

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. 9,674,035

DECLARATION OF STUART LIPOFF

Charter Communications, Inc. - Exhibit 1002 Charter Communications, Inc. v. Iarnach Technologies, Ltd.

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PETITIONER’S EXHIBIT LIST

Ex. 1001	U.S. Patent No. 9,674,035
Ex. 1002	Declaration of Stuart Lipoff
Ex. 1003	Prosecution History of U.S. Patent No. 9,674,035
Ex. 1004	U.S. Provisional Appl. No. 61/468,504 (“Provisional”)
Ex. 1005	U.S. Patent Publication No. 2011/0072119A1 (“Bronstein”)
Ex. 1006	U.S. Patent No. 8,160,448 (“Tsuge”)
Ex. 1007	U.S. Patent No. 7,848,234 (“McKinnon”)
Ex. 1008	U.S. Patent Appl. 2008/0253771 (“Noel”)
Ex. 1009	KR Patent No. 10-0414671 (“Go”)
Ex. 1010	U.S. Patent No. 8,416,816 (“Bourgart”)
Ex. 1011	U.S. Patent No. 7,519,690 (“Barrow”)
Ex. 1012	J. Koshy and R. Pandey, "Remote incremental linking for energy-efficient reprogramming of sensor networks," <i>Proceedings of the Second European Workshop on Wireless Sensor Networks, 2005.</i> , Istanbul, Turkey, 2005, pp. 354-365, DOI: 10.1109/EWSN.2005.1462027, ISBN:0-7803-8801-1 (“Koshy”)
Ex. 1013	Data-Over-Cable Service Interface Specifications (DOCSIS), SP-OSSI-I01-970403
Ex. 1014	DOCSIS® Provisioning of EPON Specifications, DPoE Architecture Specification, DPoE-SP-ARCHv1.0-I01-110225
Ex. 1015	DOCSIS® Provisioning of EPON Specifications, DPoE Operations and Support System Interface Specification, DPoE-SP-OSSIV1.0-I01-110225

Ex. 1016	Complaint, <i>IARNACH TECHNOLOGIES, INC. v. CHARTER COMMUNICATIONS, INC., et al</i> , Case No. 2:24-cv-00230 (E.D. Tex.)
Ex. 1017	Docket Control Order, <i>IARNACH TECHNOLOGIES, INC. v. CHARTER COMMUNICATIONS, INC., et al.</i> , Case No. 2:24-cv-00230 (E.D. Tex.)
Ex. 1018	Certified English Translation of KR Patent No. 10-0414671 (“Go”)
Ex. 1019	Declaration of Todd Hillmer

I, Stuart Lipoff, resident at 2877 Paradise Road Unit 205, Las Vegas, NV 89109, hereby declare as follows:

I have been retained by Petitioner to provide my opinions concerning the validity of Claims 1-32 of U.S. Pat. No. 9,674,035 (“the ’035 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.

2. I am currently president of IP Action Partners Inc., a consulting practice that serves the telecommunications, information technology, media, electronics, and e-business industries.

3. I earned a Bachelor of Science degree in Electrical Engineering in 1968 and a second Bachelor of Science degree in Engineering Physics in 1969, both from

Lehigh University. I earned a Master of Science degree in Electrical Engineering from Northeastern University in 1974, and then a Master of Business Administration degree from Suffolk University in 1983.

4. I hold a Federal Communications Commission (“FCC”) General Radiotelephone License. I also hold a Certificate in Data Processing from the Institute for the Certification of Computing Professionals (“ICCP”), which is supported by the Association for Computing Machinery (“ACM”).

5. I am also a registered professional engineer (PE) in the Commonwealth of Massachusetts and in the State of Nevada.

6. I am a Life Fellow of the Institute of Electrical and Electronics Engineers (“IEEE”) Consumer Electronics, Communications, Computer, Circuits, and Vehicular Technology Groups. I have been a member of the IEEE Consumer Electronics Society National Board of Governors (formerly known as the Administrative Committee) since 1981, and I was Boston Chapter Chairman of the IEEE Vehicular Technology Society from 1974 to 1976. I served as the 1996-1997 President of the IEEE Consumer Electronics Society, and from 1999 to 2018 I served as Chairman of the Society’s Technical Activities and Standards Committee and as Vice President of Publications for the Society. I previously have served as Vice President of Standards and Industry Activities and currently serve as the

Historian for the Society. I have also served as an Ibuka Award committee member for the IEEE's Award in the field of consumer electronics.

7. I have prepared and presented numerous papers at the IEEE and at other professional meetings. For example, in fall 2000, I served as general program chair for IEEE's Vehicular Technology Conference on advanced wireless communication technology. I have organized sessions at The International Conference on Consumer Electronics (ICCE), and I was the 1984 program chairman. I currently serve on the Technical Program Committee for ICCE2025. I conducted an eight-week IEEE-sponsored short course on Fiber Optics System Design. I received IEEE's Centennial Medal in 1984, and I received IEEE's Millennium Medal in 2000.

8. As Vice President and Standards Group Chairman for the Association of Computer Users ("ACU") from 1980 to 1983, I served as the ACU representative to the ANSI X3 Standards Group. From 1976 to 1978, I served as Chairman of the task group on user rule compliance for the FCC's Citizens Advisory Committee on Citizen's Band Radio.

9. Over the last 25 years, I have been a member of the Society of Cable Television Engineers, the Association for Computing Machinery, and The Society of Motion Picture and Television Engineers. From 2001 to 2004, I served as a member of the USA advisory board to the National Science Museum of Israel. In

1998, I presented a short course on international product development strategies as a faculty member for Technion Institute of Management in Israel. From 2001 to 2003, I served as a member of the board or directors of The Massachusetts Future Problem Solving Program. I have been elected to membership in The Cable Television Pioneers.

10. I am a named inventor on nine United States patents and have several publications on data communications in publications, including Electronics Design, Microwaves, EDN, the Proceedings of the Frequency Control Symposium, Optical Spectra, and IEEE publications.

11. During my professional career dating from 1969 to the present, I have been heavily engaged in the study, analysis, evaluation, design, and implementation of products and technology associated with consumer electronics and electronic appliances.

12. For 25 years, I worked for Arthur D. Little, Inc. (“ADL”), where I became Vice President and Director of Communications, Information Technology, and Electronics (“CIE”). Prior to my time at ADL, I served as a Section Manager for Bell & Howell Communications Company for four years, and prior to that, as a Project Engineer for Motorola’s Communications Division for three years.

13. At ADL, I was responsible for the firm’s global CIE practice in laboratory-based contract engineering, product development, and technology-based

consulting. At both Bell & Howell and Motorola, I had project design responsibility for wireless communication and paging products.

14. While employed at ADL, I served as the leader of a project that developed a series of specifications for residential cable modems known as Data over Cable Service Interface Specification, or “DOCSIS.” The scope of work for this project included developing a roadmap and strategic framework for evolving the business from internet services to broadband services combining voice, data, and secure electronic content delivery. This project was performed by ADL under contract to the Multimedia Cable Network System (“MCNS”) consortium of cable TV operators representing 85% of the subscriber base in North America and the specifications resulting from that project have since been adopted by the United Nations as a global telecommunications specification.

15. Following my time at ADL, I managed a project (through IP Action Partners) for Next Generation Network Architecture, LLC (“NGNA”) that produced a five-year planning horizon for services and technology in the cable industry. The services and vision were then mapped to overall architectures impacting network elements in the back office, head-end, outside plant, and customer premises, and documented in next generation network recommendations. The project involved coordination with senior technical staff of several multiple

service operators (“MSOs”) as well as interactions with over one hundred suppliers and vendors of systems, software, and products in the cable industry.

16. Under contract to The National Cable Telecommunications Association (NCTA), I represented the point of view of the cable industry in an FCC workshop on universal broadband availability. This project involved a presentation on the technical capabilities of the cable industry DOCSIS cablemodem infrastructure, a comparison of cablemodem services with DSL, fiber to home (including various Passive Optical Networks (PONS) such as Ethernet PONs (EPONs)), and wireless broadband. Issues related to net neutrality were included in the discussion. Following the FCC workshop, I was further commissioned by NCTA to prepare a white paper comparing DOCSIS cablemodem services with fiber to the home services such as FiOS.

17. For Magnavox Cable TV (a division of N.A. Philips) I performed comparative cost and technical analysis of fiber optics versus conventional coax systems. This analysis was followed by the development of strategies and sales support materials to pitch the new Hybrid Fiber-Cable (HFC) systems to cable TV operators. At that time, HFC systems were preferred over pure fiber system because they could leverage the existing cable infrastructure already prevalent in the market, and thus provided a lower cost alternative to a pure fiber-based infrastructure even though a pure fiber-based infrastructures offered better performance. Additionally,

while customer bandwidth requirements continued to increase over time to the levels we expect today, and customer bandwidth expectations and/or requirements at that time were adequately serviced with existing cable lines for some of the transmission line.

18. I performed additional work for The Cable Television Laboratories in which I studied the application of remote and distributed antennas supporting microcellular PCS on hybrid fiber-coax cable TV systems. A key issue explored was the requirement for the fiber optic portion of the plant to carry the PCS carriers in analog form and deal with the wide dynamic range demands for inbound signals.

19. For a consortium of the major cable TV operators consisting of Comcast, Time Warner, Cox, and Rogers; I developed models for prediction of reliability of alternative HFC architectures and their suitability to provide local exchange voice services competitive with incumbent local exchange carriers. The project required understanding the reliability specifications employed in conventional local exchange carrier telephone plant and the contributions between hardware, power, and workmanship failures. Each of three alternative fiber optic architectures for cable delivered voice telephony were studied and modeled to develop reliability predictions and recommendations were made as to which aspects of the three alternatives were the best choice for cable delivered voice telephony.

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

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

II. UNDERSTANDING OF THE LAWS

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

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

24. 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.

25. 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.

26. 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.

27. 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.

28. I understand that the '035 Patent claims priority to a provisional application that was filed on March 28, 2011. I take no position at this time on whether Claims

1-32 of the '035 Patent are actually entitled to claim priority to this March 2011 application. For the purposes of this Declaration, I have analyzed obviousness from the perspective of a POSA prior to the date of that provisional filing.

III. BASIS FOR MY OPINION

29. In forming my opinion, I have relied on the '035 Patent claims and its disclosure (EX1001), the prosecution history of the '035 patent (EX1003), the prior art and other documents discussed herein and in the Petition (EX1004-1019) as well as my own experience and expertise in this field.

30. 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

31. 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 and 2-3 years experience relating to the design and/or maintenance of DOCSIS networks, portions of which include fiber optical elements.

32. 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.

33. 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.

34. Based upon my experience as set forth above in Section I, I believe I can provide an expert opinion in the field of the '035 Patent, including what one of ordinary skill in the art would have understood from the prior art in this field at that time.

V. BACKGROUND OF THE TECHNOLOGY AT ISSUE

35. The '035 Patent concerns cable systems which can communicate video, voice and data. EX1001, 1:19-49. Equipment at the cable provider's "headend"—a cable modem termination system (CMTS)—communicates with equipment—a cable modem (CM)—located at a customer's premises. EX1001, 2:56-67.

36. At least as early as 1997, communication over cable networks was standardized with the publication of the Data Over Cable Service Interface Specification (DOCSIS). EX1013, 1-2. Initially accommodating internet data, later iterations of the standard expanded to include Voice Over Intern (VoIP). DOCSIS determines, among other things, how a cable modem receives and transmits data.

37. Since the advent of modern fiber optics, portions of these networks have routinely communicated across high-capacity, optical fiber. EX1001, 1:22-46. These hybrid fiber-coaxial networks (HFCs) employ an intermediate optical fiber portion. *Id.* The devices at either end of the fiber portion of the HFC are called the Optical Line Terminal (OLT) and the Optical Network Unit (ONU). EX1001, 1:22-46 and EX1014, 1. The OLT connects to the CMTS or "headend" and communicates with ONUs proximate to the subscribers. EX1001, 2:56-3:17 and EX1014, 5 and Figure 1.

38. The network has a point-to-multipoint topology, meaning that a single OLT services a plurality of ONUs. EX1001, 1:22-46. A *passive* optical network (PON)

employs unpowered splitters that divide the OLT's downstream optical signal among receiving ONUs. An *Ethernet* passive optical network is a type of PON that uses ethernet packets to distribute data. EX1014, 44. Standards detailing the structure and implementations of *Ethernet* passive optical networks or EPONs were promulgated by the Institute of Electrical Engineers (IEEE) at least as early as 2004.

39. A DPoE network (*i.e.*, DOCSIS Provisioning of Ethernet Passive Optical Network) pairs a DOCSIS cable system with an EPON network. EX1014, 1. Specific standards for DPoE networks were first promulgated before the claimed priority date of the '035 Patent. *See e.g.*, EX1014, ii.

VI. OVERVIEW OF '035 PATENT AND PROSECUTION HISTORY

A. Effective Filing Date of '035 Patent

40. The '035 Patent issued from U.S. Patent Application No. 13/433,235 filed March 28, 2012 and claims priority to Provisional Application No. 61/468,504, filed March 28, 2011.

B. Specification

41. The '035 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. The use of passive optical networks with such HFC networks is well-known.

42. The '035 Patent acknowledges prior cable systems supported on-demand programming using optical fiber networks. EX1001, 2:65-68. A cable operator's

back-office system and core network were connected to a hybrid fiber cable network (HFC) by means of a cable modem termination system (CMTS). EX1001, 3:2-6. Downstream, cable modems (CMs), typically located at a customer's premises, served as a communications interface between the hybrid fiber cable network and one or more customer devices, such as home routers, set-top devices, and personal computers. EX1001, 2:56-64. Figure 1 of the '035 Patent illustrates an example of this traditional DOCSIS (Data Over Cable Service Interface Specification) architecture.

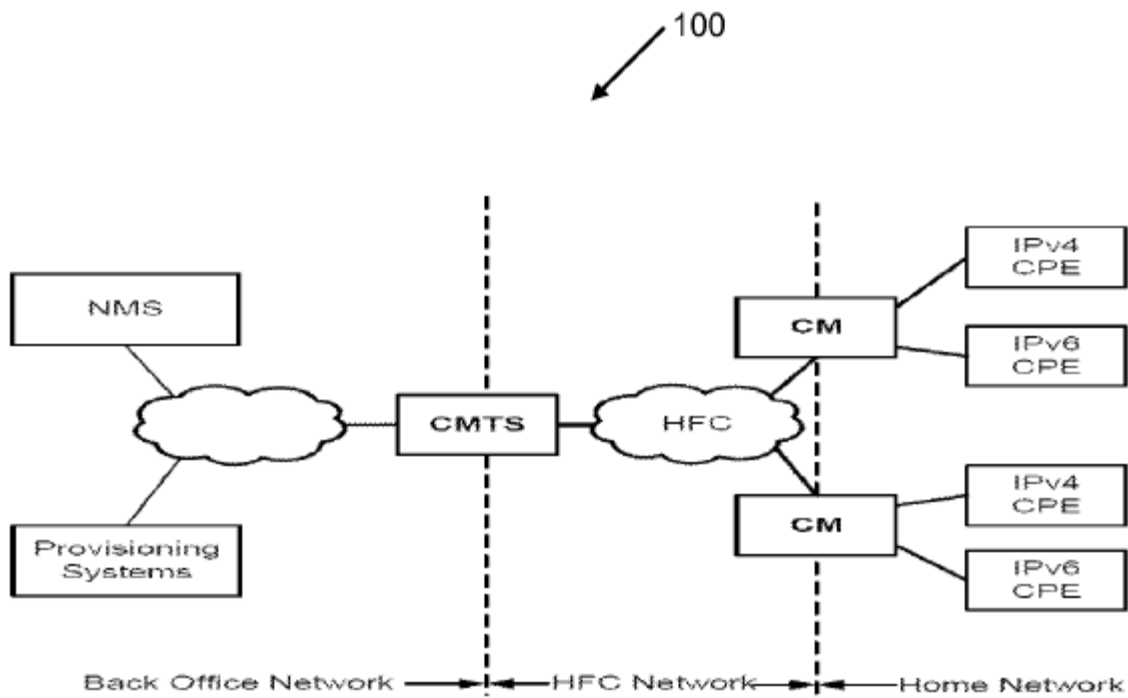


FIG. 1

EX1001, Figure 1.

43. The '035 Patent describes use of a well-known optical fiber network known as a passive ethernet optical network (EPON). EX1001, 1:19-46, 2:41-3:6. When combined with traditional DOCSIS system, such a hybrid system was commonly known as a DOCSIS Provisioning over Ethernet (DPoE) System. *Id.*

44. The '035 Patent acknowledges that DPoE systems were known. EX1001, 1:19-46. Such systems included a back-office system that handled administrative functions, such as recording the identity of subscribers and the services to which they subscribed. EX1001, 2:47-3:6. These systems also employed a communication network transmitting and receiving packets of information via radio frequencies in accordance with the DOCSIS specifications. *Id.* Additionally, these networks employed fiber optic cables, together with devices at each end to translate these radio frequencies into optical wavelengths and back again. *Id.*

45. EPONs and networks employing DOCSIS were known to use different protocols, control messages and addressing methods for sending data packets. EX1001, 1:19-46, 3:7-18. To bridge this divide, it was known to employ a *virtual* cable modem to receive DOCSIS communications from the CMTS and translate those signals into optical transmissions. EX1001, 3:27-53. The '035 Patent explains that these “[d]etails of [the DPoE] architecture, as well as expected roles

and functionalities of specific network elements ... can be found in the [prior art] DPoE-SP-ARCH standard, published by Cable-Labs.” EX1001, 3:12-18.

46. The published prior art DPoE standard referenced by the '035 Patent similarly explains that “[s]ince all traffic going to a DPoE ONU from the OSS [*i.e.* from the back-office DOCSIS network] passes through the DPoE System, it is possible for the DPoE System to perform the functions of a CM.” EX1014, 25. The '035 Patent acknowledges that the published standard teaches that “DPoE Systems operate a virtual cable modem (vCM) for each and every DPoE ONU.” *Id.* “The vCM can proxy requests, signaling, and messages to the DPoE ONU using EPON OAM messages[.]” *Id.*

47. As described in the published prior art DPoE standard, the ONUs “are managed from OSSI by proxy through a virtual Cable Modem (vCM)[.]” EX1014, 37. The published prior art DPoE standard illustrates below the use of a vCM [BLUE] “to represent the IP-addressable management entity [*i.e.* ONU] [ORANGE] maintained and controlled within the DPoE System.” EX1015, 17.

