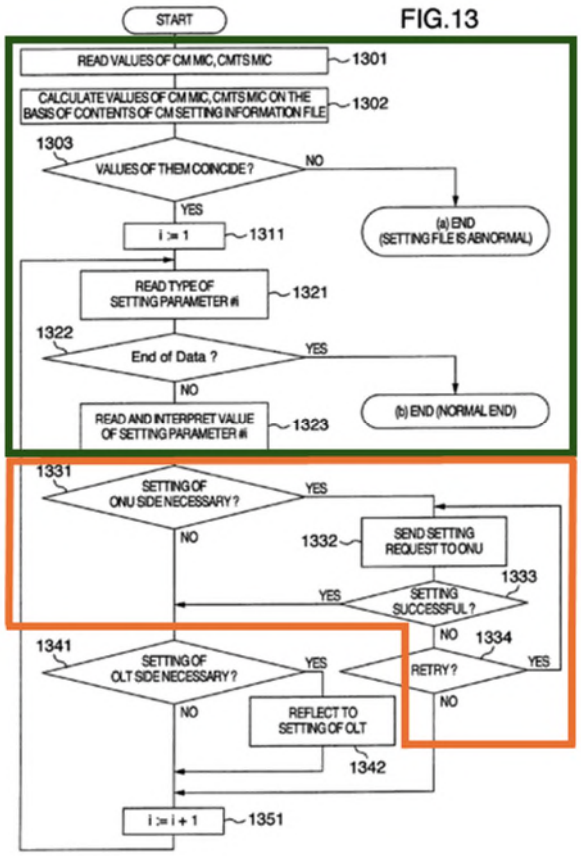
143. A POSA would understand step 934-2 is performed locally because, as shown, "OLT Setting" is conducted on OLT 101 without outside communications. EX1008, Fig. 9 (annotated); *see also* 18:25-38 ("upstream communication bandwidth setting information is stored as setting for the LLID into the OLT by the

OLT-ONU setting sequence 930 shown in FIG. 9 (step 1810)[.]"), Fig. 18 (step 1810)).

144. For the foregoing reasons, Tsuge discloses "the DPoE system configuring the OLT locally according to the configuration information of the OLT."

Element 1[d]: and meanwhile configuring the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU;

145. Tsuge discloses that the ONU is meanwhile configured according to the configuration information of the ONU. Tsuge states "[i]f the setting of the ONU is necessary (step 1331) as a result of the interpretation in step 1323, the corresponding ONU setting request message is transmitted to the ONU (step 1332)[.]" EX1008, 16:64-17:10.

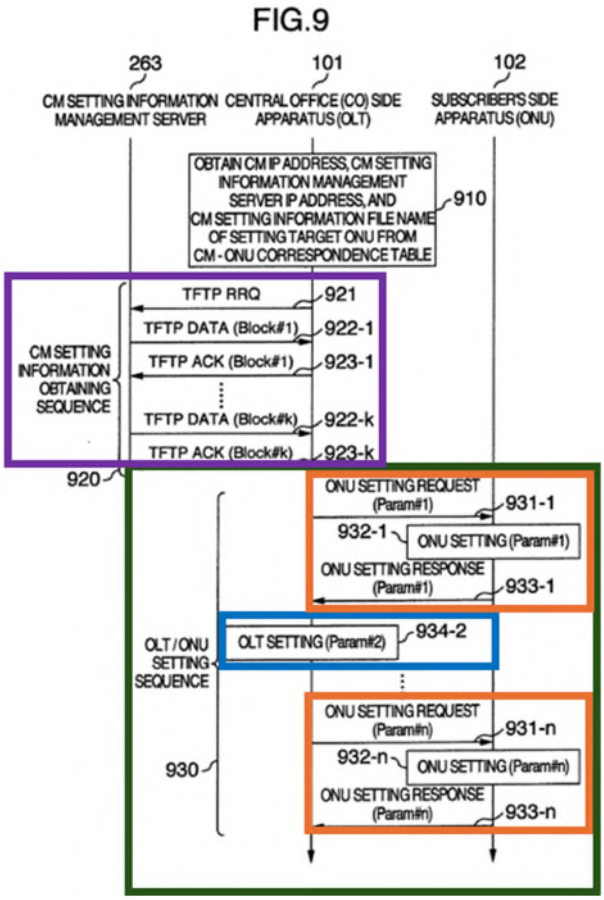


EX1008, Fig. 13.

146. Tsuge explains that both the ONU and OLT are simultaneously configured in the course of the parsing of the configuration file. According to the algorithm shown in FIG. 13, "the OLT 101 sequentially interprets setting parameters included in the CM setting information file." EX1008, 14:62-67. As OLT 101 identifies each setting parameter, "the value of the setting parameter is read out and what kind of settings are necessary in the PON are interpreted together with the type value (step 1323)." *Id.*, 16:60-63. "If the setting of the ONU is necessary (step 1331) as a result of the interpretation in step 1323, the

corresponding ONU setting request message is transmitted to the ONU (step 1332)." *Id.*, 16:64-66. "If the setting on the OLT side is necessary, the setting is reflected to the OLT (step 1342)." *Id.*, 17:16-17.

Figure 9 depicts the simultaneous application of configuration changes to both the OLT [BLUE] and the ONU [ORANGE] during the OLT-ONU setting sequence 930 [DARK GREEN]:



Id., Fig. 9 (annotated).

147. Tsuge also teaches that such configuring occurs via a management channel between the OLT and ONU. Tsuge explains that its system uses "a

specific protocol and a detailed message transmitting and receiving sequence … for the ONU setting request message …. For example, in the case of in the GE-PON, the MPCP and the OAM sub-layer of IEEE 802.3ah standard." EX1008, 15:18-20. The '982 Patent confirms that an OAM channel is a management channel. EX1001, 5:18-20.

148. For the foregoing reasons, Tsuge discloses configuring the OLT "and meanwhile configuring the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU."

Element 1[e]: wherein, the method is performed in a process of ONU initialization; and

149. Tsuge teaches that its method is performed part of the ONU initialization process. Tsuge explains its method may be employed during the *initial* setting of the ONU. EX1008, 4:46-56 ("the OLT receives the *initial setting information* of the CM by using the address information and the file name of the TFTP server obtained by the DHCP and *makes initial setting* corresponding to its contents to the ONU by using the protocol of the PON interval (or, reflects it to the setting of the OLT itself).")))

Element 1[f]: wherein, when analyzing the acquired configuration file, the DPoE system further converts the configuration information of the ONU into a message format which can be identified by the ONU, and

150. Tsuge explains that, when analyzing the acquired configuration file, the OLT of its DPoE system further converts the configuration information of the

ONU into a message format which can be identified by the ONU. EX1008, 12:22-28 ("[i]f the PON is the GE-PON, the MPCP protocol of the IEEE 802.3ah standard is used for a part or all of the … ONU setting information signal 543[.]")); *see also id.* (citing EX1008, 4:46-50 ("the OLT … makes initial setting corresponding to its contents to the ONU **by using the protocol of the PON interval**[.]") (emphasis added); EX1008, 4:34-37 ("**The OLT converts** the CM apparatus control signal received in the apparatus management interface **into an ONU apparatus control signal** which is used in the PON interval and transmits toward the ONU.”))(emphasis added).

151. Moreover, it would have been obvious to a POSA to convert CM setting information into a message format that would be understood by the ONU, because the setting information would otherwise be unusable. A POSA would have understood how to make such a conversion and would have had a reasonable expectation of success in doing so.

Element 1[g]: converts the configuration information of the OLT into a message format which can be identified by the OLT.

152. Tsuge's system converts the configuration information of the OLT into a message format which can be identified by the OLT. Tsuge explains that the CM setting information is converted "into settings to the OLT itself[.]" EX1008, 4:46-51. Figure 9 depicts storage of upstream communication bandwidth setting

information as a setting for the LLID in the OLT as part of the OLT-ONU setting sequence 930 (step 1810). *Id.*, 18:25-36.

153. Moreover, it would have been obvious to a POSA, in light of their knowledge and/or in light of the teachings of Bernstein, to convert CM setting information into a message format that would be understood by the OLT, because the setting information would otherwise be unusable. See Ground 1, element 1[g] A POSA would have understood how to make such a conversion and would have had a reasonable expectation of success in doing so.

2. Claim 2

2. The method according to claim 1, wherein, the configuration information of the OLT is configuration information related to services opened by the ONU.

154. Claim 2 is obvious over Tsuge in view of Bernstein and/or the knowledge of one of skill in the art. Tsuge discloses that "the configuration information of the OLT is configuration information related to services opened by the ONU." *See* element 1[c].