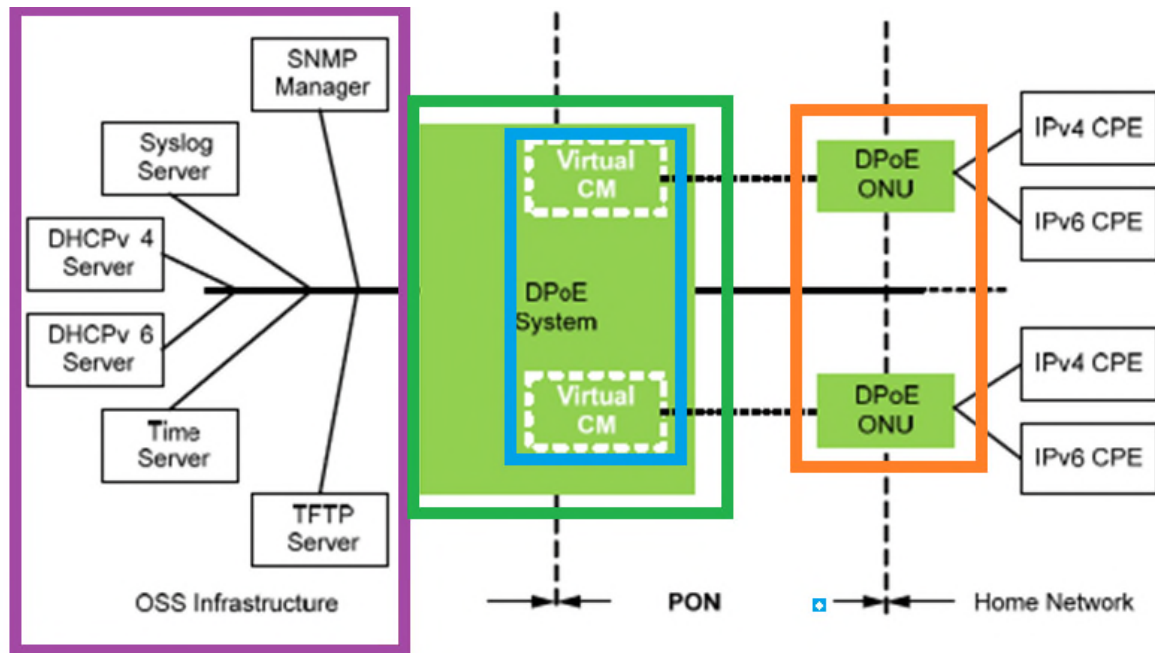


Figure 6 - DPoE Virtual CM (vCM) Concept

EX1015, Fig. 6 (annotated) and 17.

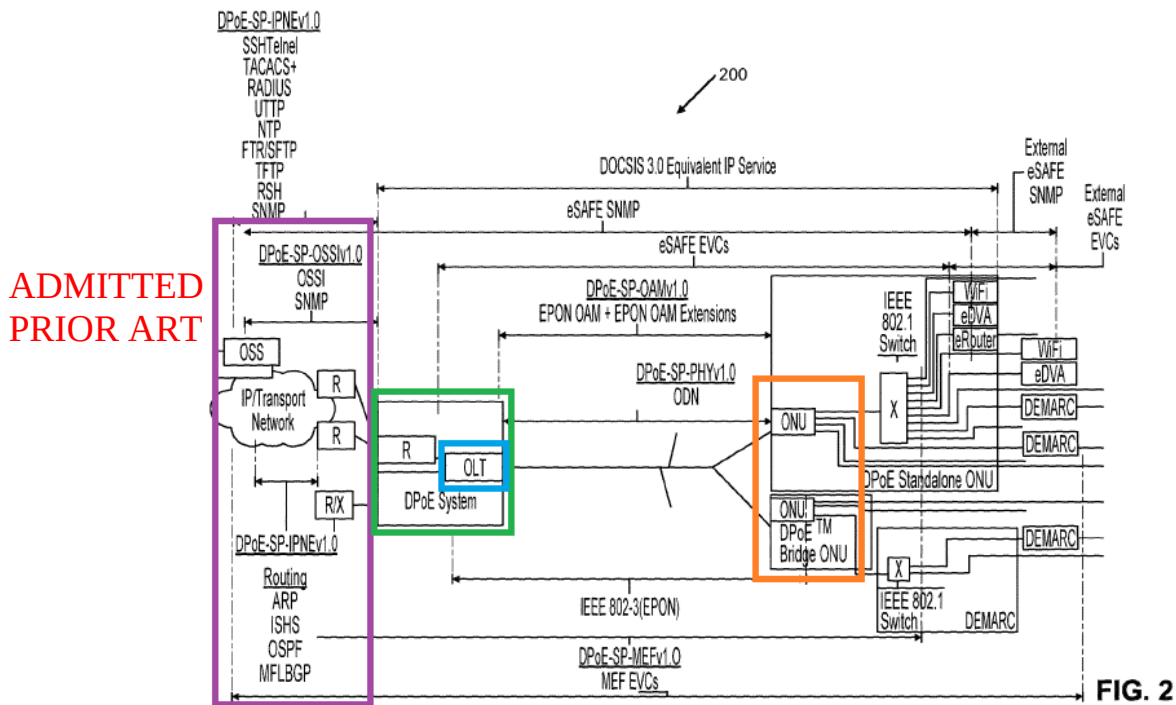
48. The vCM “is used to map requirements that were previously required of the DOCSIS CM to requirements on the DPoE System.” EX1015, 17. The DPoE System [GREEN] (which includes the vCM [BLUE]) thereby allows the DOCSIS back-office system [PURPLE], to manage and control the DPoE ONUs [ORANGE]. EX1015, Fig. 6 (annotated) and 17. “DPoE Networks offer IP(HSD) services functionally equivalent to DOCSIS networks, where the DPoE System acts like a DOCSIS CMTS and the DPoE System and DPoE Optical Network Unit (ONU) to appear to act like a DOCSIS CM.” *Id.* 1.

49. In other words, the '035 Patent describes a well-known DPoE network that uses a software module (*i.e.* vCM) operating on the OLT to “provide the translation

between the EPON and DOCSIS backoffice systems for provisioning of DOCSIS services” on the ONU(s). EX1001, 3:7-18.

50. Figure 2 of the '035 patent offer a similar “architectural diagram of DPoE,” system that is the subject of the patent. Within Fig. 2, reference is made to several well-known prior art industry specifications such as DPoE and DOCSIS documents from CableLabs as well as other well-known prior art documents such as from the SNMP family published by The Internet Engineering Task Force.

51. Figure 2 incorporates: (1) a “DOCSIS backoffice system[] for provisioning DOCSIS services” [PURPLE]; (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) and an OLT [BLUE]; and (3) an ONU [ORANGE] connected to customer premise equipment:



Id., Fig. 2 (annotated). As shown, the '035 Patent is directed to a system to provide “DOCSIS 3.0 Equivalent IP Service” to customer premise equipment while encapsulating existing PON transport technologies unbeknownst to the customer.

52. The '035 Patent explains that the ONUs in its DPoE network are initially configured by a plurality of DOCSIS back-office components using the standard DPoE ONU configuration process, as described in the prior art and known to a POSA. EX1001, 4:51-5:19. In that process, the vCM issues a DHCP request to the DOCSIS back-office system, and receives the location and file name of the target DOCSIS configuration file located on the DOCSIS TFTP servers. *Id.* The vCM then obtains the configuration file via DOCSIS TFTP and translates it into a series of DPoE ONU configuration parameters. *Id.* The configuration parameters are

delivered to the ONU using the established EPON eOAM link and used to configure the ONU. *Id.*

53. The specification admits that both initial configuration and re-configuration of ONUs in a DPoE network were well-known. EX1001, 1:19-46 (describing prior art DPoE networks including a DOCSIS back-office system for provisioning DOCSIS services on ONUs in an EPON), 3:7-18, 3:27-4:3 (prior art DPoE ONU devices are provisioned using “DOCSIS like mechanism[s]” at both initialization and later reconfiguration), 4:51-5:5 (“any changes to the DPoE ONU, service etc.” prompt download of updated configuration file), 5:21-27.

54. The ‘035 Patent provides the following examples of the types of re-configurations contemplated:

In one example, a service for the given customer might need to be temporarily blocked for any operational reasons while leaving services for other customers provided with the same DPoE ONU unaffected. In another example, service provisioned for a particular customer might need to be modified without affecting services provided for other customers on the same DPoE ONU- in certain business scenarios, bandwidth provided for the given customer might needed to be increased to accommodate expected demand spike, for which customer is charged extra.

EX1001, 6:20-30.

55. The method for doing so described in the ‘035 Patent conforms to the mechanisms defined in the published prior art DPoE I01 specifications, which mimics the earlier DOCSIS CM configuration process. A network operator edits

the configuration file stored on in the back-office system. EX1001, 5:32-39. The vCM is notified that an updated configuration file is available for download by means of a change made to a management object in a Management Information Base (MIB). EX1001, 5:28-67; *compare* EX1015, 48. This triggers the vCM to use the standard DPoE mechanism to obtain the updated configuration file, including via a DHCP request and TFTP download. *Id.* The vCM then analyzes the updated configuration file for any structural errors. EX1001, 6:1-15; *compare* EX1015, 33, 88. The vCM then determines any differences between the active configuration and the updated configuration file which may require different resources. EX1001, 7:49-8:1; *compare* EX1015, 48, 56-57, 62, 92. The vCM then performs a resource validation to confirm that the hardware and software resources available on the ONU can support the modified services. EX1001, 6:35-57; *compare* EX1015, 30). The vCM then converts the configuration parameters into a set of standard eOAM messages which are communicated to and applied to the ONU as known. EX1001, 6:58-7:23; *compare* EX1015, 17). The '035 Patent acknowledges that these are well-known default steps to re-configure an ONU in a DPoE network and would have been familiar to a POSA. *See, e.g.*, EX1001, 1:19-46, 3:7-4:3, 4:51-5:5, 5:21-27.

56. The '035 Patent's specification further suggests that initially the intent had been to have DPoE systems unnecessarily emulate the behavior of prior DOCSIS

CMTS/CM systems, in which a reboot prompted the CM to repeat the authentication, discovery, registration and configuration download process. For traditional CMTS/CM networks, this business determined behavior was designed to add additional control over the customer services provisioned and the accounting therefor. A DPoE system, however, is capable of dynamically reconfiguring a particular customer's services via an ONU:

Once the DPoE ONU is authenticated and securely provisioned, a number of services can be instantiated. For the purpose of further description, it is assumed that the given DPoE ONU supports at least two services, the parameters for one of which will be modified through the proposed mechanism and the other one will remain fully operational

EX1001, 5:13-19; *see also* 6:31-32 (“[t]his configuration refresh should not cause the DPoE ONU to reboot[.]”)

57. The ‘035 specification also describes an unclaimed step whereby a “configuration delta *file*” containing the changes between the existing and updated configuration files “is used to drive the DPoE configuration update. EX1001, 6:16-31. The ‘035 Patent acknowledges, however, that this “delta file” may be nothing more than the new configuration file. *Id.* (“In some implementations, the configuration delta file may be equal to CMN, in which case the whole DPoE ONU configuration will be refreshed.”).

58. None of the claims of the '035 Patent recite any requirement that configuration changes be accomplished without rebooting the ONU using a configuration delta file.

C. Prosecution History

59. The application for the '035 Patent was filed March 28, 2012, claiming priority to U.S. Provisional Appl. No. 61/468,504 ("Provisional"), filed March 28, 2011. In contrast to the claims of the issued '035 Patent, the Provisional's sole claim required configuration updates to be accomplished without a reboot:

A method for updating configuration of an optical network unit device in a passive optical network for communications, comprising: updating optical network unit device configuration of an optical network unit device **without rebooting the optical network unit device**.

EX1004, claim 1 (emphasis added).

60. In the utility application for the '035 Patent, however, the applicant abandoned this requirement. EX1003, 27-34. The applicant did not refer to nor rely upon such a requirement in attempting to traverse the examiner's repeated rejections. EX1003 (257-270, 280-286).

61. The majority of Claims 1-13 were initially rejected as anticipated by Publication No. US2011/0131624A1 (Wu). The examiner concluded that Wu disclosed an apparatus for causing an update to a configuration file used for operation of an Optical Network Unit (ONU) operable in an Ethernet Passive

Optical Network (EPON). EX1003, 89-92. The examiner observed that Wu described generating an updated configuration file for an ONU, notifying a virtual cable modem of the availability of that file, providing that file to the ONU when requested, and monitoring the vCM for an indication the ONU was successfully updated. *Id.* According to the examiner, Wu also described a system that detected the need for a configuration change in the ONU and modified at least one service listed in the configuration file to generate an updated file. *Id.* Wu also taught the receipt of a dynamic host control protocol (DHCP) request from the vCM, providing information concerning the location of the updated configuration file to the vCM, and allowing the vCM to download the updated file. *Id.*

62. Remaining claims reciting use of a management information base (MIB) were rejected as obvious based upon the disclosures in Wu in view of Publication No. US2008/0232801A1 (Arnold). *Id.*, 92-93. The examiner observed that Arnold described changing variables in a vCM's management information base (MIB) so as to notify the vCM of availability of an updated configuration. *Id.* The examiner concluded that a POSA would have been motivated to incorporate the notification method described in Arnold in connection with the updating process discussed in Wu.

63. In addition, issued Claim 14 and related claims were rejected as obvious based upon disclosures in Publication No. US2011/0072119A1 (Bronstein) in view

of Publication No. US2008/0010358A1 (Jin). The examiner observed that Bronstein disclosed an apparatus for updating configuration of an Optical Network Unit (ONU) in an Ethernet Passive Optical Network (EPON). *Id.*, 93-98. The examiner noted that Bronstein disclosed a means for receiving a notification that an updated configuration file for the ONU was available, means for obtaining that file, mean for determining changes between that file and a current configuration file to identify ONU resources needed to implement those changes, means for determining that such resources ae available, and means for applying those changes to the ONU. *Id.*

64. Bronstein also described detecting changes in a vCM's MIB entries as a means for notifying an updated configuration file was available. Bronstein was also found to teach sending dynamic host control protocol (DHCP) messages, receiving identities of servers storing updated configuration files, and obtaining such files from an TFTP server. The examiner further determined Bronstein described validating whether the OLT and DPoE system included resources needed to implement the changes in the update file. *Id.*

65. The examiner concluded that Jin, for its part, taught the validation of the updated configuration file for structural errors, as well as the deletion of the updated configuration file from local memory after the successful update. The examiner concluded a POSA would have been motivated to include Jin's structural integrity

check, and to adopt its clearing of local memory, as part of the updating process described in Bronstein. *Id.*

66. In response to the examiner's rejections, the applicant argued that neither Wu nor Bronstein taught configuration of an ONU after initialization. The applicant amended its claims to add the requirement that the ONU have an *existing* configuration when updated. *Id.*, 117-130. The applicant further argued that neither Wu nor Bornstein taught notifying the vCM of the availability of an updated configuration file. *Id.*, 129-130.

67. In response, the examiner maintained his objections with respect to Claim 14-32 and again rejected Claims 1-13, declaring them obvious based on Wu in light of Bronstein. The examiner noted Bronstein disclosed updating a previously configured ONU, as claimed. *Id.*, 145-155.

68. Specifically, Bronstein taught a means of accelerating the re-provisioning of an ONU. Bronstein explains:

To accelerate this provisioning process, the fact that a given configuration file will not likely have changed after an ONU is powered down and then re-booted is exploited. For example, the PON [*i.e.* passive optical network] may store the CM configuration file on, for example, the SCC [*i.e.* system controller card] in a non-volatile memory. In this fashion, the DOCSIS proxy need not push the configuration file via RPC [*i.e.* remote procedure call] to the SCC again. One example accelerated process will occur as follows

Upon power-up, each ONU registers with its OLT prior to the request for the configuration file. The OLT may then check if the

same ONU (through its unique MAC address) was provisioned earlier. If it was, the ONU is immediately re-provisioned using the stored configuration file corresponding to this MAC address. ... The SCC may then send an “ONU registered” event via RPC to the DOCSIS proxy with the ONU's identifying data such as MAC address as well as the index and timestamp of the last configuration change.

Upon receiving this event, the DOCSIS proxy may obtain the TFTP server IP address from the DHCP server as well as the name of the configuration file. Using this IP address and file name, the DOCSIS proxy obtains the corresponding configuration file as discussed earlier with regard to FIG. 4. ...

[T]he DOCSIS proxy compares the previous configuration file name to the file name retrieved in step 2. In addition, the DOCSIS proxy compares a message integrity code (MIC) from the previous configuration file to the current MIC. If both the names and MICs match, the accelerated configuration is confirmed. Otherwise, a full (non-accelerated) re-provisioning process is initiated.

EX1005, [0033]-[0037].

69. In response, the applicant did not contest the examiner’s interpretation of Bronstein as teaching the application of an updated configuration file to an ONU having an existing configuration file. Instead, the applicant argued that the combination did not teach “receiving a notification that an updated configuration file is available for the ONU,” as recited in Claims 14-32. To gain allowance Claims 1-13, the applicant amended claims 1-13 to recite receipt of a notice concerning the availability of an updated configuration file “prior to the successful update of the ONU.” *Id.*, 258-270. The applicant successfully argued that With respect to Claims 14-32, Applicant argued that the “updating of the CM status in step 430 and that the

reporting of successful loading of configuration file in step 415 in Bronstein 119” did not teach, as asserted by the examiner, a prior notification of the availability of the updated configuration file. *Id.*, 232.

70. The claims were only allowed over the prior art based on this “prior notification” feature, whereby notification of the availability of an updated configuration file is received prior to successful update of the ONU. *Id.*, 268-269, 285. As issued, claims 1-13 are directed towards the administrative functions of the DOCSIS back-office of the DPoE system in generating updated configuration files in the back-office system and monitoring their application to targeted ONUs, while claims 14-32 are directed towards the actions of a vCM, which mimics the behavior of a DOCSIS CM, in obtaining updated DOCSIS configuration files from DOCSIS back-office systems and applying updated configurations to targeted ONUs.

D. Level of Ordinary Skill

71. 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 and 2-3 years experience relating to the design and/or maintenance of DOCSIS networks, portions of which include fiber optical elements.

E. Claim Construction (37 C.F.R. §§42.104(b)(1) and (b)(3))

72. Words in a claim are given their plain meaning, as understood by a POSA in view of the patent and file history. 37 C.F.R. § 42.100(b); 83 Fed. Reg. 197,

51340 (Oct. 11, 2018); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*). For purposes of this Petition only, other than the following terms, Petitioner proposes that no claim language requires express construction to resolve the grounds herein. Petitioner reserves the right to propose additional/alternative claim constructions in other proceedings in response to arguments that may be advanced therein by PO.

73. Independent claim 13 recites “An apparatus for causing an update to a configuration file used for operation of an Optical Network Unit (ONU) operable in an Ethernet Passive Optical Network (EPON), the apparatus comprising: means for[:] generating an updated configuration file ... notifying a virtual cable modem (vCM) ... providing [the file] ... and ... monitoring the vCM for an indication of successful update of the ONU[.]” EX1001, 11:32-46.

74. The drafter’s use of the phrase “means for” presumes that these limitations are properly construed pursuant to Section 112, paragraph 6 (now Section 112(f)). *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed.Cir. 2015). These terms fail to recite a sufficiently definite structure to one of ordinary skill in the art. In addition, the specification does not disclose any structures and only describes the claimed means in functional terms as “digital electronic circuitry, or computer software of firmware operating on hardware.” However, because indefiniteness is

not an issue for the Board, for purposes of invalidity, the prior art discloses such means as discussed herein.

1. means for generating an updated configuration file

75. The only structure disclosed in the specification explicitly linked to the performance of the function of generating an updated configuration file is the “module 602” of apparatus 600. EX1001, 7:34-36. The ’035 Patent explains that module 602 “can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware[.]” EX1001, 8:20-50 and FIG. 6.

76. Thus, for purposes of the present Petition only, the term “means for generating an updated configuration file” has been construed to mean a digital electronic circuitry, or computer software of firmware operating on hardware that generates an updated configuration file and equivalents thereof.

2. means for notifying a vCM

77. The only structure disclosed in the specification for performing the function of notifying a vCM that the updated configuration file is available for the ONU is the “module 604” of apparatus 600. EX1001, 7:36-38. The ’035 Patent explains that module 602 “can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware[.]” EX1001, 8:20-50 and FIG. 6.

78. Thus, the term “means for notifying a vCM” should be construed to mean a digital electronic circuitry, or computer software of firmware operating on

hardware that notifies a vCM that the updated configuration file is available and equivalents thereof.

3. means for providing the updated configuration file

79. The only structure disclosed in the specification for performing the function of providing the updated configuration file to the vCM the “module 606” of apparatus 600. EX1001, 7:38-40. The ’035 Patent explains that module 602 “can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware[.]” EX1001, 8:20-50 and FIG. 6.

80. Thus, the term “means for providing the updated configuration file” should be construed to mean a digital electronic circuitry, or computer software of firmware operating on hardware that provides the updated configuration file and equivalents thereof.

4. means for monitoring the vCM for an indication of successful update of the ONU

81. The only structure disclosed in the specification for performing the function of monitoring the vCM for an indication of successful update of the ONU is the “module 608” of apparatus 600. EX1001, 7:40-42. The ’035 Patent explains that module 602 “can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware[.]” EX1001, 8:20-50 and FIG. 6.

82. Thus, the term “means for monitoring the vCM for an indication of successful update of the ONU” should be construed to mean a digital electronic

circuitry, or computer software or firmware operating on hardware that monitors a vCM for an indication of successful update of the ONU and equivalents thereof.

VII. PRIOR ART

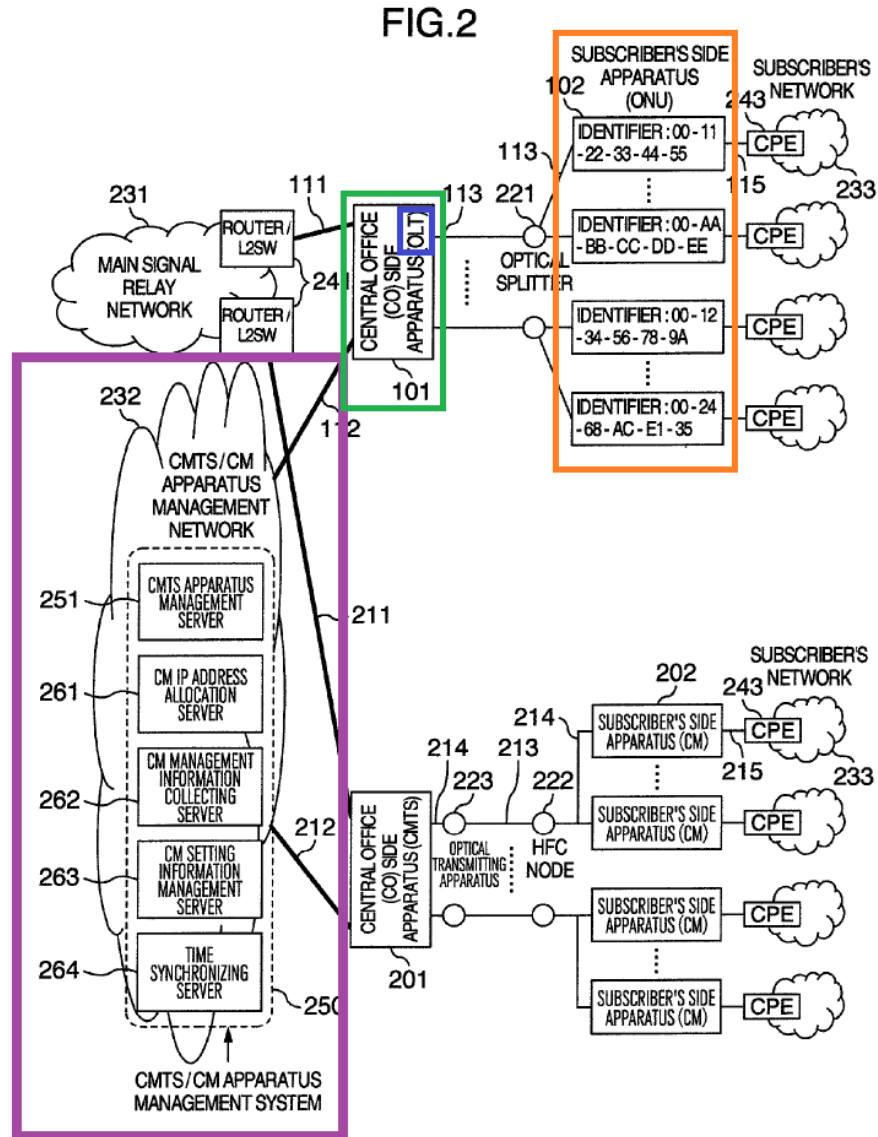
A. Tsuge

83. U.S. Patent No. 8,160,448 (“Tsuge”) issued April 17, 2012, and is entitled “Communication System Using Passive Optical Network and Passive Optical Network.” EX1006, (45), (54). Tsuge issued from an application filed March 17, 2009. Tsuge is prior art pursuant to the applicable version of 35 U.S.C. §102(e).

84. Like the claimed invention, Tsuge 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). EX1006, 1:22-31, 4:12-40; *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (reference is analogous art if from same field of endeavor as claimed invention or would have “logically [] have commended itself to an inventor's attention in considering his problem”); *In re ICON Health and Fitness, Inc.*, 496 F.3d 1374, 1379-80 (Fed. Cir. 2007).

85. PONs and DOCSIS, however, use different protocols, control messages and addressing methods for sending a data packet from one location to another. EX1006, 3:3-56. To bridge this divide, a *virtual* cable modem is established

upstream of the optical fiber (i.e. at the OLT) to receive DOCSIS communications from the CMTS and translate those signals into optical transmissions. *Id.* Figure 2 of Tsuge illustrates a DPoE network, which includes, *inter alia*, three components: (1) a DOCSIS back-office system for provisioning DOCSIS services (“CMTS/CM Apparatus Management Network 232”) [PURPLE]; (2) a DPoE system (“central office (CO) side apparatus (OLT)”) [GREEN] including, *inter alia* a software emulation of a traditional cable modem (CM) (i.e., a virtual cable modem or vCM) and an OLT [BLUE]; and (3) an ONU [ORANGE] connected to customer premise equipment:



EX1006, Fig. 2 (annotated).

86. Tsuge discloses how to use a PON with an existing cable network (i.e. DOCSIS), thus creating a DPoE network. EX1006, 4:12-20, 2:26-32 (“[A] method whereby the station side apparatus [CMTS] is replaced by the OLT ... the subscriber’s apparatus [CM] is replaced by the ONU ... and the access line between [the CMTS and CM] is replaced by the optical fiber and the optical splitter.”)).

Tsuge's solution is to provide an "apparatus management interface 112" (AMI) coupled with a "CMTS/CM apparatus control signal 122", i.e. software that transmits and receives control signals from the back-office DOCSIS network in "the same format as that of apparatus control signals of a CMTS and CM[.]" EX1006, 4:22-40. Tsuge's DPoE system processes received CMTS apparatus control signal and applies it to the OLT and converts CM apparatus control signal received into an "ONU apparatus control signal which is used in the PON interval and transmit[ted] towards the ONU." *Id.* Tsuge's DPoE system further converts the ONU apparatus control signals received from the ONU through the PON interval into the CM apparatus control signal to transmit to the back-office DOCSIS network. *Id.* Thus, Tsuge's DPoE system makes the PON system appear as a CMTS/CM to the back-office DOCSIS system, thereby allowing the network operator to control the PON system using the existing DOCSIS framework. EX1006, 5:3-35. Similarly, Tsuge's DPoE system makes the back-office DOCSIS system appear to the ONU as merely a PON system, thus allowing the ONU and PON systems to use their respective control signals and management operations. *Id.* Thus, Tsuge's DPoE system provides a "virtual" CM (vCM) at the OLT and allows the use of any PON system with an existing DOCSIS back-office network. *Id.*

87. Tsuge describes a well-known DPoE network that uses a software module (i.e. vCM) at the OLT to provide the translation between the EPON and the

DOCSIS back-office system for provisioning of services on the ONU(s). EX1006, 1:21-31, 4:13-40 (through its apparatus management interface, the OLT “transmits and receives control signals of the same format as that of apparatus control signals of a CMTS and a CM”), 5:8-11 (“Since the PON of the invention is seen in a manner similar to that of the CMTS and the CM from the apparatus management system, the system administrator can control the PON system by a method similar to that of the CMTS and the CM.”).

88. Tsuge explains that the ONUs in its DPoE network are initially configured using the default DPoE ONU configuration process, which includes the software module running at the OLT (vCM) issuing a DHCP request to the back-office system, which then informs the OLT of the address information and file name of the TFTP server storing the initial setting information for the ONU. EX1006, 4:41-50. The OLT then receives the initial setting information via TFTP and converts it into the protocol of the PON. *Id.* The ONU is then configured using this initial setting information. *Id.*

89. Tsuge also describes setting a new configuration on an already initialized ONU. EX1006, 14:20-15:15, Figure 9. First, the OLT obtains the location and file name of the setting information file (step 910). *Id.* Then the OLT obtains the setting information file (step 920) via TFTP (“setting information obtaining sequence”). *Id.* Subsequently, the OLT executes an ONU setting sequence by using the obtained

setting information file (step 930). *Id.* This includes that the CM setting obtaining/converting function 503 in the OLT analyzes the setting information file for any structural errors. EX1006, 16:39-52. The OLT then parses out the setting parameters to determine any changes to the current ONU configuration, converts them, and sends a corresponding ONU setting request message to the ONU (step 1323). EX1006, 16:53-67. The ONU implements these settings and sends an ONU setting response message confirming successful update (setting) of the ONU configuration. EX1006, 16:64-17:11.

B. Noel

90. U.S. Patent Application Publication No. 2008/0253771 (“Noel”) was published October 16, 2008, and is entitled “Method and Apparatus for Configuring Optical Network Terminals (ONT) in a Network.” EX1008, (43), (54). Noel was published from an application filed May 18, 2007. Noel is prior art pursuant to the applicable version of 35 U.S.C. §102(e).

91. Like the claimed invention, Noel describes a method for reconfiguring ONUs in a conventional passive ethernet optical network (PON). EX1008, [0002]-[0003]. Noel is analogous art. *Bigio*, 381 F.3d at 1325; *ICON Health*, 496 F.3d at 1379-80.

92. Noel explains that, as shown in Figure 1, its PON comprises an OLT [BLUE], an Element Management System (EMS) [PURPLE], and at least one ONU

[ORANGE] (also referred to as an optical network terminal or ONT). EX1008, [0021].

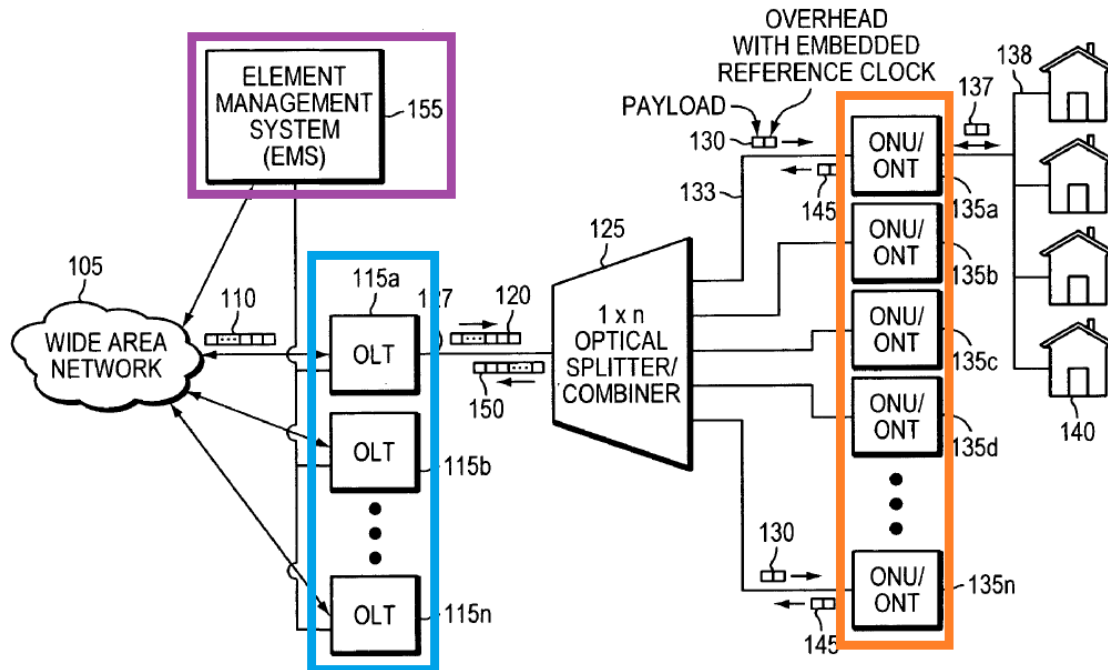


FIG. 1

EX1008, Figure 1 (annotated).

93. Noel notes that ONUs use settings parameters to enable various services, and these settings are stored in the ONU as a configuration and may be updated. EX1008, [0026]). Noel explains that a network operator needs to be able reconfigure ONUs in a convenient fashion and provides a method that allows a network operator to change services on a large group of ONUs. EX1008, [0027], [0029].

94. Noel's Figure 3B depicts how, when a new configuration is available for an ONU, a corresponding notification is sent to the OLT, which passes it along to at least one ONU. EX1008, [0036]-[0039]. The ONU sends a request (308) for the updated configuration file to the Configuration Server via the OLT. *Id.* The Configuration Server then sends back the updated configuration file (309), via the OLT, to the ONU, which is reconfigured according to the new parameters. *Id.*

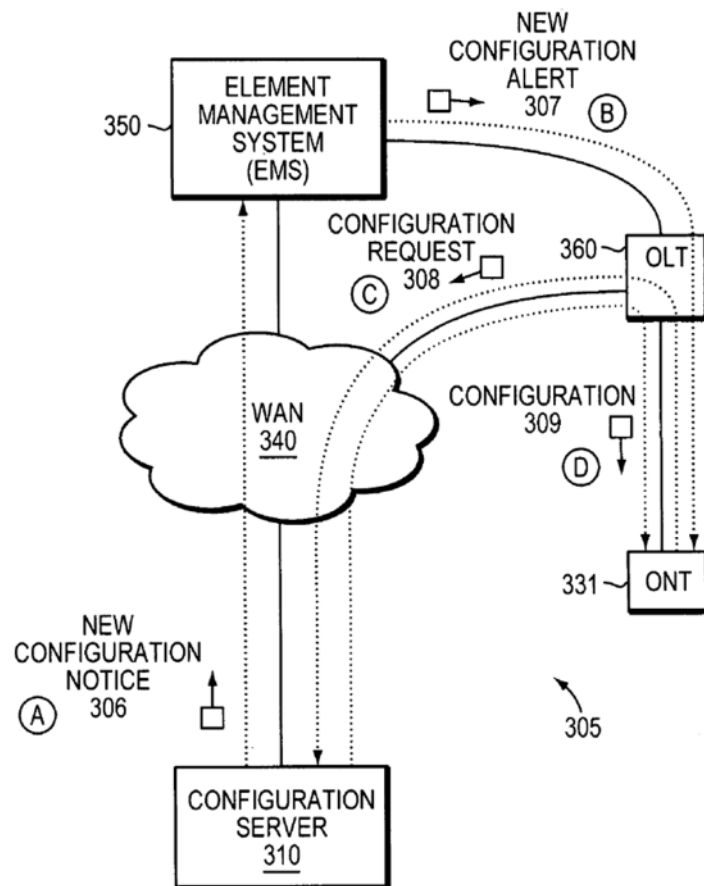


FIG. 3B

EX1008, Figure 3B.

C. McKinnon

95. U.S. Patent No. 7,848,234 (“McKinnon”) issued December 7, 2010, and is entitled “Allocating Access Across Shared Communication Medium to User Classes.” EX1007, (45), (54). McKinnon issued from an application filed February 19, 2007. McKinnon is prior art pursuant to the applicable version of 35 U.S.C. §102(a) and (e).

96. The '035 Patent concerns updating ONU configurations by sending updated configuration files to vCMs from a DOCSIS back-office. McKinnon describes updating configuration files in a Data-Over-Cable network comprising both fiber optical and coaxial cabling, *i.e.* a DPoE network. EX1007, 1:18-22, 45-49. McKinnon explains that in such networks data packets are transmitted downstream from a cable modem termination system (CMTS) to cable modems (CMs) of users. EX1007, 1:55-61. McKinnon explains that ever-increasing demand for higher throughput rates has prompted development of DOCSIS standards for prioritizing transmission of data over the network. “Data packets representing voice or video, for example, now can be identified and given priority transmission over data packets representing email, file transfers, and text-based Web documents.” EX1007, 3:51-60. McKinnon describes the generation of CM configuration files which, among other things, limit a CM’s bandwidth consumption to a pre-authorized amount. EX1007, 7:60-8:2. McKinnon would

have logically commended itself to the attention of POSAs considering problems addressed by the '035 Patent. Thus, McKinnon is analogous prior art. See *Bigio*, 381 F.3d at 1325; *ICON Health*, 496 F.3d at 1379-80.

97. McKinnon explains that a CM is first assigned a configuration file when it initially comes online. This configuration file, *inter alia*, sets bandwidth limits on the CM's downstream and upstream communications. EX1007, 13:31-40. For example, this configuration file will prompt a CM to notify its router when downstream bandwidth limits are reached, causing the router to suspend further downloads until expiration of the current time interval. EX1007, 7:48-57.

98. McKinnon describes various methods by which initial bandwidth allocations are modified based upon events occurring after initial configuration of a CM. See *e.g.*, EX1007, 17:1-26 (describing the development of usage statistics employed by Bandwidth Allocator 92); 24:15-38 (describing use of service level agreements (SLAs) to generate configuration files for users and classes of users which may be "updated from time-to-time by the Administrator 106"); 28:64-29:46 (describing post-initialization user effected changes to SLAs that in turn prompt an update of user configuration files)). Changes to these inputs prompt revisions to user bandwidth allocations in the relevant CM configuration files for each such user. EX1007, 26:56-27:21 ("The DOC Network is updated by incorporating (Step 2302) the user allocations as bandwidth allowances (i.e., bandwidth limits) into CM

configuration files (MD-5 files) for the CMs of the respective users.”); Fig. 23 (Step 2302)). These updated configuration files are sent by the bandwidth Allocator 92 to a Trivial File Transfer Protocol (TFTP) server which maintains those files for the network. EX1007, 26:56-27:21; Fig. 23 (Step2304)). A notification is then sent to the relevant CMs “causing the CMs to acquire and implement the CM configuration files maintained on the TFTP server.” EX1007, 27:17-21, 7:60-8:2 (“sending a command either to each user's cable modem, or to a cable modem termination system to which each user's cable modem is connected, to cause the cable modem to acquire its new respective configuration file.”)).

99. McKinnon explains that these methods can be implemented via a network access manager 86 which preferably comprises a hardware component having software modules including a Data Collector 88, a Database Manager 90, Bandwidth Allocator 92, and GUI & Report Generating Engine 94. EX1007, 14:12-63. McKinnon, for example, describes Data Collector 88 that initiates data collection from each customer-facing CM at predetermined time intervals. EX1007, 16:1-10. Data is collected using SNMP from information stored in the DOCSIS-compliant CM's management information base (MIB). EX1007, 15:53-67. A Database Manager 90, in turn, receives information from Data Collector 88 relating to performance of these CMs. Database Manager 90 provides information to Bandwidth Allocator 92 for its use in generating updated configuration files.