3. Independent Claim 4

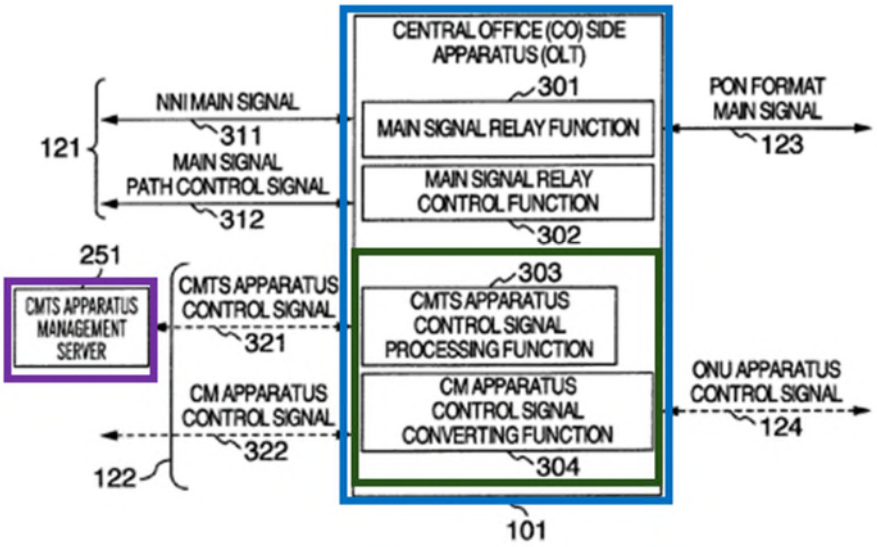
Element 4[preamble]: 4. A data over cable service interface system (DOCSIS) Provisioning Of EPON (DPoE) system, comprising

155. Claim 4 is obvious over Tsuge in view of Bernstein and/or the knowledge of one of skill in the art. Tsuge discloses "A data over cable service interface system (DOCSIS) Provisioning Of EPON (DPoE) system." See element 1[preamble] above.

Element 4[a]: an acquisition unit, an analyzing unit and a configuration unit; wherein, during an process of an optical network unit (ONU) initialization,

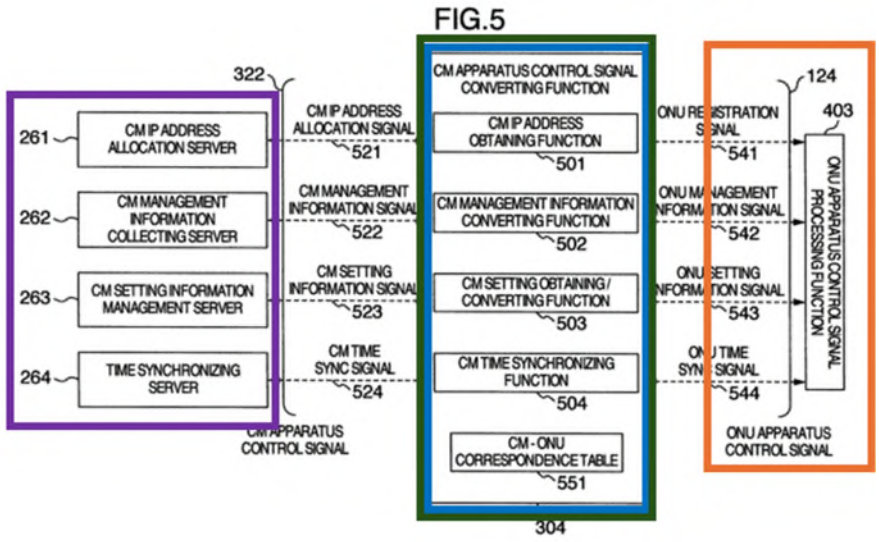
156. Tsuge discloses an acquisition unit, an analyzing unit and a configuration unit at least because it discloses a DPoE system comprising OLT 101 programmed with a CM Apparatus Control Signal Converting Function 304 (the equivalent of a virtual cable modem). EX1008, 9:17-21 and 10:60-11:3, 11:57-12:2, Figs. 3. *See* elements 1[preamble], 1[a].

FIG.3



157. Specifically, Tsuge discloses a DPoE system comprising OLT 101 consisting of software and related hardware, including CM Apparatus Control Signal Converting Function 304 having CM Setting Obtaining/Converting Function 503 [BLUE], configured to "obtain[] a CM setting information signal 523" (*i.e.* a configuration file) from a back-office management system [PURPLE]

(*i.e.* CM Setting Information Management Server 263). *Id.*, 11:57-12:2. *See also* element 1[a], above, and 4[b], below.



158. Tsuge discloses a DPoE system comprising OLT 101 consisting of software and related hardware, including CM Apparatus Control Signal Converting Function 304 having CM Setting Obtaining/Converting Function 503, configured to analyze the acquired configuration file and obtain both the configuration information of the ONU and the configuration information of the OLT. EX1008, 11:57-12:2; *see also* element 1[b], above and 4[c], below.

159. Tsuge discloses a DPoE system comprising OLT 101 consisting of software and related hardware, including CM Apparatus Control Signal Converting Function 304 having CM Setting Obtaining/Converting Function 503, configured to configure the OLT locally according to the configuration information of the

OLT and meanwhile configure the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU. *Id.*, 12:22-28; *see also* element 1[c]-[d], above and 4[d]-[e] below.

160. Lastly, Tsuge discloses that its acquisition unit, analyzing unit and configuration unit operate "during an [sic] process of an optical network unit (ONU) initialization" at least for the reasons set forth above with respect to element 1[e].

Element 4[b]: the acquisition unit is configured to acquire a configuration file from a back-office management system, wherein the configuration file comprises configuration both information of the ONU and configuration information of an optical line terminal (OLT) in the DPoE system;

161. Tsuge teaches the acquisition unit is configured to acquire a configuration file from a back-office management system, wherein the configuration file comprises configuration both information of the ONU and configuration information of an optical line terminal (OLT) in the DPoE system. See element 1[a] and 4[a] above.

a. Element 4[c]

the analyzing unit is configured to analyze the acquired configuration file and obtain both the configuration information of the ONU and the configuration information of the OLT; and

162. Tsuge teaches the analyzing unit is configured to analyze the acquired configuration file and obtain both the configuration information of the ONU and the configuration information of the OLT. See element 1[b] and 4[a] above.

b. Element 4[d]

the configuration unit is configured to configure the OLT locally according to the configuration information of the OLT and meanwhile configure the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU.

163. Tsuge teaches the configuration unit is configured to configure the OLT locally according to the configuration information of the OLT and meanwhile configure the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU. See elements 1[c]-[d] and 4[a] above.

4. Claim 5

5. The system according to claim 4, wherein, the analyzing unit is further configured to, when analyzing the acquired configuration file, convert the configuration information of the ONU into a message format which can be identified by the ONU and convert the configuration information of the OLT into a message format which can be identified by the OLT.

164. Claim 5 is obvious over Tsuge in view of Bernstein and/or the knowledge of one of skill in the art. Tsuge teaches this element. See elements 1[f]-[g] above.

5. Claim 6

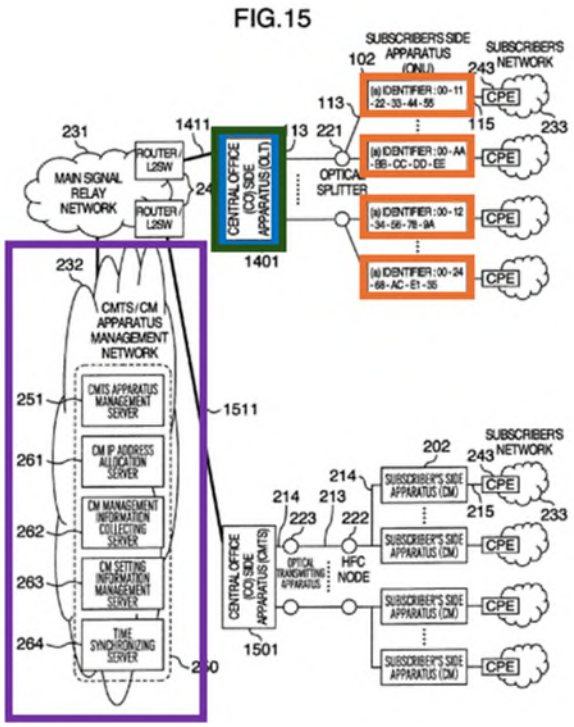
164.1. Claim 6 is obvious over Tsuge in view of Bernstein and/or the knowledge of one of skill in the art.

Element 6[preamble]: 6. A service auto-configuration network of a DOCSIS Provisioning Of EPON (DPoE) system, comprising

165. Tsuge discloses "A service auto-configuration network of a DOCSIS Provisioning Of EPON (DPoE) system." See element 1[preamble] above.

Element 6[a]: a DPoE system, a back-office management system and a plurality of optical network units (ONUs);

166. Tsuge discloses "a DPoE system, a back-office management system and a plurality of optical network units (ONUs)." Figure 15 depicts a "CMTS/CM Apparatus Management Network 232" that comprises a conventional DOCSIS back-office management system [PURPLE] and a plurality of ONUs [ORANGE]:



Id. (citing EX1008, FIG. 15) (annotated).

Element 6[b]: wherein, the DPoE system comprises an acquisition unit, an analyzing unit and a configuration unit; wherein, during an process of an optical network unit (ONU) initialization,

167. Tsuge teaches wherein, the DPoE system comprises an acquisition unit, an analyzing unit and a configuration unit; wherein, during an process of an optical network unit (ONU) initialization. See element 4[a] above.

Element 6[c]: the acquisition unit is configured to acquire a configuration file from a back-office management system, wherein the configuration file comprises configuration both information of the ONU and configuration information of an optical line terminal (OLT) in the DPoE system;

168. Tsuge teaches the acquisition unit is configured to acquire a configuration file from a back-office management system, wherein the configuration file comprises configuration both information of the ONU and configuration information of an optical line terminal (OLT) in the DPoE system. See element 4[b] above.

Element 6[d]: the analyzing unit is configured to analyze the acquired configuration file and obtain both the configuration information of the ONU and the configuration information of the OLT; and

169. Tsuge teaches the analyzing unit is configured to analyze the acquired configuration file and obtain both the configuration information of the ONU and the configuration information of the OLT. See element 4[c] above.

Element 6[e]: the configuration unit is configured to configure the OLT locally according to the configuration information of the OLT and meanwhile configure the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU; and

170. Tsuge teaches the configuration unit is configured to configure the OLT locally according to the configuration information of the OLT and meanwhile

configure the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU. See element 4[d] above.

Element 6[f]: the back-office management system is configured to: save the configuration file, and download the configuration file to the DPoE system, wherein the configuration file comprises the configuration information of the ONU and the configuration information of the OLT in the DPoE system.

171. Tsuge discloses that "the back-office management system is configured to: save the configuration file, and download the configuration file to the DPoE system, wherein the configuration file comprises the configuration information of the ONU and the configuration information of the OLT in the DPoE system." As explained in more detail above in element 1[a] above, Tsuge discloses a conventional DOCSIS back-office TFTP server [PURPLE] that saves configuration files [DARK GREEN] that contain both configuration information of the ONU [ORANGE] and of the OLT, and download that file to the DPoE system in response to a request for a configuration file:

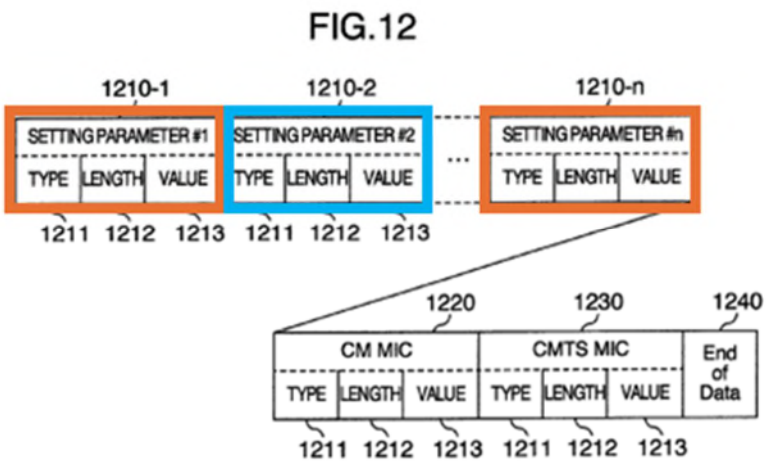
FIG.11

551

1101	1102	1103	1104
CM IP ADDRESS	CM SETTING INFORMATION MANAGEMENT SERVER IP ADDRESS	CM SETTING INFORMATION FILE NAME	ONU INTRINSIC IDENTIFIER
10.1.2.3	10.100.1.253	default.cm	00-11-22-33-44-55
10.1.2.4	10.100.1.253	default.cm	00-AA-BB-CC-DD-EE
10.1.2.129	10.100.1.253	premium.cm	00-12-34-56-78-9A
⋮	⋮	⋮	⋮

Id., 14:40-61, 15:59-62, Figs. 11 and 12 (annotated). Tsuge further explains that, in accordance with the DOCSIS standard, the OLT requests and obtains the file using "the TFTP." *Id*. See element 1[a] above.

172. Tsuge also explains that the configuration file comprises the configuration information of the ONU and the configuration information of the OLT in the DPoE system. This is illustrated in Figure 12, which shows the structure of the configuration files having parameters for configuring ONUs [ORANGE] and OLTs [BLUE]:



EX1008, Fig. 12 (annotated).

6. Claim 7

7. The network according to claim 6, wherein, the back-office management system comprises a trivial file transfer protocol (TFTP) server configured to: receive a TFTP request initiated by the DPoE system, respond to that TFTP request, and download the configuration file to the DPoE system.

173. Claim 7 is obvious over Tsuge in view of Bernstein and/or the knowledge of one of skill in the art. Tsuge discloses that "the back-office management system comprises a trivial file transfer protocol (TFTP) server configured to: receive a TFTP request initiated by the DPoE system, respond to that TFTP request, and download the configuration file to the DPoE system." As explained in more detail above in element 1[a] above, Tsuge discloses a TFTP server that saves configuration files that contain both configuration information of the ONU and of the OLT, and downloads that file to the DPoE system in response to a request for a configuration file. *See* element 1[a] above.

7. Claim 8

8. The network according to claim 7, wherein, the configuration information of the OLT is configuration information related to services opened by the ONU.

174. Claim 8 is obvious over Tsuge in view of Bernstein and/or the knowledge of one of skill in the art. Tsuge discloses "wherein, the configuration information of the OLT is configuration information related to services opened by the ONU." *See* Claim 2 above.

8. Claim 9

9. The network according to claim 6, wherein, the configuration information of the OLT is configuration information related to services opened by the ONU.

175. Claim 9 is obvious over Tsuge in view of Bernstein and/or the knowledge of one of skill in the art. Tsuge discloses "wherein, the configuration information

of the OLT is configuration information related to services opened by the ONU." *See* Claim 2 above.

9. Claim 11

11. The network according to claim 6, wherein, the analyzing unit is further configured to, when analyzing the acquired configuration file, convert the configuration information of the ONU into a message format which can be identified by the ONU and convert the configuration information of the OLT into a message format which can be identified by the OLT.

176. Claim 11 is obvious over Tsuge in view of Bernstein and/or the knowledge of one of skill in the art. Tsuge discloses "wherein, the analyzing unit is further configured to, when analyzing the acquired configuration file, convert the configuration information of the ONU into a message format which can be identified by the ONU and convert the configuration information of the OLT into a message format which can be identified by the OLT." *See* Claims 5 and 6 above.

X. GROUND 4: CLAIMS 3 AND 10 ARE OBVIOUS OVER TSUGE IN VIEW OF BERNSTEIN AND THE KNOWLEDGE OF ONE OF SKILL IN THE ART AND IN FURTH VIEW OF MEF 6.1

176.1. The combination of Tsuge, Bernstein, the MEF 6.1 Ethernet Services Definition specification and the knowledge of one of ordinary skill in the art render obvious Claims 3 and 10.

1. Claim 3

3. The method according to claim 2, wherein, the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC)

address of the OLT related to the services opened by the ONU.

177. Claim 3 would have been obvious to one of skill in the art based upon the Tsuge's disclosures alone or in view of Bernstein and the knowledge of one of skill in the art, in further view of MEF 6.1. As noted above, the elements of Claim 2 would have been obvious to one of skill in the art. *See* Ground 2, Claim 2, above.

178. The disclosures in MEF 6.1 would have motivated a POSA to employ the systems and methods disclosed in Bernstein for Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services, and use of configuration information of the OLT comprising one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to these Ethernet services would have been obvious in light of those disclosures. MEF 6.1 is from the same field as Bernstein (Ethernet based optical network services) and reasonable pertinent to the problem of configuring such a network to provide for such services. EX1007, 7-9.

179. At the time of the invention, April 13, 2011, it was conventional to provide Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services. *Id.* 7-9, 12-14.

180. For example, the MEF Technical Specification, MEF 6.1, Ethernet Services Definitions – Phase 2, published in April 2008, explained that "Ethernet Service types are generic constructs used to create a broad range of services." *Id*.,

7. MEF 6.1 defined Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services. *Id*. at 7-21.

MEF Ethernet Services Definitions, Phase 2 – MEF 6.1



Figure 1: Ethernet Service Definition Framework

This document defines three Ethernet Service type generic constructs, namely, Ethernet Line (E-Line) Service type (refer to Section 6.1), Ethernet LAN (E-LAN) Service type (refer to Section 6.2) and Ethernet Tree (E-Tree) Service type (refer to Section 6.3), and their associated service attributes and parameters. The key differentiator is the type of connectivity provided, as indicated by the 'EVC Type' service attribute. The UNI and EVC service attributes and parameters are normatively defined in [2].

More than one Ethernet Service is defined for each of the three Ethernet Service types. These are differentiated by the method for service identification used at the UNIs. Services using All to One Bundling UNIs (port-based) are referred to as 'Private', while services using UNIs that are that are Service Multiplexed (VLAN-based), are referred to as 'Virtual Private'. This relationship is shown in Table 2 below.