EX1007, 15:21-27, 16:17-22 (“Database Manager 90 “stores the information in a user statistics table (‘stats’) for later use by the Bandwidth Allocator 92[.]”). McKinnon further discloses that Bandwidth Allocator 92 detects the need for configuration changes that may have occurred due to changes in a user(s) service level agreement(s). EX1007, 26:30-55. Bandwidth Allocator 92 retrieves information from Database Manager 90, including information contained in the SLAs for users and/or classes of users. *Id.* This information is “updated from time to time by Administrator 106.” *Id.*

D. Bourgart

100. U.S. Patent No. 8,416,616 (“Bourgart”) issued April 9, 2013, and is entitled “Reconfiguration of Network Termination Devices.” EX1010, (45), (54). McKinnon issued from an application filed June 28, 2010 having an earliest priority claim to a French application filed September 4, 2007. Bourgart is prior art pursuant to the applicable version of 35 U.S.C. §102(e).

101. Bourgart describes a method of reconfiguring network termination devices, including ONUs in a PON. EX1010, Abstract, 1:59-2:6, 5:47-54. Bourgart concerns the same field as the Patent, specifically each are concerned with updating configuration files to reconfigure services provided over telecommunication networking equipment such as ONUs within PONs. EX1002, ¶¶101, 322 (EX1010,

Abstract). Thus, Bourgart is analogous prior art. *See Bigio*, 381 F.3d at 1325; *ICON Health*, 496 F.3d at 1379-80.

102. Bourgart observes that communications between the line termination device (LT) and the network termination devices (NTs) are governed by a protocol, “that is to say a set of descriptions of formatting, segmentation and sharing of data between several applications and several network-termination devices.” EX1010, 1:46-49. Bourgart notes the need to anticipate that communications protocols are “likely to change.” EX1010, 1:59-60, 2:11-14 (“The protocol governing the communications over the line is naturally still likely to evolve[.]”), 2:15-16 (“Other service-integration multiplexing formats will probably appear.”).

103. Bourgart proposes a “low-cost solution for the reconfiguration of network-termination devices” that is simple to apply and that “does not require service interruption.” EX1010, 2:32-34. Bourgart observes that previously these protocol upgrades were accomplished by “replac[ing] the network-termination devices[.]” EX1010, 2:17-18. Alternatively, each user was provided with a storage medium (*e.g.* USB drive) containing a stored program for reconfiguring the network device. EX1010, 2:24-26.

104. Bourgart notes, however, that these approaches were disadvantageous. The former is costly and complex, requiring not only the manufacture of new, upgraded devices, but also arranging replacement operations that necessitate

undesirable service interruptions. EX1010, 2:19-23. The latter must be carefully coordinated across point-to-multipoint networks to ensure simultaneous upgrade of a plurality of network devices required for proper operation of shared communications. EX1010, 2:26-31.

105. In Bourgart's solution, an LT simply communicates instructions to the connected NT to modify its protocols. EX1010, 2:38-55 ("[T]he line-termination device is used both for transmitting content data included in frames conforming to a communication protocol and for commanding at least in part the possible changes of this communication protocol over the line.").

E. Go

106. Korean Patent No. 10-0414671 ("Go") issued January 7, 2004, and is entitled "Method for automatic remote software upgrade of cable modems." EX1009/EX1018, (45), (54). Go issued from an application filed February 14, 2002. *Id.* (22). Go is prior art pursuant to the applicable version of 35 U.S.C. §102(b).

107. The '035 Patent discloses remotely reconfiguring network elements (vCMs) using pre-existing DOCSIS CM functionality *i.e.* management via MIBs. EX1001, Abstract. Go describes a method "for the convenient and rapid automatic upgrade of software for cable modems in a cable network where at least two or more types of cable modems are mixed." EX1009/EX1018, Abstract. Go would have

logically commended itself to the attention of POSAs considering problems addressed by the '035 Patent. Go is analogous art. *See Bigio*, 381 F.3d at 1325; *ICON Health*, 496 F.3d at 1379-80.

108. Go notes that the operation of CMs is determined by the software installed on them, also called firmware, that “if issues arise with this software, the cable modem may fail to perform its intended functions.” EX1009/EX1018, p. 2. “To address such issues or to enhance quality, manufacturers remotely upgrade the software of cable modems through the headend system over the cable network.” *Id.* Go also notes that existing upgrade methods sometimes resulted in cases where upgrades were not properly performed or unsupported CMs were upgraded. EX1009/EX1018, pp. 2-3.

109. To avoid these problems, Go’s method sequentially obtains and analyzes the information in each cable modem’s (“CM”) Management Information Base (“MIB”) using Simple Network Management Protocol (“SNMP”) to determine whether the type of the respective cable modem corresponds to the upgrade target. For each CM identified as an upgrade target, instructions are sent via SNMP to download a corresponding updated configuration file from the TFTP server and apply the updated configuration file. EX1009/EX1018, Abstract and pp. 2 and 4-5 (“[T]he process moves from step (208) to step (210) to instruct the software upgrade for the corresponding cable modem using the 'docsDevSoftware'

information. ... 'docsDevSwAdminStatus' is set to 'upgradeFromMgt(1)' through SNMP. Consequently, the corresponding cable modem will download the software from the TFTP server (118).”).

F. Barrow

110. U.S. Patent No. 7,519,690 (“Barrow”) issued April 14, 2009, and is entitled “Dynamically Updateable Parameters in Integrated Services Hub.” EX1011, (45), (54). Barrow issued from an application filed February 28, 2002. *Id.* (22). Barrow is prior art pursuant to the applicable version of 35 U.S.C. §102(b).

111. The ’035 Patent professes to be interested in reconfiguring ONUs on-the-fly. EX1002, ¶322. Barrow relates to a method for dynamically updating configuration files to reconfigure services provided by telecommunication networking equipment that provide one or more of voice, video and data (Internet) services. EX1011, 1:21-24 (“The present invention relates to a method for updating parameters in a customer premises telecommunications hub, and more particularly to a method for dynamically updating configuration files.”). Barrow would have logically commended itself to the attention of POSAs considering problems addressed by the ’035 Patent. Barrow analogous art. *See Bigio*, 381 F.3d at 1325; *ICON Health*, 496 F.3d at 1379-80.

112. In Barrow, these services are provided by an Integrated Services Hub, or ISH, that is “a hardware component that links business or residential user devices

such as telephones and computers to the broadband, wide area network through a plurality of user interfaces and at least one network interface.” *Id.* Barrow explains that the controller for the ISH “requires configuration files to set parameters for the various interfaces for the POTS ports, Ethernet ports, etc.” EX1011, 2:1-67. Barrow provides an update module to modify these parameters, which may be necessary for various reasons, such as adjusting the default volume of a phone call or adjusting the speed of an Ethernet module. EX1011, 3:3-20 and 7:59-67.

113. Barrow’s update module functions to identify configuration changes and updates dynamically those elements that do not require a reboot:

When a new configuration file is received by the update module, it stores the new configuration file and issues a check function call to each of the other modules. Each module checks the new configuration file against its current parameters, determines if any changes require it to reboot, and notifies the update module if reboot is needed. ... If no reboot is needed, the update module issues an update function call to all modules, which then update their parameters to the new configuration file setting dynamically, *i.e.* without a reboot.

EX1011, 3:3-20, 9:3-9; *see also* 8:25-60 (“Each module starts by reading the new configuration file in flash memory, or at least by reading the parameters which affect it. Then each module compares the new parameters to the previously stored parameters to see if any changes have actually been made. Each parameter used in a module is designated as to whether or not it can be dynamically changed or requires a system reboot.”).

G. Koshy

114. An article authored by Joel Koshy and Raju Pandey entitled, “Remote Incremental Linking for Energy-Efficient Reprogramming of Sensor Networks” was in February and July, 2005. EX1012; EX1019, ¶¶5-7. Koshy is prior art pursuant to the applicable version of 35 U.S.C. §102(b).

115. Koshy relates to wireless sensor networks (“WSN”) that “coordinate to perform continuous sensing tasks.” EX1012, p. 354. Kosher further explains that “many of these applications have reprogrammability needs ranging from parameter changes for re-tuning applications, to whole system reprogramming (reflashing)” that may need to be deployed to the sensors remotely. *Id.* Because of the number of devices typical in a WSN, the update process can be cumbersome. *Id.* To streamline the updating process, Koshy teaches a method that involves updating devices such that only changed parameters are modified where possible. *Id.* at p. 355.

116. Koshy discloses that a delta encapsulating the differences between a current configuration file and an updated configuration file, also known as a diff-script, is created. EX1012 at 360-361. This delta is then applied to a corresponding device to update its operation. *Id.* Koshy is analogous prior art.

**VIII. GROUND 1: CLAIMS 1-2, 4-6, 8-10, AND 12-13 ARE OBVIOUS
BASED ON TSUGE ALONE AND/OR IN VIEW OF MCKINNON
AND/OR IN FURTHER VIEW OF NOEL**

117. Claims 1-2, 4-6, 8-10 and 12-13 would have been obvious to a person of ordinary skill based upon the disclosures of Tsuge alone and/or in light of the knowledge of one of skill in the art and/or in view of McKinnon and/or Noel.

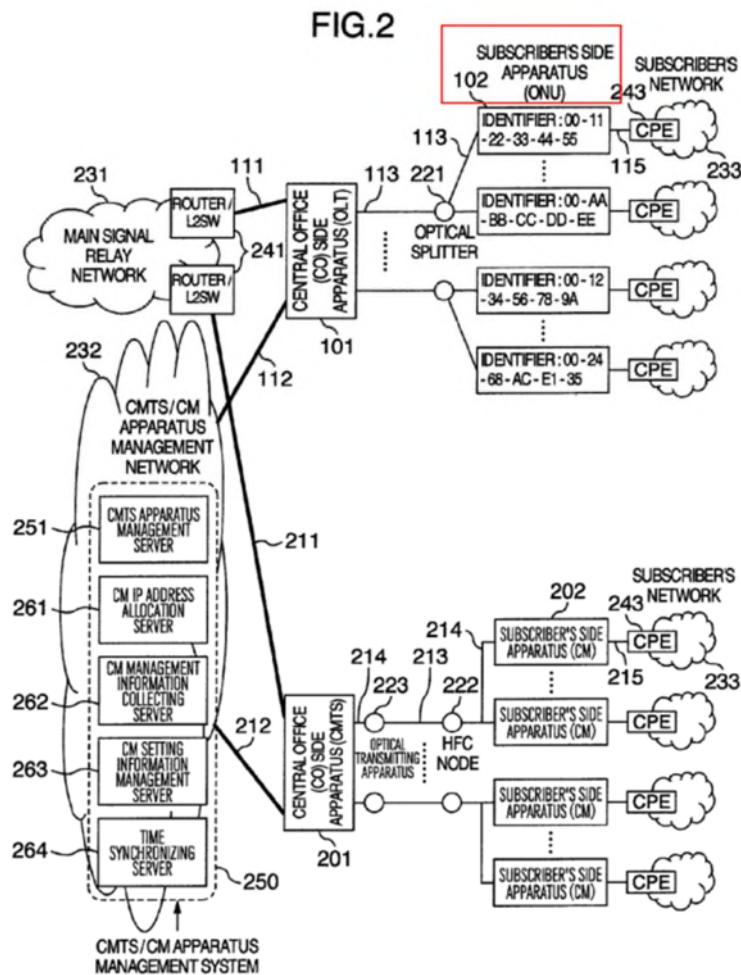
1. Independent Claim 1

Preamble: 1. A method of causing an update to a configuration file used for operation of an Optical Network Unit (ONU) operable in an Ethernet Passive Optical Network (EPON), the method comprising:

118. To the extent the preamble is deemed limiting, as more fully described below in connection with Elements 1[a]-[d], Tsuge discloses causing an update to a configuration file used for operation of an Optical Network Unit (ONU) operable in an Ethernet Passive Optical Network (EPON), or a POSA would otherwise have found it obvious to update a configuration file used for operation of an ONU in an EPON based on the disclosures of Tsuge alone, and/or in view of McKinnon, and/or in further view of Noel.

119. Tsuge discloses a method for provisioning and updating services provided by ONUs in an EPON. EX1006, 6:47-55 (“an example in which a GE-PON which has been standardized by the IEEE Standard 802.3ah is used as a PON of the invention”), 2:21-25 (explaining that GE-PON refers to “Gigabit Ethernet PON”); and 14:40-15:22.

120. Figure 2 (below) illustrates an example of the communication system disclosed in Tsuge highlighting inclusion of an ONU [RED]:



EX1006, 6:24-26, Fig. 2 (annotated).

Element 1[a]: generating, using at least one computer, an updated configuration file for the ONU, wherein the ONU is configured with an existing configuration file;

121. A POSA would find it obvious to use at least one computer to generate an updated configuration file for an ONU configured with an existing configuration

file based upon the disclosures of Tsuge alone and/or in view of McKinnon and/or in further view of Noel.

122. Tsuge discloses a method for provisioning and updating services provided by ONUs in an EPON by means of a virtual cable modem. EX1006, 4:41-50. McKinnon discloses a method of supplying updated configuration files to cable modems generated using, among other things, profiles, or classes, of service level parameters. EX1007, Abstract, 26:30-55. Noel similarly discloses using profiles to generate configuration files used to reconfigure ONUs operating in a Passive Optical Network. EX1008, [0044].

123. Tsuge describes configuring ONUs. Tsuge explains that an optical line terminal (OLT 101) employs a CM-ONU correspondence table 551 to configure ONUs. EX1006, 20-29, Fig. 9 (Step 910). The CM-ONU correspondence table 551 resides on the OLT. EX1006, 11:4-17, 12:51-62, Fig. 6. The table associates a Cable Modem (CM) IP address with an identifier unique to the ONU, such as a MAC address. EX1006, 15:61-16:8. As shown below, each CM IP Address 1101 is associated with an ONU Intrinsic Identifier 1104 [ORANGE]. EX1006, 12:12-15, 63-66, Fig. 11 (annotated).

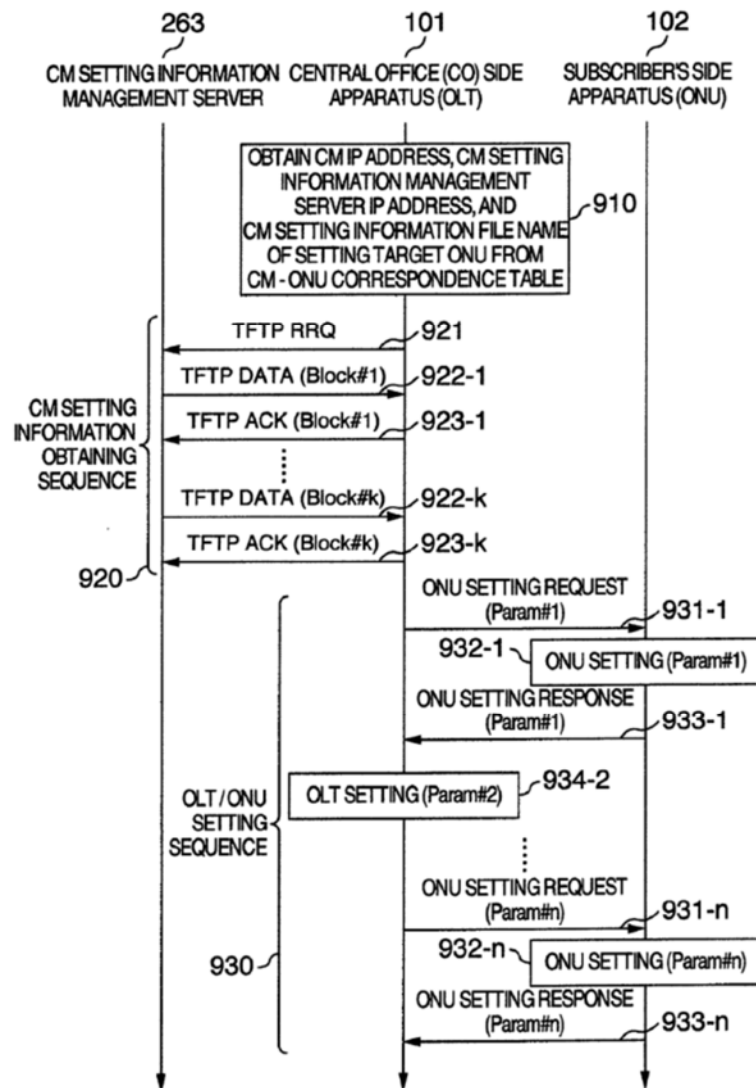
FIG.11

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	
⋮	⋮	⋮	⋮	

EX1010, 15:59-33, Fig. 11 (annotated).

124. The table 551 also associates each ONU with a file containing setting information [GREEN, above], together with the IP address of the server upon which that file resides [PURPLE]. EX1006, 12:66-13:6, Fig. 11 (annotated)). Using the name and location of the setting information file, OLT 101 acquires that configuration file using Trivial File Transfer Protocol (TFTP). EX1006, 40-46, 51-61, Fig. 9 (Step 920).

FIG.9



125. After acquiring the CM setting information file (*i.e.* configuration file), the OLT 101 sequentially interprets the parameters included in it. EX1006, 14:64-67, Fig. 9 (Step 930). The parameters are converted into ONU setting information signals 543. EX1006, 14:67-15:4. Setting request messages for each parameter are transmitted to the target ONU 102. EX1006, 14:6-9, Fig. 9 (Step 931). The ONU then applies the settings to itself and returns a response indicating successful

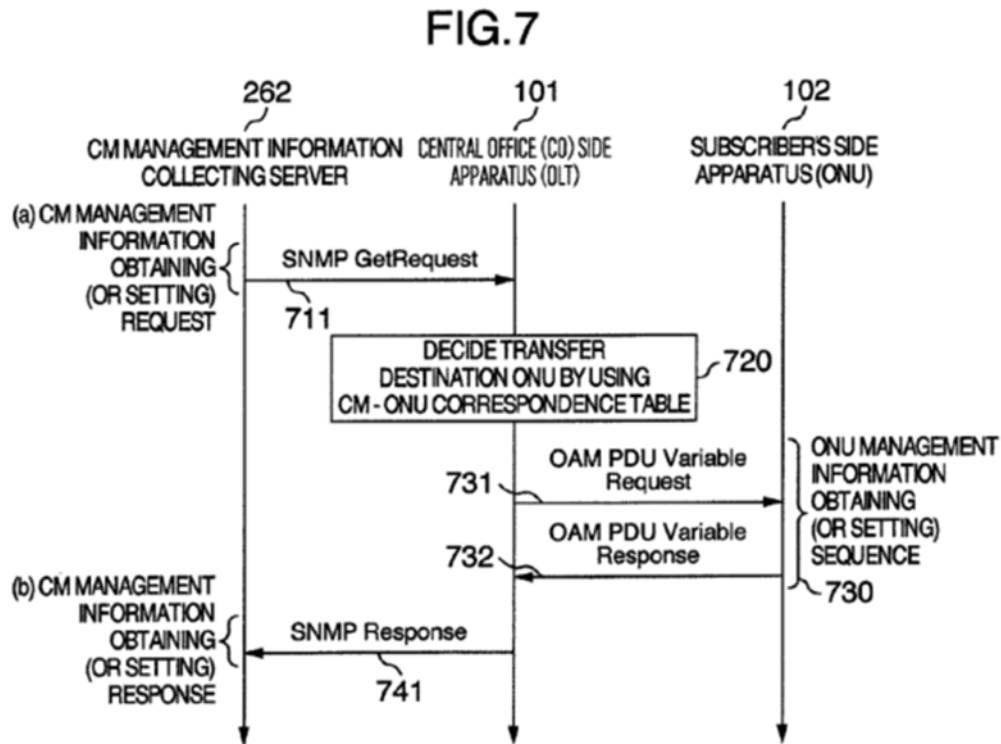
application of those settings. EX1006, 15:9-12 (“The ONU 102 which received the ONU setting request message reflects the requested setting to itself (step 932) and returns an ONU setting response message toward the OLT (step 933).”).