Service Type	Port-Based (All to One Bundling)	VLAN-Based (EVC identified by VLAN ID)
E-Line (point-to-point EVC)	Ethernet Private Line (EPL)	Ethernet Virtual Private Line (EVPL)[1]
E-LAN (multipoint-to-multipoint EVC)	Ethernet Private LAN (EP-LAN)	Ethernet Virtual Private LAN (EVP-LAN)
E-Tree (rooted multipoint EVC)	Ethernet Private Tree (EP-Tree)	Ethernet Virtual Private Tree (EVP-Tree)

Id., 13. Specifically, E-LINE services are "any services based on Point-to-Point Ethernet Virtual Connection (EVC)" between devices, while E-LAN services relate to any service "based upon a Multipoint-to-Multipoint EVC" and E-TREE services are "based upon a Rooted-Multipoint" EVC. *Id*., 14-18.

181. It was equally well-known that the definitions for these services entailed user port information, virtual local area network information and user media access control (MAC) information. As shown above, the definition of those services

explicitly identified configuration parameters associated with those services to include a virtual local area network (VLAN), a user port and/or a user media access control (MAC) address of the OLT related to the services opened by the ONU. *Id.*, 13-21.

182. Tsuge explains his system is a GE-PON specified by IEEE 802.3ah which transmits "data packets" via Layer 2 of the Open Systems Interconnection (OSI) networking model. EX1008, 9:23-39. The IEEE 802.3ah standard is an amendment to the base 802.3 Ethernet standard which extended the delivery of Ethernet services in access networks using -supported copper and fiber techniques. *Id.* Ethernet communications entail transmission of "data packets" via Layer 2 of the OSI. It would have been obvious to a POSA at least as of April 13, 2011, to provide E-LINE, E-TREE and/or E-LAN services—as defined in the MEF 6.1 specification—over the DPoE system of Tsuge because Tsuge describes the use of Ethernet protocols to communicate with ONUs and the E-LINE, E-TREE and E-LAN services were conventional services specifically designed to provide protocols for Ethernet-based communications between devices.

183. POSAs would have reasonably expected, at least as of April 13, 2011, that the conventional E-LINE, E-TREE and/or E-LAN services protocols would be suitable and successful for providing Ethernet communications between devices because each of these services were long-established, widely utilized, off-the-shelf

solutions for doing just that. EX1007, 12. For example, "With the introduction of Metro Ethernet services [in 2004], Service Providers started using this Ethernet 'connectivity' technology to provide Ethernet 'services'" *Id.*, 12 and fn. 1. In 2008, MEF introduced the claimed services, which were described as "three generic service constructs called Ethernet Service types and specifies their associated service attributes and parameters used to create Point-to-Point, Multipoint-to-Multipoint, and Rooted-Multipoint Ethernet services" "and are defined based on the service attributes that might appear in a Service Level Agreement (SLA) or Service Level Specification (SLS)" between data service providers and its subscribers. *Id*. A POSA would also understand that the recited services "are agnostic of the underlying network infrastructure" and thus could be used on a variety of underlying networks technologies, such as HFCs, PONs and the like.

2. Claim 10

10. The network according to claim 9, wherein, the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to the services opened by the ONU.

184. Claim 10 would have been obvious to one of skill in the art based upon the Tsuge's disclosures alone or in view of Bernstein and the knowledge of one of skill in the art, in further view of MEF 6.1, as noted above with respect to Claim 3. *See also* Ground 3, element 9.

XI. CONCLUSION

185. The inventions recited in Claims 1-11 are anticipated by Bernstein, and/or would have been obvious to a POSA based upon the disclosures in Bernstein in light of the knowledge of persons of skill in the art at the time and/or the teaching of Tsuge and/or MEF 6.1; the inventions recited in Claims 1-11 also would have been obvious to a POSA based upon the disclosures in Tsuge in light of the knowledge of persons of skill in the art at the time and/or the teaching of Bernstein and MEF 6.1.

Signature Page Follows.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on July 26, 2024



Paul Min

EXHIBIT 1

Paul S. Min, Ph.D.
Washington University in Saint Louis
(Webpage : https://engineering.wustl.edu/faculty/Paul-Min.html)

psm@wustl.edu
+1 (314) 853-6200 (phone)

Campus Box 1223
Academy Building Room 218A
St. Louis, MO 63130

Education

Year	College or University	Degree
1987	The University of Michigan	Ph.D. in Electrical Engineering
1984	The University of Michigan	M.S. in Electrical Engineering
1982	The University of Michigan	B.S. in Electrical Engineering

Professional Experience

From: 1990
To: Present
Organization: Washington University, St. Louis

Summary:

2015 -	Senior Professor - Department of Electrical Systems Engineering
2011 – 2014	Chair – Undergraduate Curriculum, Department of Electrical and Systems Engineering
2000 – 2002	Chair – Graduate Curriculum, Department of Electrical and Systems Engineering
2002 - 2014	Associate Professor - Department of Electrical and Systems Engineering
1997 - 2008	On leave from full-time duty at Washington University – as Presidents of MinMax Technologies and Erlang Technology.)
1996 - 2002	Associate Professor - Department of Electrical Engineering
1996	Promoted with Tenure

1990 - 1996 Assistant Professor - Department of Electrical Engineering

Teaching Experience

- "Transmission System and Multiplexing," Washington University, ESE 571
- "Electrical Laboratory I," Washington University, EE 250.
- "Communication Theory," Washington University, ESE 471.
- "Reliability and Quality Control," Washington University, ESE 405/505
- "Signaling and Control of Communications Networks," Washington University, ESE 572.
- "Introduction to Electronic Circuits," Washington University, ESE232
- "Queueing Systems and Discrete Stochastic Processes," Washington University, EE 536 / CS 567.
- "Digital Computer," Washington University, EE 260M / CS 260.
- "Data Networks," Washington University, EE 530.
- "Electrical Circuit Analysis," Washington University, ESE 230.
- "Computer/Communications System Analysis I," Washington University, EE 557/ CS 557.
- "Computer/Communications System Analysis II," Washington University, EE558 / CS 558.
- "Digital Systems Laboratory," Washington University, EE 455 / CS 455.

From:	1999
To:	2008
Organization:	Erlang Technology, Inc., St. Louis, Missouri
Title:	Founder and President
Summary:	Up to 70 employees, $40M in total capital raised from 5 VCs and 3 Corporations Received "Product of Year" Award from Analog Zone Magazine in 2004

From:	1997
To:	1999
Organization:	MinMax Technologies, Inc., St. Louis, Missouri
Title:	Founder and President
Summary:	Fabless semiconductor company, designing high performance switching ASICs

From:	September 1987
To:	August 1990
Organization:	Bellcore, New Jersey
Title:	Member of Technical Staff
Summary:	Member of New Network Architecture Development Group

From:	1983
To:	1987

Organization: Department of Electrical Engineering, The University of Michigan
Title: Graduate Instructor
Summary: Instructor for senior level Electrical Engineering Laboratory Class. Received a Best "Best Graduate Instructor Award" from the Department of Electrical Engineering

Professional Affiliations, Achievements & Awards

- Technical Program Committee, COMCAS 2021, Tel Aviv, November 2021.
- Technical Program Committee, COMCAS 2019, Tel Aviv, November 2019.
- Technical Program Committee, COMCAS 2017, Tel Aviv, November 2017.
- Technical Program Committee, COMCAS 2015, Tel Aviv, October 2015.
- Past-Chair, Saint Louis Section of the Institute of Electrical and Electronics Engineers (IEEE), 2015.
- Member of Executive Committee, Saint Louis Section of the IEEE, 2010-2015.
- Chair, Saint Louis Section of the IEEE, 2014.
- Technical Program Committee, COMCAS 2013, Tel Aviv, October 2013.
- Vice Chair, Saint Louis Section of the IEEE, 2013
- Treasurer, Saint Louis Section of the IEEE, 2012.
- The Best Paper Award at MOBILITY 2011, October 2011, Barcelona, Spain.
- Counselor, Student Chapter of the Year, the Institute of Electrical and Electronics Engineers, 2011.
- Award of Appreciation, Saint Louis Section of the Institute of Electrical and Electronics. Engineers, 2011, for contribution to various activities of the Saint Louis Section the Institute of Electrical and Electronics Engineers.
- Secretary, Saint Louis Section of the IEEE, 2010.
- Counselor, Student Chapter of the Year, the Institute of Electrical and Electronics Engineers, 2010.
- Wall Street Journal Businessmen of Year, 2003.
- American Men and Women of Science, listed in 1997.
- Member, Eta Kappa Nu (Honor Society for Electrical Engineers), inducted in 1992
- Outstanding Achievement Award, Bellcore, 1990.
- 18th ISATA Award of Technical Excellence, the best paper award at ISATA 1988.
- Rockwell Fellow, Rockwell International, 1985, 1986.
- Outstanding Graduate Student Award, the University of Michigan, 1985.
- Outstanding Teaching Award, the University of Michigan, 1984, 1986.
- Member of Honor's College, the University of Michigan, 1979, 1980.

- Honor's Convocation, the University of Michigan, 1979.
- Outstanding Freshman Award, the University of Michigan, 1979.
- Woodhaven Rotary Club Scholarship, Woodhaven Rotary Club, 1978.
- Second Place Winner, the State of Michigan Mathematics Prize Competition, 1977.
- International Program Committee, *IASTED International Conference on Communications, Internet and Information Technology (CIIT 2005*), Cambridge, Massachusetts from October 31-November 2, 2005.
- International Program Committee, *IASTED International Conference on Communications 2003*, Scottsdale, Arizona, 2003.
- International Program Committee, *Wireless and Optical Communications 2003*, Banff, Canada, 2003.
- International Program Committee, Session Chair, *Wireless and Optical Communications 2002*, Banff, Canada, 2002.
- Invited participant, *NSF Workshop on Enhancing International Cooperation in CS/CE Research and Education*, Portland, 1997.
- Session Chair, *the 1993 Conference on Information Sciences and Systems,* Baltimore, March 1997.
- Member, Board of Editors, *Journal of Network and Systems Management*, 1996-1998.
- Program Committee, *International Symposium on Integrated Network Management*, San Diego, 1997.
- Guest Editor, *Journal of Network and Systems Management, Special Issue on Routing in Broadband Networks*, December 1995 and June 1996.
- Invited participant, *ARPA Workshop on Survivability of Large Scale Systems*, Washington D.C., 1996.
- Special Event Organizer, *International Symposium on Integrated Network Management,* Santa Barbara, 1995.
- Organizing Committee, *International Symposium on Integrated Network Management*, Santa Barbara, 1995.
- Local Arrangements Chair, *IEEE Information Theory Workshop on Information Theory Multiple Access and Queueing*, St. Louis, 1995.
- Chair, *Communications Chapter, St. Louis Section of the IEEE*, 1995.
- Participant, *IEEE Information Theory Workshop on Information Theory, Multiple Access and Queueing*, St. Louis, 1995.
- Participant, *ARPA/AFOSR Non-Linear Optics and Communication Workshop,* Denver, 1994.
- Participant, *CNRI Giga Bit Network Workshop*, Washington D.C., 1993.
- Participant, *IFIP/IEEE International Workshop on Distributed Systems*, New Jersey, 1993.
- Program Committee, *International Conference on Computer Communications and Networks,* San Diego, 1992.
- Session Chair, *ISMM International Conference*, New Orleans, 1990.
- Senior Member, *IEEE*.

- Member, *IEEE Committee on Network Operations and Management*.
- Member, *IEEE Committee on Computer Communications*.
- Registered Specialist, *Hong Kong Research Grant Council*.
- Reviewer, *IEEE Transactions on Communications*.
- Reviewer, *IEEE Transactions on Networking*.
- Reviewer, *IEEE Journal on Selected Areas in Communications*.
- Reviewer, *Journal of Network and Systems Management*.
- Reviewer, *Telecommunication Systems*.
- Reviewer, Computers and Electrical Engineering.
- Reviewer, *ETRI Journal*.
- Reviewer, *IEEE Transactions on Automatic Control*.
- Reviewer, *IEEE Communications*.
- Book Reviewer, *Prentice Hall*.
- Book Reviewer, *Morgan Kaufmann Publishers, Inc.*
- Book Reviewer, *Irwin Publishing Co.*

University Activities:

- Undergraduate Studies Committee, School of Engineering and Applied Science (2012 – Present)
- Faculty Advisor for IEEE Student Chapter (2009 – Present)
- Ambassador for McDonnell International Scholar Academy (2007 – 2013)
- Web Development Committee (2006 – 2008)
- University Judicial Board (1998 - 2000)
- Resource Generation Committee (1994 - 1995)
- Top 20 Committee (1992 - 1995)
- Telecommunications Committee, Chair (1991 - 1997)
- Library Planning Committee (1991 - 1992)
- Computer Engineering Committee (1990 - 1996)
- Communications Curriculum Committee (1990 - 1992)
- Resources Committee (1990 - 1992)

Patents

Patent No.	Date	Title
10,623,323	04/14/20	Network Devices and a Method for Signature Pattern Detection
10,284,476	05/07/19	Hierarchical Pattern Matching Devices and Methods

7,110,411	09/19/06	Method of and Apparatus for WFQ Scheduling Using a Plurality of Scheduling Queues to Provide Fairness, High Scalability, and Low Computational Complexity
7,106,738	09/12/06	Method of and Apparatus for High Speed Packet Switching Using Train Packet Queuing and Providing High Scalability
6,859,455	02/22/05	Method of and Apparatus for Building and Using Multi-Dimensional Index Trees for Multi-Dimensional Data Objects
6,614,789	09/02/03	Method of and Apparatus for Matching Strings of Different Lengths
6,359,885	3/19/02	Multi-Channel Packet Switching Apparatus Having Traffic Flow Controlling and Checking Functions
6,128,292	10/03/00	Packet Switching Apparatus with Multi-Channel and Multi-Cast Switching Functions and Packet Switching System Using the Same
5,788,161	12/13/98	Network Designer for Communication Networks
5,526,352	06/11/95	Integrable Low Complexity Multi-Channel Switch
5,440,549	08/08/95	Nonblocking Multi-Channel Switching with Multicasting Capability

Publications

- Yu, Qixiang, Luo, Z, and Min, P.S., "Intrusion Detection in Wireless Sensor Networks for Destructive Intruders." Proceedings of the APSIPA 2015 conference. December 16-19, 2015.
- Hung, C.P., and Min, P.S., "Simple Web Application Framework." Submitted for publication in the IEEE Transactions on Cloud Computing.
- Luo, Z., and Min, P.S., "Parallel Implementation of Energy-Based Target Localization Methods in Wireless Sensor Networks." Proceeding of the 2014 IEEE SOUTHEASTCON.
- Yu, Q., Luo, Z., and Min, P.S., "Intrusion Detection in Wireless Sensor Networks for Destructive Intruder." Proceeding of 2014 International Conference on Smart Computing (SMARTCOMP 2014).
- Luo, Z., and Min, P.S., "Survey of Target Localization Methods in Wireless Sensor Networks," 19th IEEE International Conference on Networks (ICON 2013), Singapore, December 11-13, 2013.
- Hung, C.P., and Min, P.S., "Deriving and Visualizing the Lower Bounds of Information Gain for Prefetch Systems," 19th IEEE International Conference On Networks (ICON 2013), Singapore, December 11-13, 2013.
- Hung, C.P., and Min, P.S., "Access LUT without CAM - Improved Pearson Hashing for Collision Reduction," 19th IEEE International Conference On Networks (ICON 2013), Singapore, December 11-13, 2013.
- Luo, Z and Min, P.S., "Target Localization in Wireless Sensor Networks for Industrial Control with Selected Sensors." International Journal of Distributed Sensor Networks, Volume 2013 (2013), Article ID 304631.
- Hung, C.P., and Min, P.S. "Performance Evaluation of Distributed Mobile Application Virtualization Services," International Journal on Advances in Internet Technology, Vol. 5, no. 3&4, 2012, pp. 65-83.

- Hung, C.P. and Min, P.S., "Performance evaluation of distributed application virtualization services using the UMTS mobility model," MOBILITY 2011 The First International Conference on Mobile Services, Resources, and Users, 23-29 Oct. 2011.
- Hung, C.P. and Min, P.S., "Service Area Optimization For Application Virtualization Using UMTS Mobility Model," International Conference on Internet Computing, pp. 128-134, Las Vegas, July 18-21, 2011.
- Hung, C.P. and Min, P.S., "Application Virtualization Using UMTS Mobility Model," ICOMP'11, September, 2011.
- Hung, C.P. and Min, P.S., "Infrastructure Arrangement for Application Virtualization Service," the 9th International Information and Telecommunication Technologies Symposium, Vol.1, pp. 78-85, Rio de Janeiro, December 2010.
- Hung, C.P. and Min, P.S., "Probabilistic Approach to Network-Based Virtual Computing," the 9th International Information and Telecommunication Technologies Symposium, Vol.1, pp. 117-124, Rio de Janeiro, December 2010.
- Shiravi, A. and Min, P. S., "On the Latency Bound of Proportional Nested-DRR with Credit Adjusting," *2007 Workshop on High Performance Switching and Routing HPSR 2007*, July 2007.
- Shiravi, A. and Min, P. S., "LOOFA-PB: A Modified LOOFA Scheduler for Variable-Length Packet Switching." *2007 IEEE International Conference on Communications (ICC 2007),* Glasgow, June 2007.
- Shiravi, A., Kim, Y. G., and Min, P. S., "Congestion Prediction of Self-Similar Network through Parameter Estimation," *Proceedings of 2006 IEEE/IFIP Network Operations & Management Symposium*, April 2006, Vancouver.
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Testimony Provided or Expected to Provide as Expert Witness

Matter: Patent Infringement for Wireless Local Area Networks
Law Firm: Quinn Emanuel Urquhard & Sullivan LLP

Case Name: Certain Audio Players and Components thereof (II). U.S.I.T.C. Inv. No. 337-TA-1330.
Testifying Expert for Google Inc.
Completed in June 2023.
(Expert reports submitted and deposed.)