126. A POSA would understand from Tsuge that its method includes causing an update to a configuration file for an ONU operable in an EPON. Tsuge teaches the application of updated configurations to ONUs previously configured with existing configuration files.

127. For example, Tsuge explains that an ONU may be initially configured using a file different from the CM setting information file (*i.e.* configuration file) denoted in the CM-ONU correspondence table 551. Tsuge notes that the OLT may first use an IP address for a CM setting information management server 263 and a CM setting information file name which were preset in the OLT, rather than the address and file name later populated in the CM-ONU correspondence table 551. EX1006, 14:29-33. A POSA would understand from these disclosures that any such configuration of an ONU occurring subsequent to its initial configuration would ultimately employ the CM setting information file identified in the CM-ONU correspondence table 551. As noted herein, a POSA would understand that Tsuge’s system contemplated upgrades to that file to reflect service changes and system improvements (*i.e.* an updated configuration file).

128. Consistent with this understanding, in discussing Figure 9 Tsuge notes that the configuration of the ONU can occur at a time other than at the time of initial registration. EX1006, 14:33-39 (Noting that the process described in Fig. 9 is “generally” executed after the registration of the ONU and, in that circumstance, need not acquire information previously stored in CM-ONU correspondence table 551).

129. A POSA would further understand from Tsuge’s illustration of the configuration setting function in Figure 7 that Tsuge’s systems encompass updating existing ONU configurations. In figure 7, Tsuge describes a CM management information collecting server 262 issuing a CM management information obtaining (or setting) request message. EX1006, 13:7-20, Fig. 7 (Step 711).



EX1006, Fig. 7. Tsuge explains that the request message can take the form of either a GetRequest or SetRequest message using the Simple Network Management Protocol (SNMP) of the DOCSIS standard. EX1006, 13:16-20.

130. SNMP is a standard protocol for remotely managing and monitoring network-connected devices. Communications are made to and from a software module installed on the managed device referred to as an SNMP agent. *Id.* The SNMP agent manages a **Management Information Base or MIB** consisting of information on the device's managed resources. The MIB consists of a hierarchical organization of objects having variable values. *Id.*

131. A SNMP **GetRequest is used** to retrieve data from a remote device's MIB, often preparatory to making a change in one or more of the values for stored objects. A SetRequest is a manager-initiated command to set or change the value of a parameter on a device via SNMP and can be used to manage or update that device's configuration settings or other parameters.

132. Figure 7 illustrates a SNMP GetRequest. OLT 101 determines the target ONU of this request using the CM-ONU correspondence table 551. EX1006, 13:21-25 (“By using the CM-ONU correspondence table 551, the OLT 101 decides the ONU 102 which has been made to correspond to the destination IP address of the CM management information obtaining(or setting) request message received in step 711 (step 720).”), Fig. 11. OLT 101 converts the contents of that Request message into a proper ONU management information signal 542. EX1006, 13:25-30, Fig. 5. OLT 101 communicates the information request to ONU 102 using the OAM sub-layer of the IEEE 802.3ah standard (Step 731), and receives the ONU's response (Step 732). EX1006, 13:16-20, Fig. 7. The data gathered from ONU 102 in Steps 731 and 732 (collectively Step 730) is converted into a CM management information signal 522 and returned as a CM management information obtaining response message 741. EX1006, 13:40-50, Figs. 5, 7.

133. A POSA would understand Tsuge's disclosure of such information gathering steps as an indication that ONU 102 was previously configured, such that

information concerning its existing configuration was obtainable (and obtained) via Step 730. A POSA would also understand Tsuge's gathering of information on an ONU's existing configuration (GetRequests) as prefatory to updating the ONU's configuration (SetRequests). EX1006, 13:12-16 (noting OLT 101 receives a CM management information **setting request** message in which an IP addresses associated with an ONU is set as the destination of the setting request), 14:24-29 (noting OLT 101 then obtains the IP address of the CM setting information management server 263, and the file name of the CM setting information, using OCM-ONU correspondence table 551), 14:40-61 (noting that OLT 101 then executes the CM setting information obtaining sequence using the information according to the DOCSIS standard by obtaining the configuration file by TFTP), 14:62-15:15 (OLT 101 subsequently executes an OLT/ONU setting sequence using the obtained CM setting information file, by converting the setting parameters into an ONU setting information signal 543 (step 930) and transmitting it to the ONU as a setting target (step 931)).

134. At minimum, a POSA would understand Tsuge's ONUs, when rebooted, employ configuration file identified in table 551. EX1006, 11:57-12:2. A POSA would have viewed as obvious that subsequent to initialization, such files would have undergone updating, for the reasons set forth below. During prosecution, the applicant did not contest, nor does the claim preclude, that the

claimed updating could occur as part of a reboot. EX1003, 249-250, 258-270; Section VI(C), above.

135. A POSA would understand from Tsuge that the configuration file was generated by a computer. The configuration file is electronically stored on CM setting information management server 263 and electronically communicated via TFTP to, and interpretable by, the CM setting obtaining/converting software module 503 operating on OLT 101. In view of Tsuge's teachings, it would have been obvious to a POSA to have a computer generate the updated configuration file to ensure the instructions would be properly interpreted, stored and transmitted.

136. To the extent that Tsuge fails to expressly describe computer-generating an updated configuration file for an ONU having an existing configuration file, a POSA would have viewed it as obvious that Tsuge's system must deliver updated configuration files for previously configured ONUs in order to accommodate services upgrades and/or changes, based on a POSA's knowledge and the disclosures of Tsuge alone, and/or in view of Noel, and/or in further view of McKinnon.

137. For example, a POSA would understand that the services provided to individual subscribers and classes of subscribers may change over time, as may the capabilities or configuration of the network delivering those services. A POSA would understand Tsuge's system needed to accommodate customers who later

change their services, and/or to allow for updates necessary to improve or maintain such services.

138. For example, Tsuge discloses classes of services. EX1006, Fig. 11 (noting Tsuge's offering of configuration files for differing levels of service, *i.e.*, "default" and "premium"). A POSA would have been motivated to employ Tsuge's system in a manner that would permit customers to either upgrade or downgrade their subscriptions from configurations associated with one service level to those associated with another. In addition, a POSA would have been motivated to modify existing configurations to incorporate technical improvements into existing classes of service, as well as to add configurations to existing or new classes of service in order to expand its service offerings. As discussed above, Tsuge discloses methods by which a POSA could have successfully prompted such updates (*e.g.* SetRequest and/or reboot).

139. Additionally, a POSA would have been motivated by the teachings of Noel and/or McKinnon to computer-generate updated configuration files for previously configured ONUs.

140. Noel teaches the advantages of reconfiguring a plurality of ONUs operating in an ethernet passive optical network. EX1008, [0023] (noting that its network may incorporate "Ethernet point-to-multipoint topologies" (*i.e.* an EPON) and include "Ethernet units" and "cable modems." As noted above, Tsuge

contemplates classes of services (*i.e.* default and premium) for which any configuration modifications would affect multiple ONUs. Noel proposes an “efficient method for configuring Optical Network Terminals (ONTs) in a network[,]” such as to “allow[] a network operator *to change services*” on multiple ONU(s). EX1008, [0003] (emphasis added).

141. Noel’s teachings contemplate the successful modification of existing ONU configurations. EX1008, [0048] (also noting that “[o]nce ONT models and profiles have been configured, new ONT configurations may be created, *or existing ONT configurations may be modified* (630).”); [0026] (parameters “are stored in the ONT 200 as a configuration 210 and *may be updated* by specifying a new configuration”) (emphasis added). In Figure 6 (shown below), Noel depicts a “flow chart illustrating configuring Optical Network Terminals (ONTs)” which encompasses the updating of existing ONT configurations. EX1008, [0013], FIG. 6.

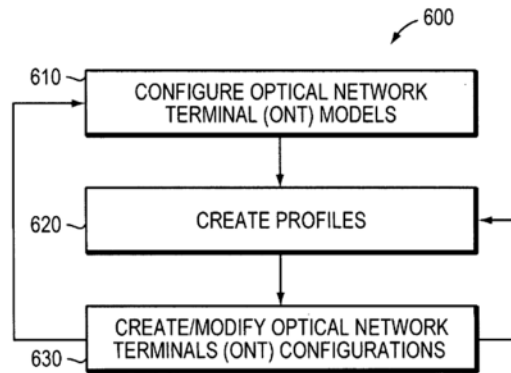
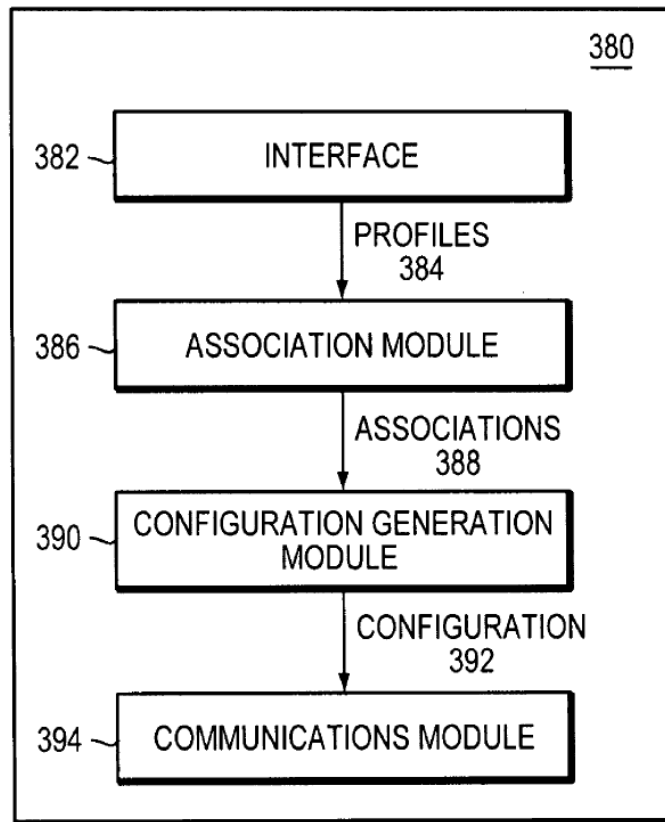


FIG. 6

142. Like Tsuge, Noel also transmits a configuration file (configuration 392) to associated ONTs in response to a request. EX1008, [0044], FIG. 3D. A POSA would understand that ONTs and ONUs are synonymous. Noel further discloses an advantageous method employing an easy-to-use graphical user interface by which a network operator may modify the contents of this configuration file so as to change services for a group of Optical Network Terminals (ONTs) in a network at one time. EX1008, [Abstract], [0003] and [0027]-[0028] (noting the advantages of such a “user-friendly” system having a “convenient” GUI by which configurations can be “easily modified”):



EX1008, Fig. 3D. Noel notes that this configuration file may be, but need not be, dynamically generated at the time it is requested. EX1008, [0037]. In other words, like the CM setting information file described in Tsuge, it may be pre-generated and stored in advance of the configuration request.

143. Similarly, McKinnon teaches the updating of configuration files in a Data-Over-Cable network including optical fiber. EX1007, 1:18-22, 45-49. McKinnon explains ever-increasing demand for higher throughput rates has prompted development of DOCISIS standards for prioritizing transmission of data over the network. “Data packets representing voice or video, for example, now can

be identified and given priority transmission over data packets representing email, file transfers, and text-based Web documents.” EX1007, 3:51-60. McKinnon explains that in such networks data packets are transmitted downstream from a cable modem termination system (CMTS) to cable modems (CMs) of users. EX1007, 1:55-61. McKinnon describes the generation of cable modem configuration files which, among other things, limit a cable modem’s bandwidth consumption to a pre-authorized amount. EX1007, 7:60-8:2. For example, this configuration file will prompt a CM to notify its router when downstream bandwidth limits are reached, causing the router to suspend further downloads until expiration of the current time interval. EX1007, 7:48-57.

144. McKinnon explains that a CM is first assigned a configuration file when it initially comes online. This configuration file, *inter alia*, sets bandwidth limits on the CM’s downstream and upstream communications. EX1007, 13:31-40. However, McKinnon explains that it would be advantageous to update a CM’s configuration based upon events occurring after it is initially configured. EX1007, 28:27-55. In addition, McKinnon further explains that it would be desirable to provide a method by which subscribers could modify the services they receive, such as by means of an easy-to-use graphical user interface. EX1007, 28:56-29:24.

145. McKinnon describes various methods by which initial bandwidth allocations are modified based upon events occurring **after** a CM’s initial

configuration. EX1007, 17:1-26 (describing the development of usage statistics employed by Bandwidth Allocator 92); 24:15-38 (describing used of service level agreements (SLAs) to generate configuration files for users and classes of users which may be “updated from time-to-time by the Administrator 106”); 28:64-29:46 (describing post-initialization user effected changes to SLAs that in turn prompt an update of user configuration files). These events prompt a need to revise user bandwidth allocations in the relevant CM configuration files. EX1007, 26:56-27:21 (“The DOC Network is updated by incorporating (Step 2302) the user allocations as bandwidth allowances (i.e., bandwidth limits) into CM configuration files (MD-5 files) for the CMs of the respective users.”); Fig. 23 (Step 2302).

146. McKinnon teaches the computer generation and transmission of updated configuration files by its Bandwidth Allocator 92 to a Trivial File Transfer Protocol (TFTP) server which maintains those files for delivery. EX1007, 26:56-27:21; Fig. 23 (Step2304). A command sent to the relevant CMs “caus[es] the CMs to acquire and implement the CM configuration files maintained on the TFTP server.” EX1007, 27:17-21. These configuration files necessarily concern previously configured cable modems having existing configuration files.

147. Based upon a POSA’s knowledge and the disclosures in Tsuge, and in further view of the disclosures in Noel and/or McKinnon, a POSA would have viewed it as obvious to computer generate updated configuration files to be used by

Tsuge's virtual cable modem to configure the ONUs forming part of Tsuge's EPON network including existing configuration files. A POSA would have been motivated to do so, so as to effect changes related to after-arising circumstances and conditions. A POSA would have been additionally motivated to allow for the generation of updated configuration files so as to incorporate the desirable features described in Noel and/or McKinnon relating to providing an easy to use, self-service graphical user interface (GUI) by which changes to configurations can be easily effected by network operators and/or users.

148. As discussed herein and in connection with Elements 1[b]-[d], below, a POSA would additionally have reasonably expected success in generating updated configuration files for re-configuration of ONUs in Tsuge. POSAs would reasonably expect Tsuge's CM setting information file contents could be modified, as described in both McKinnon and Noel, by updating profiles or other information (*e.g.* terms of SLAs) via a GUI to generate modified configuration files stored for later retrieval. EX1002, ¶183. POSAs would also have reasonably expected Tsuge's CM setting information file could have been successfully modified in the additional manner described in McKinnon whereby computer detection of performance conditions prompts generation of an updated file.

Element 1[b]: notifying a virtual cable modem (vCM), prior to successful update of the ONU, that the updated configuration file is available for the ONU;
--

149. Tsuge discloses this element, or it would have been obvious in light of Tsuge and/or in view of McKinnon and/or in further view of Noel.

150. As discussed above in connection with Element 1[a], Tsuge discloses updating an ONU using an updated configuration file and/or it would have been obvious to a POSA to update Tsuge's ONU using an updated configuration file.

151. As discussed above in connection with Element 1[a], Tsuge describes a CMTS/CM apparatus management system 250 issuing to OLT 101 a CM management information setting request in the form of a SNMP SetRequest. Tsuge's setting request prompts the OLT to retrieve the CM setting information file (*i.e.* configuration file) for a target ONU associated with the CM IP Address reflected in the request. *See* Element 1[a], above; EX1006, 13:16-20, Fig. 7. This request message is issued before the ONU is successfully updated. EX1006, 14:6-9, 67-15:4, Fig. 9 (Step 931) (noting that Tsuge's OLT 101 parses the retrieved CM configuration file to identify ONU parameters which it then converts into ONU setting information signals 543 to communicate to the ONU). This request serves to notify the OLT of the updated configuration file. As discussed below, Tsuge's OLT, with its various CM apparatus control signal converting functions 304, constitutes a virtual cable modem (vCM). *Id.*

152. To the extent that Tsuge does not disclose this notification, a POSA would have viewed such a notification to be obvious based upon Tsuge alone and/or in further view of McKinnon and/or Noel.

153. A POSA would have been motivated, for the same reasons they would have been motivated to generate an updated configuration file, to also notify Tsuge's OLT of the availability of such an updated configuration file so that this updated configuration could be downloaded and applied in order that the user(s) and/or the system could take advantage of the configuration changes without delay. For example, a provider would have sought to implement as soon as possible changes that justified increased revenues from users, or alternatively, to implement promptly changes that reduced a user's access where the provider could no longer charge a premium for such services. *Id.* A provider would also have been motivated to immediately push out changes intended to stabilize the network or address issues affecting service. *Id.*

154. To the extent not obvious from a POSA's knowledge and the disclosures in Tsuge, a POSA would have viewed such a notification to be obvious based upon the disclosures in McKinnon and/or Noel.

155. McKinnon explains that following generation of an updated configuration file, a command is sent to the relevant CMs "causing the CMs to acquire and implement the CM configuration files maintained on the TFTP server."

EX1007, 27:17-21; 7:60-8:2 (“sending a command either to each user's cable modem, or to a cable modem termination system to which each user's cable modem is connected, to cause the cable modem to acquire its new respective configuration file.”). These commands thereby notify the cable modem of the available updated configuration file prior to the update.

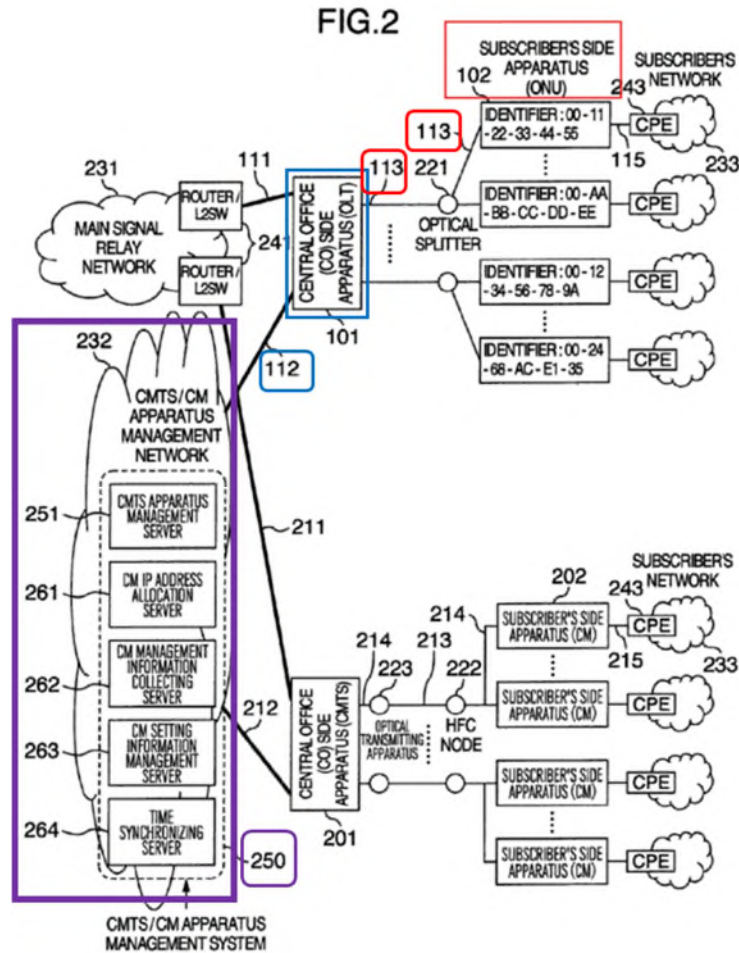
156. Noel teaches that “when a new configuration is available,” a notice of the new configuration is sent to an OLT, which passes the notification along to the ONU. EX1008, [0031], [0038]-[0041]. This notification occurs prior to successful update of the ONU because, as Noel explains, after the ONU receives the notification, it may then send a “configuration request” to acquire the updated configuration file. EX1008, [0038]-[0039] (“an ONT331 may be notified of the existence of a new configuration so that the ONY 331 may immediately send requests for its updated configuration.”).