Matter: Patent Infringement for Wireless Communications
Law Firm: Alston & Bird
Case Name: Atlas Global Technologies LLC v. ASUSTek Computers Inc.USDC WD TX Civil Action No. 6:21-cv-820
Testifying Expert for ASUSTek
Completed in November 2023
(Expert report submitted.)

Matter: Patent Infringement for Wireless Communications
Law Firm: Perkins Coie
Case Name: Bell Northern Research, LLC v. HMD AMERICA, INC. et al., Case No.: 1:22-cv-22706-SCOLA/GOODMAN (S.D. Fla.)
Testifying Expert for HMD
Completed in December 2023
(Expert report submitted. Deposed.)

Matter: Patent Infringement for Wireless Communications
Law Firm: LAW OFFICES S. J. CHRISTINE YANG
Case Name: Atlas Global Technologies LLC v. ZyXEL Communications Corp. et al., U.S.D.C., W.D.T.X., W aco Div., Case No. 6:22-cv-00355 Atlas Global Technologies LLC v. D-Link Corp. U.S.D.C., W.D.T.X., Waco Div., Case No. 6:22-cv-00520
Testifying Expert for ZyXel
Retained in March 2023.
(Expert report submitted.)

Matter: Patent Infringement for Wireless Communications
Law Firm: Finnegan, Henderson, Farabow, Garrett & Dunner, LLP
Case Name: Bell Northern Research v. MeidaTek Inc.
Testifying Expert for MediaTek Inc.
Retained in August 2023.

Matter: Patent Infringement for Home Security System
Law Firm: Foley and Lardner LLP
Case Name: Alarm.com v. Vivint, Inc., AAA Arbitration Case. No. 01-22-0004-5525 and U.S.D.C. Case No. 2:23-cv-00004-JRG-RSP (E.D. Tex.),
Testifying Expert for Vivint, Inc.
Completed in 2023.

Matter: Patent Infringement for Wireless Communications and Electronics

Law Firm: Perkins Coie
Case Name: Bell Northern Research, LLC v. HMD AMERICA, INC. et al., Case No.: 1:22-cv-22706-SCOLA/GOODMAN (S.D. Fla.)
Testifying Expert for HMD
Completed in December 2023.

Matter: Patent Infringement for Network Switches
Law Firm: Charhon Callahan Robson & Garza, PLLC
Case Name: Sable Networks, Inc. and Sable IP, LLC v. CouldFlare, Inc. U.S.D.C. WD Tx Case No. 6:21-cv-261
Testifying Expert for CloudFlare, Inc.
Completed in January 2024.
(Expert report submitted and deposed.)

Matter: Patent Infringement for Network Security
Law Firm: Fish and Richardson
Case Name: Finjan LLC v. Palo Alto Networks, Inc. – Case No. 4:14-cv-04908-PJH. USDC ND CA, Oakland Division.
Testifying Expert for Finjan LLC.
Retained in September 2022.
(Expert report submitted and deposed.)

Matter: Patent Infringement for Network Management
Law Firm: Irell & Manella LLP
Case Name: SNMP Research, Inc. & SNMP Research International, Inc. v. Broadcom Inc., Brodcade Communications Systems LLC, & Extreme Networks, Inc. U.S.D.C. E.D. Tennessee at Knoxville Case No. 3:20-CV-451
Testifying Expert for SNMP Research.
Retained in May 2022.

Matter: Inter Parte Reexamination for Wireless Communications
Law Firm: Finnegan, Henderson, Farabow, Garrett & Dunner, LLP
Case Name: Patent reexamination in front of the U.S.P.T.O.
Testifying Expert for MediaTek
Retained in March 2023.

Matter: Patent Infringement for Network Switching
Law Firm: Baker Botts
Case Name: Corrigent Corp. v. Arista Networks, Inc., Case No. 1:22-cv-00497-UNA. USDC Delaware
Testifying Expert for Arista
Retained in October 2022.

Matter: Patent Infringement for Mobile Deives
Law Firm: Fish and Richardson
Case Name: GComm v. Samsung, U.S.D.C. ED. TX. Case No.:2:22-cv-0078-JRG

Testifying Expert for Samsung
Completed in January 2024.

Matter: Patent Infringement for Wireless Networks
Law Firm: McKool Smith
Case Name: Certain Mobile Telephones, Tablet Computers with Cellular Connectivity, and Smart Watches with Cellular Connectivity, Components Thereof, and Products Containing Same. U.S.I.T.C. Inv. No. 337-TA-1299
Testifying Expert for Ericsson
Completed in July 2022.
(Expert report submitted and deposed.)

Matter: Patent Infringement for Semiconductor Manufacturing
Law Firm: Kramer Levin
Case Name: Oasis Tooling, Inc. v. Siemens Indus. Software, Inc., 1:22-cv-151 (D. Del.), Oasis Tooling, Inc. v. GlobalFoundries U.S. Inc., 1:22-cv-312 (D. Del.)
Testifying Expert for Oasis Tooling
Retained in June 2022.
(Expert reports submitted.)

Matter: Patent Infringement for Optical Networks
Law Firm: Duane Morris
Case Name: NextGen Innovations, LLC v. Infinera Corporation. U.S.D.C. ED. TX (Marshall) Case No. 2:22-cv-00306-JRG-RSP / IPR
Testifying Expert for Infinera
Retained in April 2023.

Matter: Patent Infringement for Wireless Devices
Law Firm: King and Spalding LLP
Case Name: Intellectual Ventures, et. al. v. General Motors Company and General Company Motors, LLC, Case No. 6:21-CV-1088 pending in the Western District of Texas, Waco Division
Testifying Expert for General Motors
Completed in January 2023.
(Expert report submitted.)

Matter: Patent Infringement for Wireless Devices
Law Firm: Sterne Kessler
Case Name: Neo Wireless LLC v. Volkswagen Group of America, Inc. and Volkswagen Group of America Chattanooga Operations, LLC and related matters
Testifying Expert for Volkswagen
Completed in September 2023.
(Expert report submitted and deposed. IPR declarations submitted)

Matter: Patent Infringement for Wireless Networks
Law Firm: Covington & Burling LLP

Case Name: XR Communications, LLC v. D-Link Systems, Inc., No. 8:17-cv-00596 (Consolidated) (C.D. Cal.)
Testifying Expert for Hewlett Packard Enterprise
Completed
(Expert report submitted and deposed.)

Matter: Patent Infringement for USB Charging System
Law Firm: Orrick, Herrington & Sutcliffe LLP
Case Name: Fundamental Innovation Systems International LLC v. TCT Mobile (US), TCT Mobile (US) Holdings, Inc., et al. U.S.D.C. Delaware No. 20-552-RGA-CJB
Testifying Expert for TCL
Completed in June 2022.
(Expert report submitted and deposed.)

Matter: Inter Parte Reexamination for Wireless Communications
Law Firm: Alston & Bird
Case Name: Patent reexamination in front of the U.S.P.T.O.
Testifying Expert for Nokia
Retained in May 2022.
(Expert report submitted.)

Matter: Patent Infringement for Network Management System
Law Firm: Morgan, Lewis & Bockius, LLP
Case Name: Certain Routers, Access Points, Controllers, Network Management Devices, Other Networking Products, and Hardware and Software Components Thereof, U.S.I.T.C. Inv. No. 337-TA-1227
Testifying Expert for Hewlett Packard, Netgear, and CommScope
Completed in August 2021.
(Expert report submitted, deposed, and testified during trial.)

Matter: Contract Dispute
Law Firm: Orrick, Herrington & Sutcliffe LLP
Case Name: Allied Telesis, Inc., et al vs. Micron Technology, Inc., Santa Clara County Case No: 2015-1-CV-282977
Testifying Expert for Micron
Retained in 2021. Deposed in October 2021.
Completed in 2022

Matter: Patent Infringement for Security Systems
Law Firm: Forley and Lardner LLP
Case Name: Certain Residential Premises Security Monitoring and Automation Control Panels, and Components Thereof (ITC Inv. No. 337-TA-1273) and ADT LLC et al v. Vivint, Inc., Case No. 6:21-cv-00687 (W.D. Tex.)
Testifying Expert for Vivint, Inc.
Completed in April 2022.
(Expert report submitted, deposed, and testified during trial.)

Matter: Inter Parte Reexamination for Internet Communications
Law Firm: Perkins Coie
Case Name: Patent reexamination in front of the U.S.P.T.O.
Testifying Expert for Twitter
Retained in June 2020.
(Expert report submitted.)