157. In view of the disclosures in McKinnon and/or Noel, a POSA would have considered it obvious to notify Tsuge's OLT of the availability of the updated configuration file so that the OLT could thereafter request that file in order to update the configuration of the ONU, given that Tsuge's system relies upon the OLT to request the configuration file using TFTP from the TFTP server.

158. With respect to requirement that the notification be made to a virtual cable modem, Tsuge discloses that the OLT which receives such a notification is a virtual cable modem.

159. The '035 Patent describes creating “an instance” of a vCM on its DPoE system, which includes an OLT. EX1001, 3:28-34, Fig. 2. A POSA would understand from this description and from the preface “*virtual*” that a “virtual cable modem” constitutes software running on other hardware (such as an OLT) to perform functions traditionally associated with a cable mode.

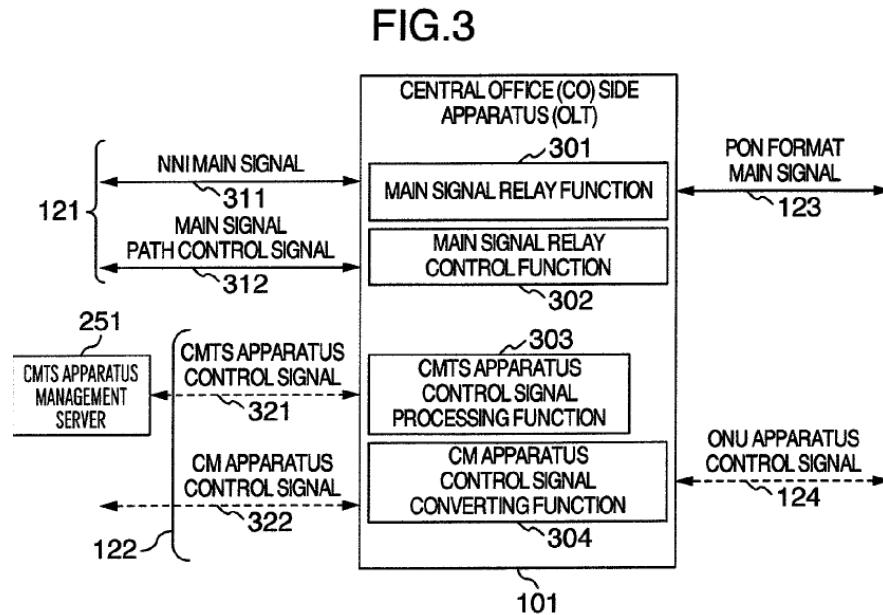
160. Tsuge configures its OLT with software modules that permit it to “transmit[] and receive[] control signals of the same format as that of apparatus control signals of a CMTS and a CM[,]” on the one hand, and transmit and receive signals to/from an ONU using a PON format on the other hand. EX1006, 4:22-40. In this manner, “communication in the PON interval [*i.e.* segment] ... is the same as the general PON system using the PON standard and the functions which the ONU of the invention has are the same as those of the ONU of the general PON system,” whereas the “system administrator can easily manage the PON and can also suppress an additional investment to the apparatus management system,” by using “the same apparatus management system as that for the CMTS and the CM[.]” EX1006, 5:20-32. Tsuge illustrates an embodiment of his system in Figure 2:



EX1006, Fig. 2 (annotated).

161. Tsuge discloses an apparatus management network 232 [PURPLE] connecting upstream to OTL 101 [BLUE] via interface 112. EX1006, 7:47-51, 7:7-9. CMTS/CM apparatus management system 250 of management network 232 communicates CM apparatus control signals 322 to a signal converting function 304 incorporated into OLT 101. EX1006, 8:25-27, 10:8-17. OLT 101 converts these signals into ONU apparatus control signals 124 that it transmits to ONU 102 [RED] via PON line 113. OLT 101 also receives signals from ONU 102 that it converts

into CM apparatus control signals for transmission back to CMTS/CM apparatus management system 250. *Id.* This process is further depicted in Tsuge's Figure 3:



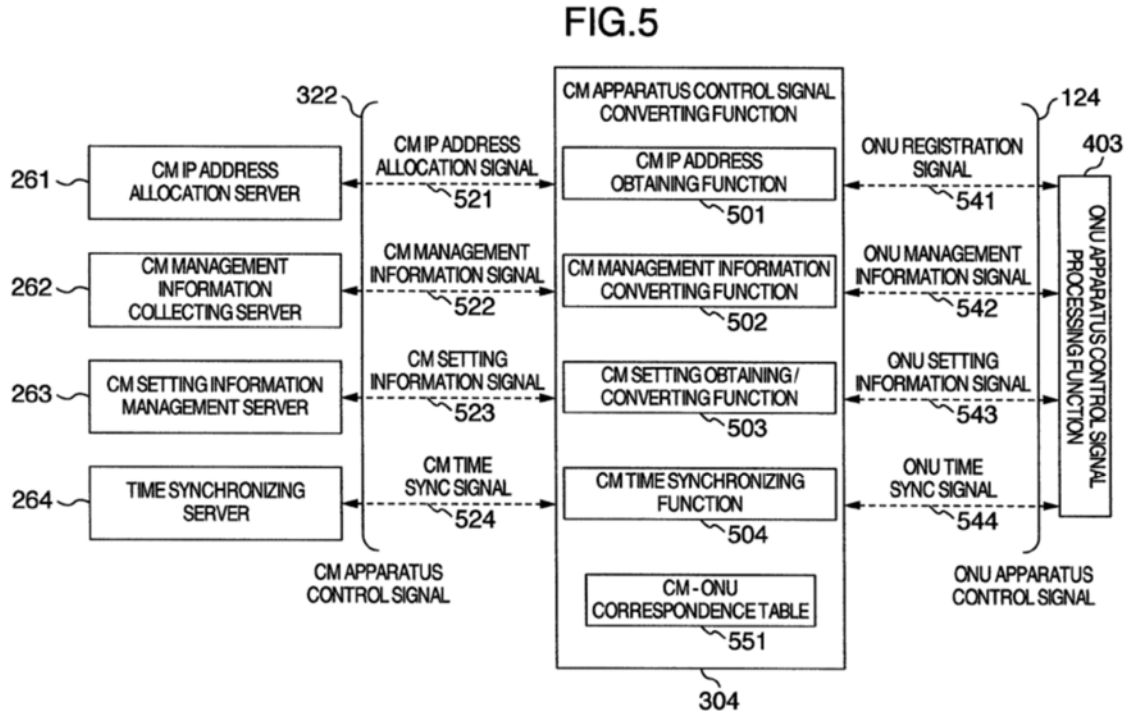
EX1006, Fig. 3.

162. Tsuge explains in a traditional DOCSIS network, “[A cable modem (CM)] obtains an IP address of the CM itself from a DHCP server by using an IP address allocation protocol called DHCP (Dynamic Host Configuration Protocol).” EX1006, 3:24-38. The cable modem retrieves initial setting information from a TFTP server using this CM IP Address. *Id.*

163. Tsuge's network replicates this functionality by means of the OLT's CM apparatus control signal converting function 304, CM IP Address obtaining function 501, CM Management information converting function 502, CM setting

obtaining/converting function 503, and CM-ONU correspondence table 551.

EX1006, 3:23-38, 10:62-11:3, Figs. 3, 5.



164. The CM address obtaining function 501 requests that CM IP address allocation server 261 obtain an IP address to use to identify the ONU. The CM address obtaining function 501 then records this IP address in the CM-ONU correspondence table 551 on the OLT. EX1006, 11:4-17, 12:51-62, Fig. 6. The table associates the CM IP address with an identifier unique to the ONU, such as a MAC address. EX1006, 12:12-15, 63-66, 15:61-16:8. The structure of this table is discussed above. The CM-ONU correspondence table 551 thereby permits the ONU to be addressed via the OLT, as if it were a cable modem. EX1006, 12:12-15, 63-66.

165. The '035 Patent describes the various functions performed by its vCM in terms nearly identical to Tsuge's description of its CM Apparatus Control Signal Converting Functions 304 operating on its OLT 101:

[The vCM] issues DHCP request, informing the back-office system about its capabilities and identification. In response, the back-office system informs the vCM about the target config file name as well as the list of (T)FTP address servers holdings its config file. The vCM then polls the said servers in a sequence, obtaining successfully the config file from one of them (usually the first one to respond). Once in the vCM, the config file is translated into a series of DPoE System and DPoE ONU configuration parameters. The DPoE System configuration parameters are used to drive the operation of the EPON OLT located in the DPoE System, while the DPoE ONU parameters are encapsulated in a series of eOAMPDUs and delivered using the established EPON eOAM link. Next, once at the DPoE ONU, such parameters are used to drive the configuration of the ONU device, specific configuration rules etc.

EX1001, 3:32-48.

166. Tsuge's CM Apparatus Control Signal Converting Functions 304 operating on OLT 101 constitute a vCM as described in the '035 Patent.

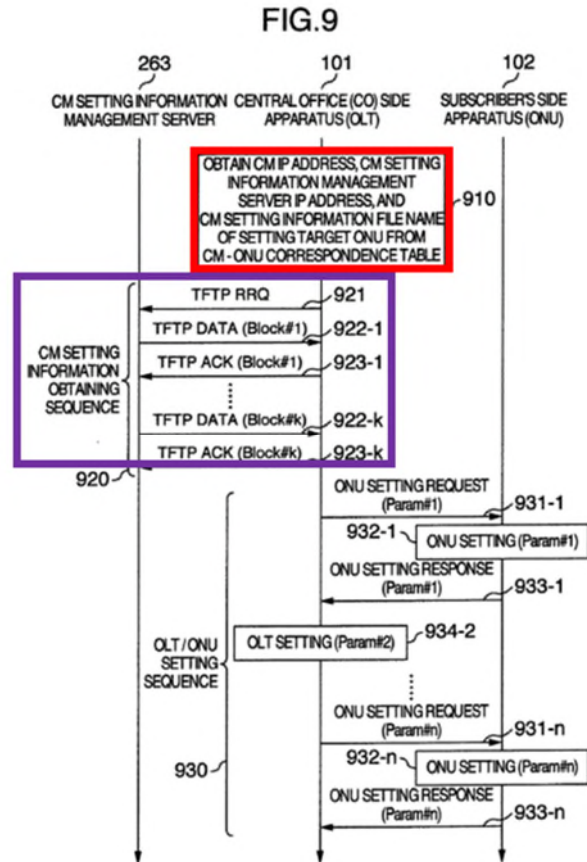
167. As discussed herein and in connection with Elements 1[a], [c]-[d], a POSA would reasonably have expected to be able to successfully notify Tsuge's vCM of the availability of an updated configuration file prior to successful configuration of its ONU using either DHCP or SNMP messaging.

Element 1[c]: providing, when requested by the vCM, to the vCM, the updated configuration file; and
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168. Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in further view of McKinnon and/or Noel.

169. As discussed above in connection with Elements 1[a], Tsuge discloses updating an ONU using an updated configuration file and/or it would have been obvious to a POSA to update Tsuge's ONU using an updated configuration file.

170. As discussed above in connection with Elements 1[a]-[b], Tsuge discloses providing the configuration file to a vCM, upon its request. Tsuge discloses a vCM (*i.e.* CM Apparatus Control Signal Converting Functions 304 operating on OLT 101) which requests CM setting information file (*i.e.* the updated configuration file) from CM setting information management server 263, whereupon that server responds by providing the vCM with that file. Tsuge's Figure 9 illustrates this process (Step 920 [PURPLE]):



EX1006, 14:20-61, FIG. 9 (annotated).

171. To the extent Tsuge is not deemed to disclose this element, or it is not considered obvious from a POSA's knowledge and the disclosures in Tsuge, a POSA would have viewed the provision of an updated configuration file upon request to be obvious based further upon the disclosures in McKinnon and/or Noel.

172. Noel teaches that the updated configuration file is provided in response to a configuration request 308 forwarded by OLT 360. EX1008, [0032]-[0033], [0039], Fig. 3B.

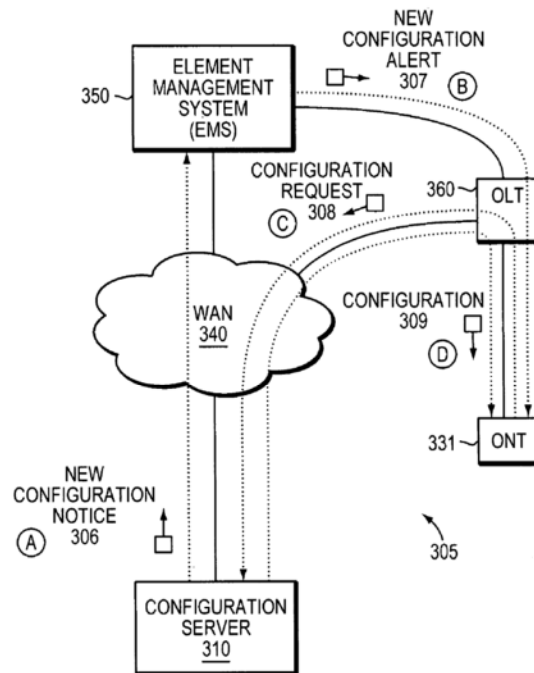


FIG. 3B

173. McKinnon teaches that the configuration file is provided to the cable modem in response to a request prompted by an alert concerning the availability of the updated configuration file. EX1007, 27;17-21 (“A command is also sent (Step 2306) to either of the CMs or the CMTS of the respective Cable Network causing the CMs to acquire and implement the CM configuration files maintained on the TFTP Server.”).

174. As discussed in connection with Elements 1[a]–[d], a POSA would reasonably have expected success in providing the configuration file in response to a request by Tsuge’s vCM (*i.e.* OLT 101) for such a file using TFTP.

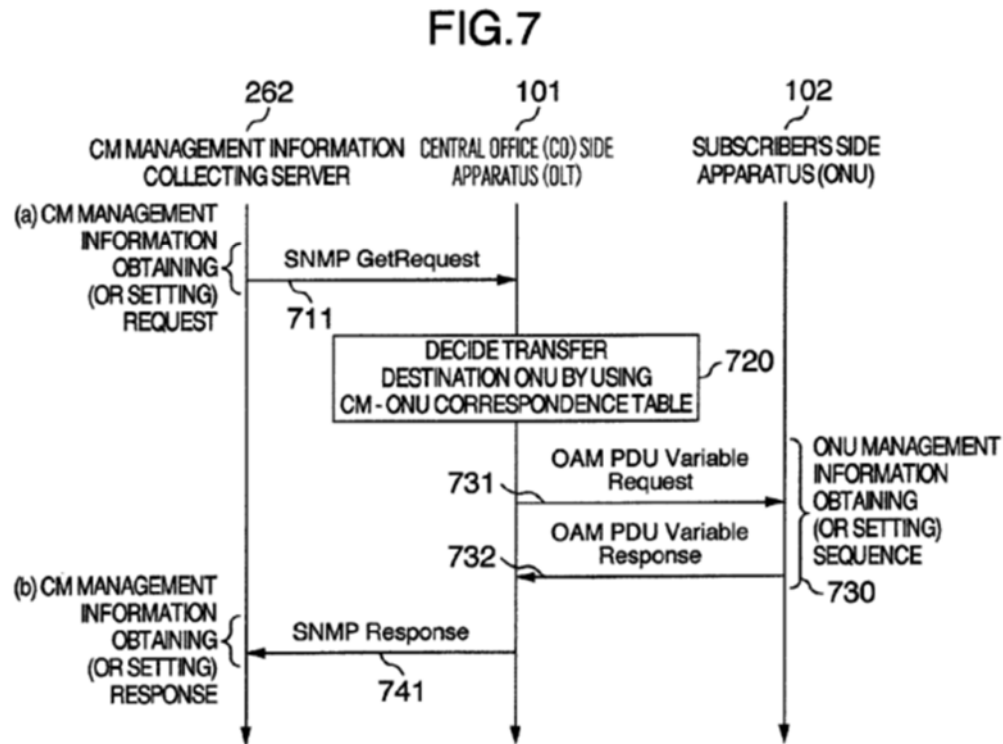
Element 1[d]: monitoring the vCM for an indication of successful update of the ONU by the vCM using the updated configuration file.
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175. Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in further view of McKinnon and/or Noel.

176. As discussed above in connection with Element 1[a], it would have been obvious to a POSA to update Tsuge's ONU using an updated configuration file.

177. Tsuge further discloses monitoring the OLT 101 and its CM Apparatus Control Signal Converting Functions 304 (*i.e.* the vCM) to confirm that the setting request directed to the ONU was successfully implemented. OLT 101 receives responses from the ONU that the configuration has been successfully implemented. EX1006, 15:9-15 ("The ONU 102 which received the ONU setting request message reflects the requested setting to itself (step 932) and returns an ONU setting response message toward the OLT (step 933). Each of the ONU setting request message and the ONU setting response message is one of the ONU setting information signal 543."); Fig. 9 (Step 933).

178. Tsuge explains that after completion of the setting sequence initiated by the SNMP SetRequest message, OLT 101 returns a CM management information setting request message in the form of a SNMP Response to the CM management information collecting server 262 forming part of the CMTS/CM apparatus management system 250. EX1006, 13:40-50, Fig. 7 (Step 741):



179. To the extent that Tsuge does not disclose monitoring OLT 101 for an indication that the update has been successfully applied, it would have been obvious to a POSA to have done so. A POSA would have been motivated to monitor the OLT 101 for an indication of successful update because the CMTS/CM apparatus management system 250 does not communicate directly with the ONU 102, but receives information on the condition of ONU 102 solely through OLT 101, due in part to the differing communications protocols on the DOCSIS and PON segments of the network. A POSA would have been motivated to monitor for an indication of a successful update because, among other reasons, knowledge that the update was effective and when it was effected can be important to calculating changes in

the charges issued to user. *Id.* Additionally, with respect to updates designed to ensure acceptable performance and delivery of services, receipt of an indication of successful update is essential to determining if further actions or repeated efforts to accomplish the necessary update must be pursued. *Id.*

180. As discussed above in connection with Elements 1[a]–[c], a POSA would reasonably have expected success in monitoring Tsuge’s vCM for SNMP Responses indicating that the update has been successfully applied.

181. Tsuge further discloses that an ONU can be successfully updated by the vCM using updated configuration files, and/or it would have been obvious to a POSA based upon his knowledge and Tsuge’s disclosures, and/or in further view of the disclosures in McKinnon and/or Noel that such updates could be reasonably be expected to be successful.