Law Firm: Fisher Broyles
Case Name: Vaxcel International Co., Ltd. v. Heathco LLC, U.S.D.C. Delaware No. 20-224-LPS
Testifying Expert for Vaxcel
Retained in February 2021.
(Expert report submitted and deposed.)

Matter: Patent Infringement for Network Communication System
Law Firm: Charhon Callahan Robson & Garza, PLLC
Case Name: Sable Networks, Inc. and Sable IP, LLC, v. ClouFlare, Inc. U.S.D.C. WDTX, Civil Action No. 6:21-cv-261
Testifying Expert for CloudFlare, Inc.,
Completed in January 2024.

Matter: Patent Infringement for Mobile Wireless Device
Law Firm: Pearl Cohen
Case Name: In the Matter Of Certain UMTS And LTE Cellular Communications Modules And Products Containing The Same, U.S.I.T.C. Inv. No. 337-TA-1240
Testifying Expert for Telit Wireless Communication, Quectel, and Thales
Completed in March 2023.
(Expert reports submitted and deposed.)

Matter: Transactional Taxes for Internet Application
Law Firm: Ryan Rapp & Underwood, PLC
Case Name: ADP, LLC v. Arizona Department of Revenue (TX2018-000246),
Testifying Expert for ADP, LLC.
Completed in June 2020.
(Expert report submitted.)

Matter: Trade Secret Misappropriation in Digital Electronics
Law Firm: Goodwin Proctor LLP
Case Name: Guzik Technical Enterprises versus Keysight Technologies, Inc. Superior Court of the State of California for the County of Santa Clara, Case No.: 19CV355879
Testifying Expert for Keysignt Technologies, Inc.
Retained in August 2020.

Matter: Patent Infringement for Fiber Optic Devices
Law Firm: Cooley

Case Name: Certain High-Density Fiber Optic Equipment and Components Thereof, U.S.I.T.C. Inv. No. 337-TA-1194
Testifying Expert for AFL Communications, Panduit, FS.Com, Wirewerk, and Siemon
Completed in October 2020.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Optical Transport Networks
Law Firm: Venerble
Case Name: Huawei Technologies Co. Ltd v Verizon Communications, Inc., et. al., 2:20-cv-0030
Testifying Expert for Verizon.
Retained in March 2020.
(IPR declarations submitted.)

Matter: Patent Infringement for Lighting System
Law Firm: Fisher Broyles
Case Name: Vaxcel International Co., Ltd., v. Jasco Products Company, LLC., (Case No. USDC Western District of Oklahoma, 5:19-CV-00154-JD
Testifying Expert for Vaxcel.
Retained in August 2020.

Matter: Patent Infringement for Wireless Communication
Law Firm: McDermott Will & Emery
Case Name: Bell Northern Research LLC v. ZTE. (Case No. 3:18-cv-01786 - S.D. Cal)
Testifying Expert for ZTE.
Retained in July 2019.
(IPR declarations submitted.)

Matter: Patent Infringement for Wireless Communication
Law Firm: Jones Day
Case Name: Bell Northern Research LLC v. Kyocera Corp. (Case No. 3:18-cv-1785 - S.D. Cal)
Testifying Expert for Kyocera.
Completed in May 2019.
(Claim construction declaration submitted, and deposed.)

Matter: Patent Infringement for Electronic Payment Systems
Law Firm: Paul Hastings
Case Name: ID Tech Corp. v. Samsung Electronics Co., Ltd., et al. (Case No. No. 8:17-cv-1748-DOC-JDE (C.D. Cal))
Testifying Expert for Samsung.
Retained in January 2019.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Internet Switching

Law Firm: Maynard Cooper
Case Name: Parity Networks, LLC v. Juniper Networks, Inc., Case No. 6:17-CV-00495-RWS-KNM (U.S.D.C.E.D. Tx.)
Testifying Expert for Juniper.
Retained in April 2018.
(IPR declarations submitted.)

Matter: Patent Infringement for Internet Switching
Law Firm: Morgan Lewis
Case Name: Parity Networks, LLC v. Hewlett Packard Enterprise Company, Case No. 6:17-CV-00682 (U.S.D.C.E.D. Tx.)
Testifying Expert for Hewlett Packard Enterprise Company.
Retained in September 2018.
(IPR declarations submitted.)

Matter: Inter Parte Rexamination for Covered Business Method
Law Firm: Reed Smith LLP
Case Name: NASDAQ v. Miami International
Expert for Miami International.
Retained in February 2018.
(Expert declarations submitted, and deposed.)

Matter: Patent Infringement for Mobile Devices
Law Firm: Quinn Emanuel
Case Name: Qualcomm v. Apple, Case No. 3:17-cv-00108-GPC-MDD (U.S.D.C.S.D. Cal.)
Testifying Expert for Qualcomm.
Completed in April 2019.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Communication Devices
Law Firm: Venable
Case Name: Sycamore IP Holdings LLC v. Verizon Communications Inc, Case No. 2:16-cv-591-JRG-RSP (U.S.D.C. E.D. Texas)
Testifying Expert for Verizon and Level 3.
Completed in September 2017.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Mobile Devices
Law Firm: Alston Bird
Case Name: Huawei Technologies Co. Ltd. V. Nokia Solutions and Networks, Case No. 2:16-cv-0056-JRG-RSP (U.S.D.C. E.D. Texas)
Testifying Expert for Nokia.
Completed in December 2017.
(Expert reports submitted.)

Matter: Patent Infringement for Mobile Devices
Law Firm: Quinn Emanuel
Case Name: Huawei Technologies Co. Ltd. V. Samsung Electronics C. Ltd, Case No. 3:16-cv-02787 (U.S.D.C. N.D. Cal)
Testifying Expert for Samsung.
Completed in March 2019.
(Expert reports submitted, and deposed.)

Matter: Arbitration for Licensing
Law Firm: Alston Bird
Case Name: Nokia v. LG Electronics, International Chamber of Commerce Arb. No. 21326
Testifying Expert for Nokia.
Completed in October 2016.
(Expert reports submitted.)

Matter: Patent Infringement for Mobile Devices
Law Firm: Ropes and Gray
Case Name: Godo Kaisha IP Bridge 1 v. TCL Communication Technology Holdings, Case No. 15-634-SLR-SRF (U.S.D.C.S.D. Delaware.)
Testifying Expert for IP Bridge.
Completed in October 2018.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Mobile Devices
Law Firm: Paul Hastings
Case Name: Odyssey Wireless, Inc,. v. Samsung Electronics Co., Ltd., et al, Case No. 3:15-cv-1738-H-RBB (U.S.D.C.S.D. Cal.)
Testifying Expert for Samsung.
Completed in October 2016.
(Expert reports submitted.)

Matter: Patent Infringement for Mobile Devices
Law Firm: Greenberg Traurig
Case Name: Mobile Telecommunications Technologies LLC v. Amazon.com, Inc., 2:13-cv-883-JRG-RSP (U.S.D.C. E.D. Texas)
Testifying Expert for Amazon.
Completed in April 2015.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Mobile Devices
Law Firm: Mayer Brown
Case Name: Mobile Telecommunications Technologies LLC v. LG Electronics Mobilecomm U.S.A., Inc., 2:13-cv-947-JRG-RSP (U.S.D.C. E.D. Texas)
Testifying Expert for LG Electronics Mobilecomm.
Completed in February 2016.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Semiconductor Devices
Law Firm: Mayer Brown
Case Name: Inter Parte Reexamination for U.S. Patent Nos. 6,895,520 and 6,899,332
Expert for LG Electronics.
Completed in February 2016.
(Expert declaration submitted, and deposed.)

Matter: Patent Infringement in Vehicular Electronics
Law Firm: Gardner, Linn, Burkhart & Flory, L.L.P
Case Name: *Magna Electronics Inc. v. TRW Automotive Holdings Corp. et al.*, Civil Action No. 1:12-cv-00654 (Western District of Michigan), and relating to the action styled *Magna Electronics Inc. v. TRW Automotive Holdings Corp. et al.*, Civil Action No. 1:13-cv-00324 (Western District of Michigan).
Testifying Expert for Magna Electronics
Completed in February 2016.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement in Electronic Circuits
Law Firm: Ropes and Gray
Case Name: Certain Devices Containing Non-Volatile Memory and Products Containing the Same (USITC Inv. Nos. 337-TA-922)
Testifying Expert for Spansion Inc.
Completed in February 2015.
(Expert reports submitted.)

Matter: Trade Secret Misappropriation in Software Method for Cable Television Advertisement
Law Firm: Brownstein Hyatt Farber Schreck
Case Name: Cross MediaWorks v. EMT Holdings, USDC Southern District of New York, Case No. 1:14-cv-00561-VSB
Testifying Expert for Cross MediaWorks.
Completed in April 2015.
(Testified during injunction hearing.)

Matter: Patent Infringement in Vehicular Electronics
Law Firm: Steptoe and Johnson
Case Name: Certain Vision-Based river Assistance System Cameras and Components Thereof (USITC Inv. Nos. 337-TA-899 and 907)
Testifying Expert for Magna Electronics
Completed in February 2015.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Vehicular System
Law Firm: Susman Godfrey

Case Name: Eagle Harbor Holdings, LLC, and Mediustech, LLC, v. Ford Motor Company, 3:11-cv-05503-BHS (U.S.D.C. Western District of Washington at Tacoma)
Testifying Expert for Mediustech.
Completed in March 2015.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Communication Networks
Law Firm: Davis Polk & Wardwell LLP
Case Name: Sprint Communications Company L.P., v. Comcast Cable Communications, LLC, Comcast IP Phone, LLC, and Comcast Phone of Kansas, LLC. 2:11-cv-02684-KHV-DJW (U.S.D.C. Kansas)
Testifying Expert for Comcast.
Retained in March 2012.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Communication Networks
Law Firm: Quinn Emanuel
Case Name: France Telecom S.A. v. Marvell Semiconductor, Inc., 12-Civ-4986 (S.D.N.Y.)
Testifying Expert for Marvell.
Completed in September 2014.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Wireless Image Distribution
Law Firm: Jones Day
Case Name: *Inter Partes* Review of U.S. Patent No. 8,437,797
Expert for Google Inc.
Completed in November 2014.
(Expert declaration submitted.)

Matter: Nonvolatile Semiconductor Memories
Law Firm: Jones Day
Case Name: *Inter Partes* Review of U.S. Patent Nos. 8,301,833 and 8,516,187
Expert for SanDisk.
Completed in May 2014.
(Expert declaration submitted.)

Matter: Communication Protocols for Wireless Device
Law Firm: Dorsey & Whitney, LLP
Case Name: Certain Point-To-Point Network Communication Devices and Products Containing Same (USITC Inv. No. 337-TA-892)
Testifying Expert for Toshiba
Completed in May 2014.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Wireless Networks
Law Firm: Ropes and Gray

Case Name: In the Matter of Certain Wireless Devices With 3G and/or 4G Capabilities and Components Thereof (USITC Inv. No. 337-TA-868) InterDigital Comms., Inc. v. Huawei Techs. Co., Ltd., No. 13-00008 (D. Del., filed January 2, 2013), InterDigital Comms., Inc. v. ZTE Corp., No. 13-00009 (D. Del., filed January 2, 2013), InterDigital Comms., Inc. v. Nokia Corp., No. 1:13-cv-00010 (D. Del., filed January 2, 2013), InterDigital Comms., Inc. v. Samsung Elec. Co., Ltd., No. 13-00011 (D. Del., filed January 2, 2013)
Testifying Expert for Joint Defense Group.
Completed in February 2014.
(Expert reports submitted, deposed, and testified during trials.)

Matter: Patent Infringement for Mobile Communication
Law Firm: Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P.
Case Name: Certain Digital Media Devices, Including Televisions, Blu-Ray Disc Players, Home Theater Systems, Tablets and Mobile Phones, Components Thereof and Associated Software (USITC Inv. No. 337-TA-882)
Testifying Expert for LG Electronics, Inc.
Completed in February 2014.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Wireless Networks
Law Firm: Vinson & Elkins LLP
Case Name: Wi-LAN USA, Inc. and Wi-LAN, Inc. v. Telefonaktiebolaget LM Ericsson and Ericsson, Inc. (USDC: Southern District of FL - Case #1: 12-cv-23569), Wi-LAN USA, Inc. and Wi-LAN, Inc. v. Alcatel-Lucent USA, Inc. (USDC: Southern District of FL - Case #1: 12-cv-23568-Altonaga/Simonton)
Testifying Expert for Wi-LAN.
Completed in May 2015.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Data Storage
Law Firm: Ropes and Gray, Weil Gotshal
Case Name: Summit Data Systems, LLC v. EMC Corporation., et al. 1:10-cv-00749-GMS (U.S.D.C. Delaware)
Testifying Expert for EMC Corporation and Netapp, Inc.
Completed in December 2012.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Wireless Mobile Device
Law Firm: Ashurst Australia
Case Name: Samsung v. Apple, Australian Federal Court Proceeding No. NSD 1243 of 2011
Testifying Expert for Samsung Electronics.
Completed in December 2012.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Wireless Mobile Devices

Law Firm: Quinn Emanuel
Case Name: Apple Inc. v. Samsung Electronics Co., Ltd., et al., 4:11-cv-01846-LHK (N.D. Cal.) and Samsung Electronics Co., Ltd., et al. v. Apple Inc., 4:11-cv-02079 (N.D. Cal.)
Testifying Expert for Samsung Electronics.
Completed in July 2012.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Wireless Mobile Device
Law Firm: Quinn Emanuel
Case Name: Certain Electronic Devices, Including Wireless Communication Devices, Portable Music And Data Processing Devices, And Tablet Computer, U.S.I.T.C. Inv. No. 337-TA-794
Testifying Expert for Samsung Electronics.
Completed in June 2012.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Portable Storage Device
Law Firm: White and Case
Case Name: CERTAIN UNIVERSAL SERIAL BUS ("USB") PORTABLE STORAGE DEVICES, INCLUDING USB FLASH DRIVES AND COMPONENTS THEREOF, US International Trade Commission Investigation No. 337-TA-788
Testifying Expert Witness for Trek
Completed in May 2012.
(Expert reports submitted, and deposed.)

Matter: Copyright Infringement for Petroleum Processing Software
Law Firm: Osha Liang LLP
Case Name: Aspen Technology, Inc. v. Tekin A. Kunt and M3 Technology, Inc., Case Number: H-10-1127, US District Court, Texas, Houston Division.
Testifying Expert for M3 Technology, Inc.
Completed in May 2012.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Trade Secret Misappropriation for DC-DC converter
Law Firm: Covington & Burling, Haynes Boone
Case Name: Certain DC—DC Controllers and Products Containing Same, US International Trade Commission Investigation No. 337-TA-698
Testifying Expert for UPI.
Completed in March 2012.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Parallel Processor
Law Firm: Orrick, Herrington, & Sutcliffe. Kirkland and Ellis.
Case Name: BIAX Corporation v. Nvidia and Sony Civil Action No. 09-cv-01257-PAB-MEH
Testifying Expert for Nvidia and Sony

Completed in March 2012.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Call Center Technology
Law Firms: Duffy, Sweeney, and Scott. Foley Lardner.
Case Name: Ronald Katz Technology Licensing v. Citizens Financial Group 7-ML-1816-C RGK (FFM)
Testifying Expert Witness for Citizens Financial Group.
Completed in 2011.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Storage Area Network
Law Firm: DLA Piper
Case Name: Network Appliance, Inc., v. Sun Microsystems, Inc., Case Number: C-07-06053 EDL, US District Court, Northern District of California, San Francisco Division.
Testifying Expert for Sun Microsystems, Inc.
Completed in 2010.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Flat Panel Display Controller
Law Firm: Jones Day
Case Name: Certain Video Displays, Components Thereof, and Products Containing Same, US International Trade Commission Investigation No. 337-TA-687
Testifying Expert for Vizio, Inc.
Completed in 2010.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Call Center Technology
Law Firms: Foley Lardner
Case Name: Ronald Katz Technology Licensing v. US Bank 7-ML-1816-C RGK (FFM)
Testifying Expert Witness for US Bank
Completed in May 2009.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for USB to VGA Converter
Law Firm: Wang Hartmann, Gibbs, & Cauley, P.C.
Case Name: Displaylink Corporation v. Magic Control Technology Corporation, Case No. 5:07-CV-01998-RMW, US District Court, Northern District of California, San Francisco Division.
Testifying Expert for Magic Control Technology Corporation
Completed in 2009.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Flash Memory
Law Firm: Jones Day and Wilson Sansini

Case Name: Certain Flash Memory Controllers, Drives, Memory Card, and Media Players and Products Containing Same. US International Trade Commission Investigation No. 337-TA-619
Testifying Expert for SanDisk Corporation.
Completed in 2008.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Semiconductor Packaging
Law Firm: Jones Day
Case Name: Certain Semiconductor Chips with Minimized Chip Package Size and Products Containing the Same. US International Trade Commission Investigation No. 337-TA-605
Testifying Expert for Freescale Semiconductor
Completed in 2008.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Automatic Switching System
Law Firms: Jones Day, and Heller Ehrman, LLP.
Case Name: ATEN International Co., Ltd and ATEN Technology, Inc. v. Belkin Corporation, Belkin Logistics, Inc. and Emine Technology Co., Ltd. US International Trade Commission Investigation No. Ltd 337-TA-589
Testifying Expert for Belkin Corporation, Belkin Logistics, Inc., and Emine Technology Co., Ltd.
Completed in 2007.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Dual Mode Communication
Law Firm: Wilmer Cutler Pickering Hale and Dorr, LLP
Case Name: Broadcom Corporation v. Qualcomm Incorporated SACV05-467-JVS (RNBx)
Testifying Expert Witness for Broadcom Corporation
Completed in 2007.
(Expert reports submitted, deposed, and testified during trial.)