182. As discussed above in connection with Elements 1[a]–[c], POSA would understand that through Tsuge’s use of SNMP setting request messages, its vCM (*i.e.* OTL 101 having CM Apparatus Control Signal Converting Functions 304) could be prompted to request and obtain a CM setting information file which it then interpreted and converted into ONU setting information signals 543 which were then transmitted to ONU 102 and applied. EX1006, 13:12-20, 14:20-23, 14:40-15:15, Fig. 9. A POSA would understand that Tsuge discloses, and/or that it would have been obvious, that Tsuge’s CMTS/CM apparatus management system 250

issue an SNMP setting request message to Tsuge's vCM when the contents of the CM setting information file were updated. A POSA would additionally or alternatively understand that Tsuge discloses and/or that it would have been obvious, for Tsuge's CMTS/CM apparatus management system 250 to issue an SNMP setting request message prompting Tsuge's vCM to initiate a further CM IP address obtaining sequence 630 whereby it secures the name of a CM setting information file reflecting upgraded or downgraded services for a particular ONU, records that file name and its location in the CM-ONU correspondence table 551, and thereafter Tsuge's CMTS/CM apparatus management system 250 issues a further SNMP setting request message prompting the vCM to acquire that setting information file and reconfigure the ONU to reflect the upgrade or downgrade in services.

183. A POSA would reasonably expect that the contents of Tsuge's CM setting information file could be modified, as described in both McKinnon and Noel, via a graphical user interface that allowed for updating of profiles or other information (*e.g.* terms of service level agreements) from which such a configuration file was then generated and stored for later retrieval. A POSA would further have also reasonably expected that the contents of Tsuge's CM setting information file could have been successfully modified in the additional manner described in McKinnon whereby monitoring of after arising conditions and

circumstances encountered during operation prompted the generation of such an updated configuration file.

184. A POSA would have expected that the vCM in Tsuge's system could readily accommodate and process an updated configuration file, such as the CM configuration file generated by McKinnon's process, in view of Tsuge's disclosures that its vCM (*i.e.* OTL 101 having CM Apparatus Control Signal Converting Functions 304) was specifically designed to use "the same apparatus management system" as that employed in traditional CMTS/CM networks. EX1006, 5:20-32. The software modules making up Tsuge's vCM expressly permit it to "transmit[] and receive[] control signals of the same format as that of apparatus control signals of a CMTS and a CM[.]" EX1006, 4:22-40.

185. For these same reasons, a POSA would have expected that Tsuge's vCM could successfully translate the parameters of the updated configuration file into setting information signals applied by the ONU.

186. A POSA would further have expected that Tsuge's ONU could successfully apply these setting information signals to update its configuration. Both Tsuge and Noel teach that the configuration of ONUs may be modified successfully.

187. While the '035 Patent's specification makes various mention of techniques for updating the configuration of ONUs without having to reboot them,

Claim 1 of the Patent does not restrict the application of the updated configuration file to circumstances in which the configuration changes take effect without a reboot. *see* Sections VI(B)-(C), above. Nevertheless, a POSA would have reasonably expected that the system described in Tsuge could successfully implement configuration modifications without rebooting.

188. Noel, for example, describes the process of modifying the configurations of a plurality of ONUs via transmission of an updated configuration file. Nowhere does Noel suggest that the reconfiguration of these ONUs requires a reboot. *See generally* EX1008.

189. Additionally, Tsuge's cable modem is *virtual*, consisting of various software modules operating on OLT 101, rather than constituting a hardware device which may require rebooting. A POSA would understand that Tsuge's vCM would not require rebooting to acquire, translate and transmit the updated configuration changes reflected in the updated configuration file.

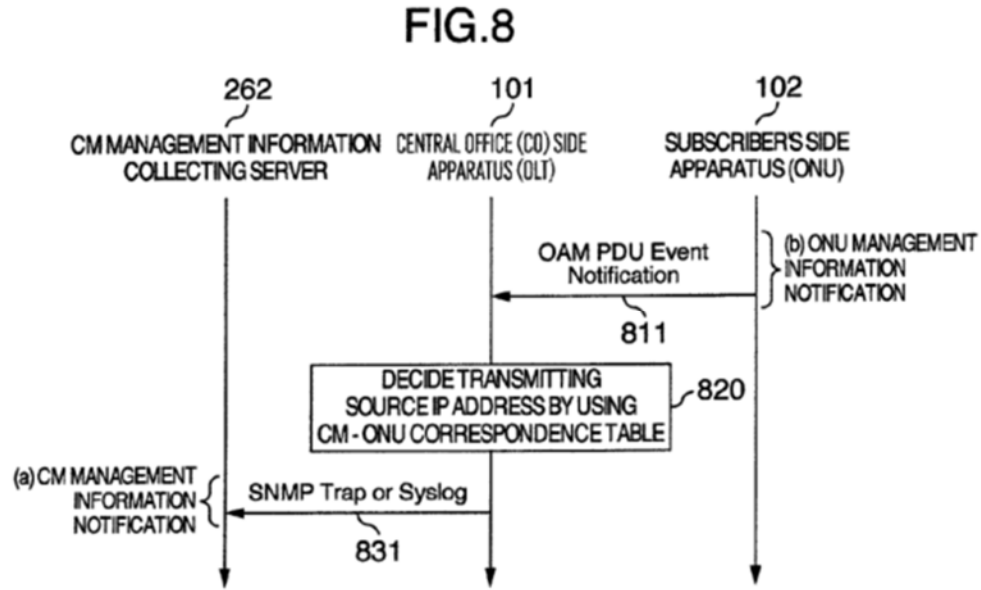
190. For the foregoing reasons, the method of Claim 1 would have been obvious to a POSA.

2. Claim 2

Element 2[a]: 2. The method of claim 1, further wherein the operation of generating the updated configuration file includes: detecting a configuration change need for the ONU; and
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191. Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or Noel. *see* Elements 1[preamble]–[d], above.

192. Tsuge contemplates the detection of issues arising in the operation of the ONU and the reporting of those issues to the CMTS/CM apparatus management system 250. Specifically, Tsuge describes a CM management information notifying process that forms part of the CM information converting function provided for the OLT. EX1006, 13:50-54, Fig. 8. Pursuant to this process, the OLT receives an OAM PDU Event Notification from the ONU. EX1006, 13:50-54, Fig. 8 (Step 811). This Event Notification can be spontaneously generated by the ONU itself, or may be prompted periodically by a message sent by the OLT to the ONU. EX1006, 14:10-19. The event notification is converted by the OTL into a SNMP Trap message and communicated to the CM management information collecting server 262. EX1006, 13:65-14:19, Fig. 8 (Step 831).



193. Both an OAM PDU Event Notification and a SNMP Trap message are designed to report issues with respect to remotely managed devices. These issues may include issues relevant to bandwidth allocation, or other issues that may require a change in configuration. *Id.*

194. As discussed above in connection with Figure 7 and Element 1[b], receipt by the CMTS/CM apparatus management system 250 of information concerning the ONU can prompt the issuance of a CM information setting request (SNMP SetRequest) that prompts the retrieval of generated updated configuration files and their application to the affected ONUs. EX1006, 14:10-19 (noting that changes in the content of periodically polled responses from an ONU can “trigger” SNMP notifications).

195. To the extent that Tsuge does not disclose the generation of an updated configuration file which involves detection of a need for a configuration change to the ONU, a POSA would have viewed such a step as obvious in light of Tsuge's disclosures and/or in further view of McKinnon and/or Noel. A POSA would have been motivated to detect needed changes to the ONU in order to promptly address those needed changes. *Id.* To the extent that the need detected could be addressed by a configuration change, a POSA would have viewed it as obvious to generate an updated configuration file in connection with detecting a needed change. *Id.*

196. Noel, for example, teaches having the ONT periodically poll its Configuration Server 310, to detect needed configuration changes. EX1008, [0027]. A POSA would have been motivated by Noel's disclosures to employ the OAM PDU/SMTP data polling capabilities already disclosed in Tsuge to provide data on the operation of its ONUs via its OLT to its CMTS/CM Apparatus Management System 250, and to provide for similar functionality by means of which the need for configuration updates would be recognized.

197. McKinnon, for its part, discloses that Bandwidth Allocator 92 detects the need for configuration changes that may have occurred due to changes in a user(s) service level agreement(s). EX1007, 26:30-55. Bandwidth Allocator 92 retrieves information from Database Manager 90, including information contained

in the SLAs for users and/or classes of users. *Id.* This information is “updated from time to time by Administrator 106.” *Id.*

198. McKinnon further describes monitoring each customer-facing CM at predetermined time intervals for information necessitating changes in configuration. EX1007, 16:1-10. Data is collected using SNMP from information stored in the DOCSIS-compliant CM’s management information base (MIB). EX1007, 15:53-67. A Database Manager 90 receives information from Data Collector 88 relating to performance of these CMs. Database Manager 90 provides this information to Bandwidth Allocator 92 for its use in generating needed updated configuration files. EX1007, 15:21-27, 16:17-22 (“Database Manager 90 “stores the information in a user statistics table (‘stats’) for later use by the Bandwidth Allocator 92[.]”).

199. As discussed above in connection with Elements 1[preamble] and 1[a], McKinnon teaches changes in the configuration of a CM by means of an update configuration file. As further discussed above, Tsuge’s CM Apparatus Control Signal Converting Functions 304 (*i.e.* vCM) converts CM configuration files into OAM messages to that configure the ONU. A POSA would have been motivated by McKinnon’s disclosures to employ the OAM PDU/SNMP data monitoring capabilities already disclosed in Tsuge to provide data on the operation of its ONUs via its OLT to its CMTS/CM Apparatus Management System 250, and to provide

for similar functionality in its CMTS/CM Apparatus Management System 250 through which the need for configuration updates would be recognized.

200. As discussed herein and in connection with Elements 1[preamble]–[d], a POSA would reasonably have expected success in detecting a configuration change need for the ONU, either through the monitoring mechanism described in Tsuge using SOAM PDU, Syslog, and/or SNMP Trap messaging and similar reporting concerning the condition of the ONU, or through the monitoring of performance and changes in authorizations such as those described in McKinnon.

Element 2[b]: modifying at least one service listed in the configuration file to generate the updated configuration file.

201. Tsuge discloses this element, or it would have been obvious in light of Tsuge’s disclosures and/or in view of McKinnon and/or in further view of Noel. *see* Elements 1[a] and 2[a], above.

202. Tsuge contemplates provision of multiple services to users of its systems. EX1006, 1:33-42 (noting services such as video on demand, Internet data services); 19:58-20:11 (referencing VoIP services delivered via ONUs). Tsuge discloses the use of CM setting information files to configure the ONU with respect to the provision of such services. EX1006, 3:22-38 (describing configuration of cable modem in typical HFC communications network to provide typical services and replication of that functionality using Tsuge’s hybrid Ge-PON system); 21:4-

16 (describing configuring ONU for voice services though CM setting obtaining/converting process illustrated in Fig. 9, discussed above in connection with Element 1[b]). As discussed above, a POSA would understand Tsuge to disclose the generation of updated configuration files making modifications to one or more services listed therein. See Element 1[a], above.

203. To the extent that Tsuge does not disclose modifying at least one service listed in a configuration file, a POSA would have viewed such a step as obvious in light of Tsuge's disclosures and his/her knowledge because update or change to a service listed in the existing configuration file would have been understood require generation of an updated configuration file having a modification to that service. See Element 1[a], above.

204. To the extent that a POSA would not have viewed this limitation as obvious in light of Tsuge's disclosures alone, a POSA would have viewed such a step as obvious in further view of McKinnon and/or Noel.

205. Noel teaches the need to prove a network operator with the capability to change services for one or more ONTs. EX1008, [0003], [0026] (operating parameters enabling *one or more services* are stored on an ONT as a configuration which may be updated), [0032]-[0033], [0036], [0041] ("a service-provider may want to configure new services for a particular user"), and [0030] (noting that the

profiles generating updated configurations include “services profiles” that may be modified).

206. McKinnon also discloses the generation of an updated configuration file in which modifications are made to at least one service listed. For example, McKinnon describes a process in which either the Administrator, or an individual user, may make changes that affect the service level agreements stored in the system which are used by the Bandwidth Allocator to generate updated configuration files. *See e.g.*, EX1007, 24:15-38 (describing use of service level agreements (SLAs) to generate configuration files for users and classes of users which may be “updated from time-to-time by the Administrator 106”); 28:64-29:46 (describing post-initialization user effected changes to SLAs that in turn prompt an update of user configuration files). Change in these inputs prompts revisions to user bandwidth allocations in the relevant CM configuration files for each such user. EX1007, 26:56-27:21 (“The DOC Network is updated by incorporating (Step 2302) the user allocations as bandwidth allowances (i.e., bandwidth limits) into CM configuration files (MD-5 files) for the CMs of the respective users.”); Fig. 23 (Step 2302). A POSA would have viewed it as obvious to have generated an updated configuration file (*i.e.* CM setting information file) for use in Tsuge’s system to update the configuration of its ONUs to modify services provided to users of that system, such as changes in the bandwidth or priority afforded users of such services.

207. As discussed above in connection with Elements 1[preamble]–[d], a POSA would reasonably have expected success in modifying one or more parameters relating to services reflected in the configuration file in order to generate an updated configuration file.

208. For the foregoing reasons, the method of Claim 2 would have been obvious to a POSA.

3. Claim 4

Element 4[a]: 4. The method of claim 1, wherein the operation of providing the updated configuration file includes: receiving a dynamic host control protocol (DHCP) request from the vCM;

209. Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in further view of Noel and/or McKinnon. *See* Elements 1[preamble]–[c], above.

210. Tsuge discloses that the operation of providing the configuration file includes receiving a DHCP request from the vCM. EX1006, 3:24-38. Tsuge explains that the CM IP Address Allocation Server 261 comprising part of the CMTS/CM Apparatus Management System 250 receives from OLT 101 a DHCP request to obtain a CM IP Address identifying a target ONU, as well as the server address and file name for the configuration file, which it then uses to retrieve the configuration file and configure the ONU. EX1006, 4:43-51, 12:51-13:6, Fig. 6

(Step 630)) *comparing* EX1001, 5:55-60 and Fig. 4 describing identical DHCP process.

211. To the extent that Tsuge does not disclose receiving a DHCP request from the vCM in connection with providing an updated configuration file, Noel discloses that its ONT requests via its OLT the updated configuration file using its “Dynamic Host Configuration Protocol (DHCP) Client Identifier (its unique ONT name), ... so the Configuration Server 310 may return the appropriate configuration 303” to the requesting ONT. EX1008, [0037]) (emphasis added).

212. As discussed above in connection with Elements 1[preamble] and 1[a], Tsuge discloses to a POSA, or it would have otherwise been obvious to a POSA, that the configuration file retrieved would have been an updated configuration file.

213. As discussed above in connection with Elements 1[preamble]-[d], a POSA would reasonably have expected success in employing DHCP as part of the operation of providing an updated configuration file.

Element 4[b]: providing the vCM information about a location of the updated configuration file; and
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214. Tsuge discloses this element, or it would have been obvious in light of Tsuge’s disclosures and/or in further view of Noel and/or McKinnon. As described in Elements 1[a]-[d] and 4[a], above, a POSA would have been motivated to provide the vCM with information about the location of the updated configuration file, and a POSA would have reasonably expected to have been successful in doing so.

Element 4[c]: permitting the vCM to download the updated configuration file using a file transfer protocol (FTP).
--

215. Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in further view of Noel and/or McKinnon. *See* Elements 1[preamble]–[d], above.

216. Tsuge discloses that CM Apparatus Control Signal Converting Function 304 operating on OLT 101 (*i.e.* the vCM) is allowed to download the configuration file using a form of file transfer protocol referred to as Trivial File Transfer Protocol (TFTP). EX1006, 40-46, 51-61, Fig. 9 (Step 920).

217. A POSA would have further found it obvious to use a file transfer protocol to download the updated configuration file because such protocols were well known for such use. For example, McKinnon, discloses that the updated configuration files are sent by the Bandwidth Allocator 92 to a Trivial File Transfer Protocol Server, which maintains those files for the cable modems, from which they may be acquired by the cable modem. EX1007, 27:13-21.

218. As discussed above in connection with Elements 1[preamble] and 1[a], Tsuge discloses to a POSA, or it would have otherwise been obvious to a POSA, that the configuration file retrieved would have been an updated configuration file.

219. As discussed above in connection with Elements 1[preamble]–[d] and herein, a POSA would reasonably have expected success in employing TFTP, a species of file transfer protocol, to download the updated configuration file.

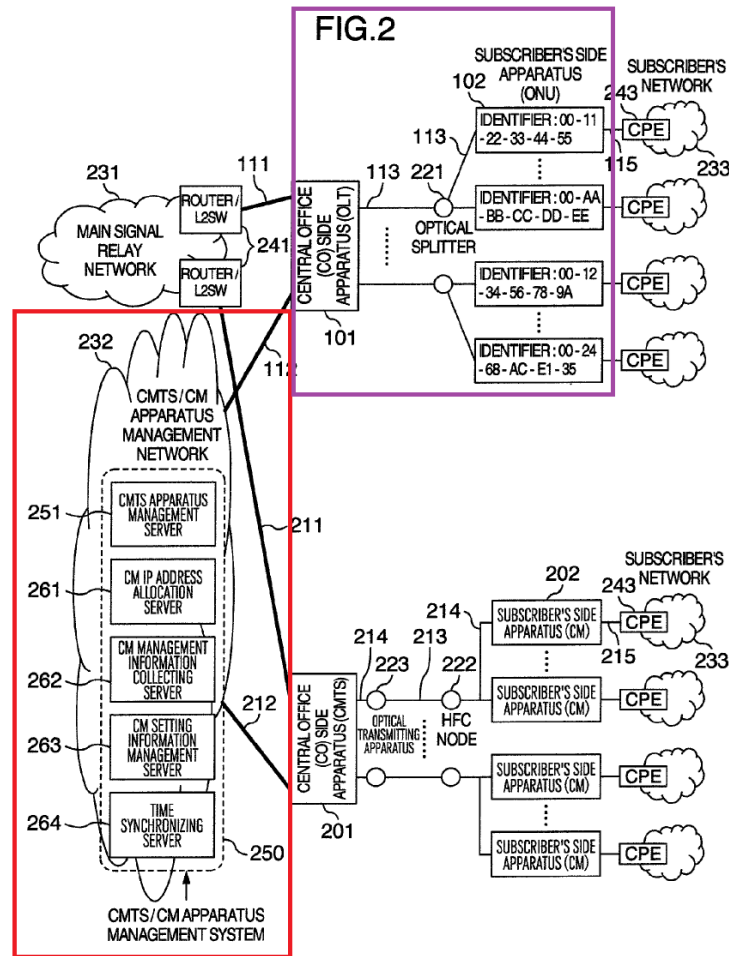
220. For the foregoing reasons, the method of Claim 4 would have been obvious to a POSA.

4. Independent Claim 5

5[preamble] 5. An apparatus for facilitating an update to a configuration file used for operation of an Optical Network Unit (ONU) operable in an Ethernet Passive Optical Network (EPON), the apparatus comprising:

221. To the extent the preamble is limiting, this element would have been obvious to a POSA based upon the disclosures in Tsuge alone and/or in view of McKinnon and/or in further view of Noel. As discussed above in connection with Element 1[a]-[d] and herein with respect to elements 5[a]-[d], Tsuge discloses a system that facilitates an update to a configuration file used for operation of an Optical Network Unit (ONU) operable in an Ethernet Passive Optical Network (EPON).

222. Tsuge discloses a DPoE network that includes a DOCSIS back-office (CMTS/CM Apparatus Management Network 232, RED below) and an EPON, including an OLT 101 and ONU(s) 102 (PURPLE below), as shown in Figure 2 (below):



EX1006, Abstract, FIG. 2 (annotated).

223. As discussed below, Tsuge alone and/or in view of McKinnon and/or in further view of Noel renders obvious an apparatus for facilitating an update of a configuration file used for operation of an ONU. *See* Elements 5[a]–[d].

Element 5[a]: a generator that generates an updated configuration file for the ONU, wherein the ONU is configured with an existing configuration file;

224. This element would have been obvious to a POSA based upon the disclosures in Tsuge alone and/or in view of McKinnon and/or in further view of Noel. *See also* Element 1[a] and 2[a], above.

225. With respect to the recited “generator,” the ’035 Patent specification states “module 602 is for generating an updated configuration file for the ONU” and “can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware[.]” EX1001, 7:34-36, 8:20-50 and FIG. 6.

226. As noted above, Tsuge describes a DPoE network and method for configuring ONUs, including generating an updated configuration file for the ONU. *See* Element 1[a]. A POSA would also understand from Tsuge’s disclosures that the ONUs being configured include ONUs that were previously configured with an existing configuration file. EX1006, 14:33-39; Element 1[preamble].

227. To the extent that Tsuge fails to expressly describe a generator, a POSA would have viewed such a step as obvious in light of Tsuge alone and/or in further view of McKinnon.

228. Based Tsuge’s disclosures, a POSA would have viewed it as obvious to employ circuitry, computer software, firmware, and/or hardware to generate an updated configuration file for an ONU having an existing configuration file, so as to accommodate modifications of services provided to customers. For example, a POSA would understand that the services provided to individual subscribers and classes of subscribers may change over time, as may the capabilities or configuration of the network delivering those services. A POSA would understand that Tsuge’s system has a need to accommodate customers who later change their

services and/or updates necessary to improve or maintain such services. EX1006, Fig. 11 (noting existence of “default” cable modem configuration files and “premium” configuration files).

229. Further, McKinnon describes updating configuration files in a Data-Over-Cable network comprising both fiber optical and coaxial cabling. EX1006, 1:18-22, 45-49. McKinnon discloses a Bandwidth Allocator 92, which it describes as one of various software modules operating within a network access manager located in the headend of the data over cable network:

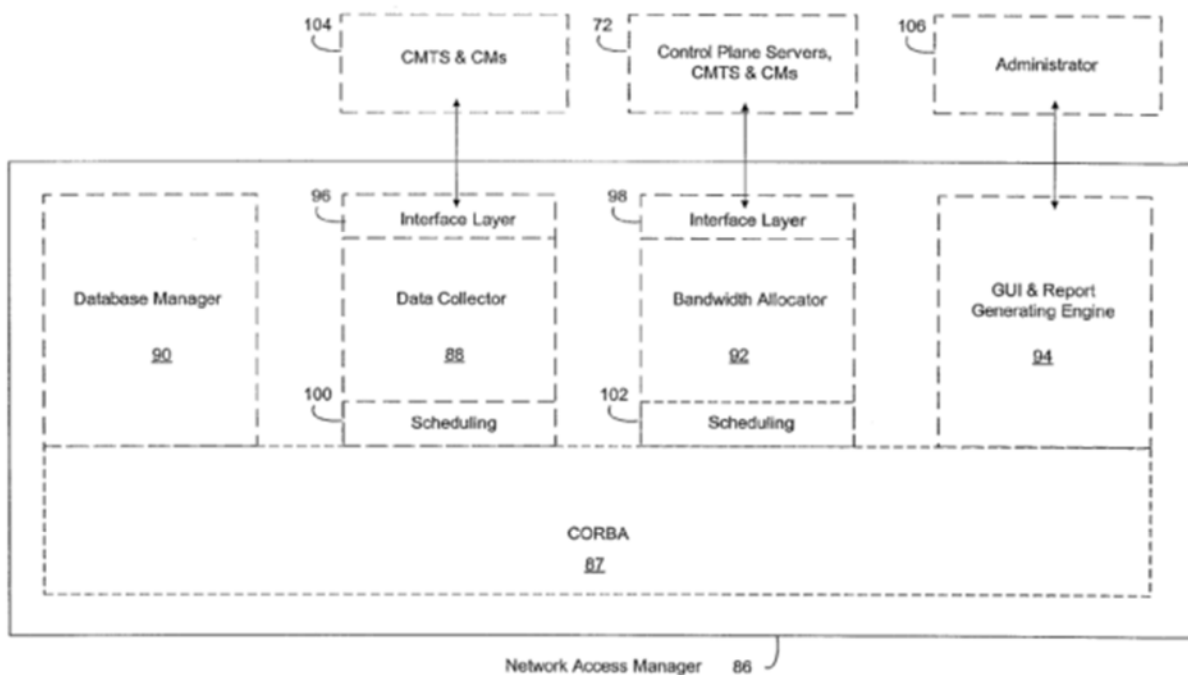


FIG. 6

EX1007, 14:39-63, 14:12-23, Fig. 6.

230. Bandwidth Allocator 92 generates needed updated configuration files using, *inter alia*, information provided by Database Manager 90. EX1007, 15:21-27, 16:17-22 (“Database Manager 90 “stores the information in a user statistics table (‘stats’) for later use by the Bandwidth Allocator 92[.]”), 17:1-11 (Bandwidth Allocator 92 allocates bandwidth for each user class, and each user within each class), 7:56-8:5 (method includes the steps of “generating cable modem configuration files” limiting each user’s allocated bandwidth), 27:4-21 and Fig. 23 (“The DOC Network is updated by incorporating (Step 2302) the user allocations as bandwidth allowances (*i.e.*, bandwidth limits) into CM configuration files (MD-5 files) for the CMs of the respective users. ... The CM configuration files are then sent (Step 2304) by the Bandwidth Allocator 92 to a Trivial File Transfer Protocol (TFTP) Server of the DOC Network, which maintains CM configuration files for the CMs of the Cable Network. A command is also sent (Step 2306) to either of the CMs or the CMTS of the respective Cable Network causing the CMs to acquire and implement the CM configuration files maintained on the TFTP Server.”).

231. A POSA would have viewed it as obvious to include a generator to generate updated configuration files used to configure the ONUs in Tsuge in view of McKinnon’s disclosures for the reasons cited above, including those expressed in McKinnon for doing so.

232. A POSA would additionally have had a reasonable expectation of success in generating updated configuration files for re-configuration of ONUs in Tsuge. A POSA would appreciate that McKinnon's updated CM configuration file generator could be employed in Tsuge's system without requiring modification of either McKinnon's updated files or Tsuge's hybrid system.

233. To the extent that the combined system of Tsuge and McKinnon fails to expressly describe a module or network operator editing or generating an updated configuration file for an ONU having an existing configuration file, a POSA would have viewed such a step as obvious in light of Tsuge in view of McKinnon and in further view of Noel.

234. As discussed above in connection with Element 1[a], Noel similarly discloses "a configuration generation module [that] generates a configuration for the associated ONT[.]" EX1008, [0044]. Thus, Noel further teaches this element and a POSA would find this element obvious over Tsuge alone and/or in view of McKinnon and/or in further view of Noel.

235. A POSA would additionally have had a reasonable expectation of success in generating updated configuration files for re-configuration of ONUs in Tsuge.

Element 5[b]: a notifier that notifies a virtual cable modem (vCM), prior to successful update of the ONU, that the updated configuration file is available for the ONU; and
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236. As discussed above in connection with Element 1[b], Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or in further view of Noel.

237. With respect to the recited "notifier" the '035 Patent specification observes that "module 604 is for notifying a virtual cable modem (vCM) that a configuration file update is available for the ONU" and "can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware[.]" EX1001, 7:34-36, 8:20-50 and FIG. 6. The specification further offers that the system's back-office may cause a change to a "MIB object to set" so as to "trigger the vCM to download the updated CM config file[.]" EX1001, 5:42-45, 7:34-38 and FIG. 6.

238. As discussed above in connection with Element 1[a]-[d] and Claim 3, Tsuge describes a CM information collecting server 262 that issues a SNMP SetRequest to OLT 101. Tsuge's setting request prompts the OLT to retrieve the CM setting information file (*i.e.* configuration file) for a target ONU associated with the CM IP Address reflected in the request by effecting a change in the MIB object triggering the vCM to download the updated configuration file. Tsuge discloses and/or its disclosures would have made obvious the use of a notifier in the form of this combination of hardware and software. As discussed, this request message is issued before the ONU is successfully updated.

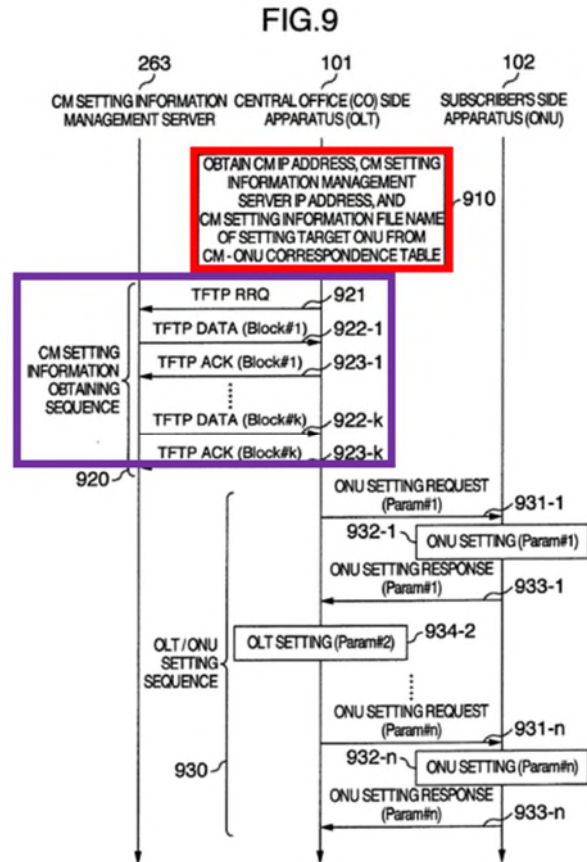
239. To the extent that Tsuge does not explicitly disclose this notifier, as discussed in connection with Element 1[a]-[d] and Claim 3, a POSA would have viewed it to be obvious based upon Tsuge alone and/or in view of McKinnon and/or in further view of Noel.

Element 5[c]: a file provider that provides, when requested by the vCM, to the vCM, the updated configuration file; and

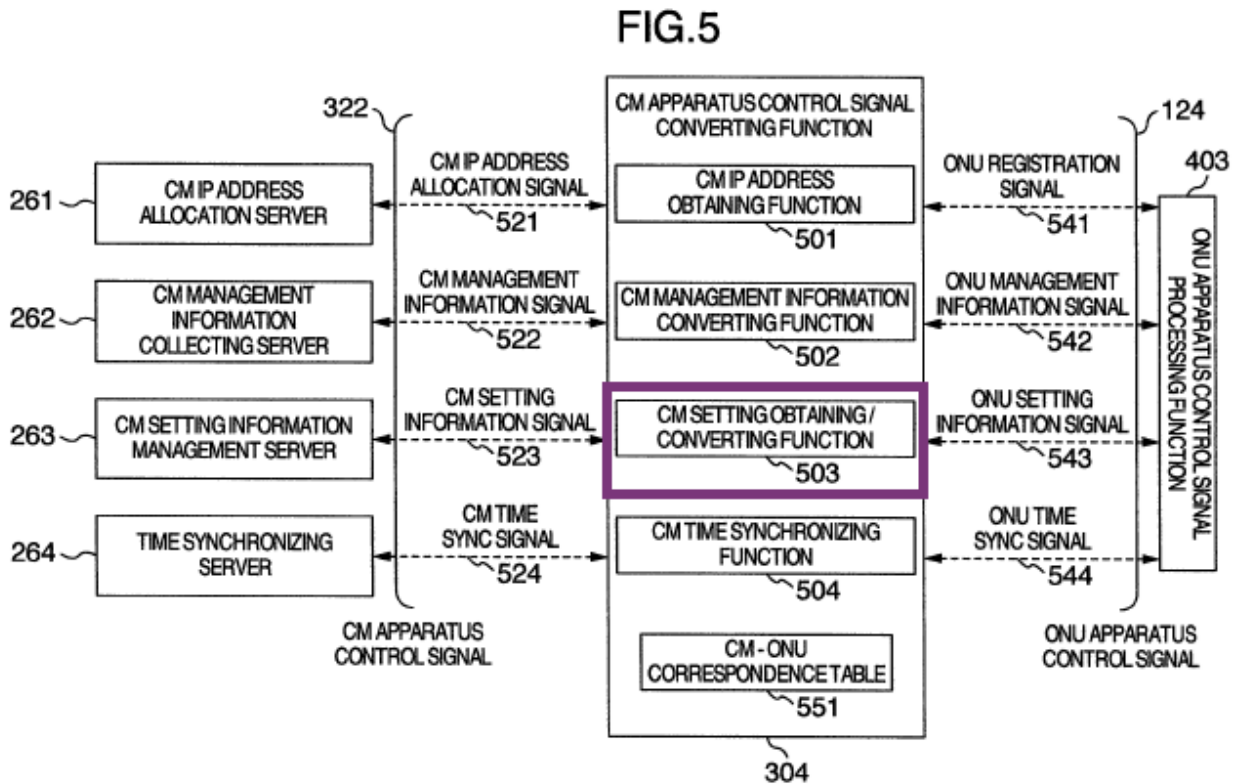
240. Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or in further view of Noel.

241. With respect to the recited "file provider," the '035 Patent specification explains that "module 606 is for providing, when requested by the vCM, the vCM the updated configuration file." EX1001, 7:34-40. The '035 Patent further notes that the "vCM uses the standard mechanism defined in DPoE I01 specifications to obtain the said CM config file, starting with DHCP request message (402) and then following with (T)FTP download (404) of the new CM config file into the DPoE System for further processing." EX1001, 5:55-60, FIG. 6.

242. As discussed above in connection with Elements 1[a]-[d] and Elements 4[a]-[c], Tsuge discloses OLT 101 (*i.e.* the vCM) requesting CM setting information file (*i.e.* configuration file) from CM setting information management server 263, which provides that file in response via Trivial File Transfer Protocol (TFTP). Tsuge's Figure 9 illustrates this process (Step 920 [PURPLE]):



EX1006, 14:20-61, FIG. 9 (annotated). This process is carried out by Cm setting information management server 263 and CM Setting Obtaining/Converting Function 503 operating on OLT 101, as depicted in Figure 5 (Module 503 [PURPLE]):



EX1006, 10:60-67, FIG. 5 (annotated).

243. McKinnon also teaches the computer generation and transmission of updated configuration files by its Bandwidth Allocator 92 to a Trivial File Transfer Protocol (TFTP) server (*i.e.* “file provider”) which maintains those files for delivery upon request. EX1007, 26:56-27:21; Fig. 23 (Step2304). A command sent to the relevant CMs “caus[es] the CMs to acquire and implement the CM configuration files maintained on the TFTP server.” EX1007, 27:17-21. These configuration files necessarily concern previously configured cable modems having existing configuration files.

Element 5[d]: a monitor that monitors the vCM for an indication of successful update of the ONU by the vCM using the updated configuration file.

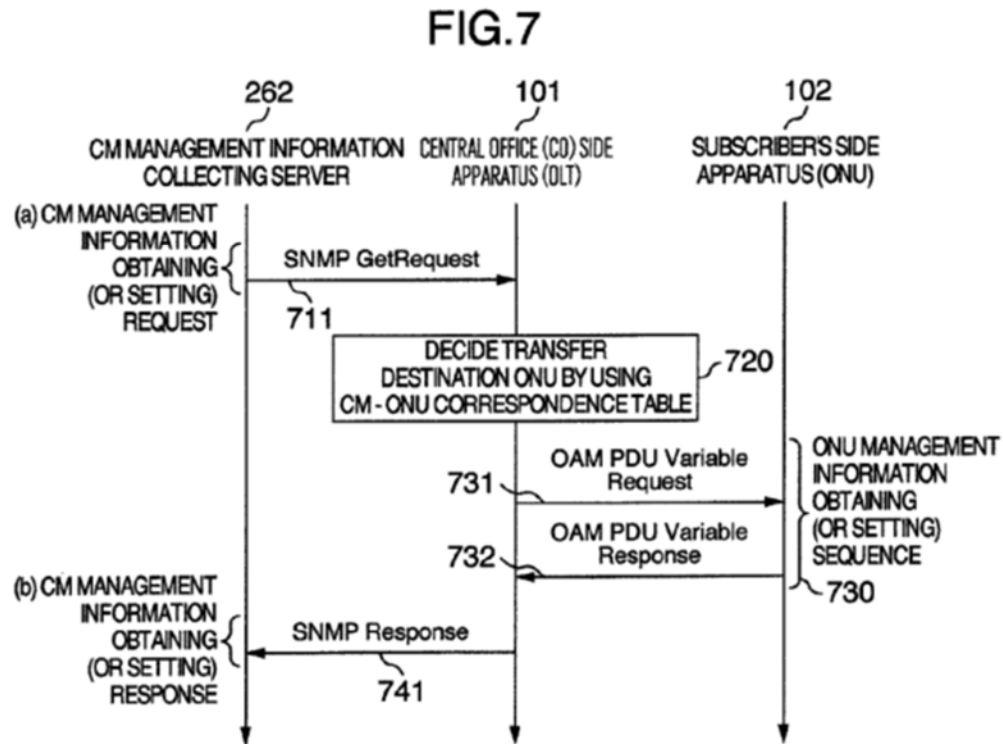
244. Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or in further view of Noel. *See* element 1[d], above.

245. With respect to the recited "monitor," the '035 Patent specification observes that "module 608 is for monitoring the vCM for an indication of successful update of the ONU by the vCM" and "can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this document and their structural equivalents, or in combinations of one or more of them." EX1001, 7:34-42, 8:20-50, FIG. 6. The '035 Patent explains that the "current status" may be reflected by various MIB object states and that the vCM can change the state of these MIB objects to reflect the status of the update. EX1001, 5:45-6:15, 8:10-14 (vCM manages update process "while advertising the progress and the state of the configuration file update via certain entries in a management information base (MIB)).

246. Tsuge explains that the "network administrator ... monitors the CMTS/CM apparatus management system" and that "the PON system of the invention can [be] manage[d] by using the CMTS/CM apparatus management system[.]" EX1006, 8:25-33. Tsuge discloses monitoring the OLT 101 (*i.e.* the vCM) to confirm that the setting request directed to the ONU was successfully

implemented. EX1006, 15:9-15 (“The ONU 102 which received the ONU setting request message reflects the requested setting to itself (step 932) and returns an ONU setting response message toward the OLT (step 933). Each of the ONU setting request message and the ONU setting response message is one of the ONU setting information signal 543.”), Fig. 9 (Step 933), 16:65-17:33 (explaining that the ONU configuration update has successfully been made “if an ONU setting response message showing the success in the setting has been received” and that the update has failed “if an ONU setting response message showing the failure of the setting has been received”).

247. Tsuge explains that after completion of the setting sequence initiated by the SNMP SetRequest message, OLT 101 returns a CM management information setting request message in the form of a SNMP Response. EX1006, 13:40-50, Fig. 7 (Step 741):



248. To the extent that Tsuge does not disclose monitoring OLT 101 for an indication that the update has been successfully applied, it would have been obvious to a POSA to have done so. A POSA would have been motivated to monitor the OLT for an indication of successful update because the CMTS/CM apparatus management system 250 does not communicate directly with the ONU 102, but receives information on the condition of ONU 102 only through OLT 101, due in part to the differing communications protocols on the DOCSIS and PON segments of the network. A POSA would have been motivated to monitor for an indication of a successful update because, among other reasons, knowledge that the update was effective and when can be important to effecting changes in the charges issued

to user. Additionally, with respect to updates designed to ensure acceptable performance and delivery of services, receipt of an indication of successful update is essentially to determining if further actions or repeated efforts to accomplish the necessary update must be pursued.

249. For the foregoing reasons, Tsuge discloses and/or renders obvious, alone and/or in view of McKinnon and/or in further view of Noel, the apparatus recited in Claim 5.

5. Claim 6

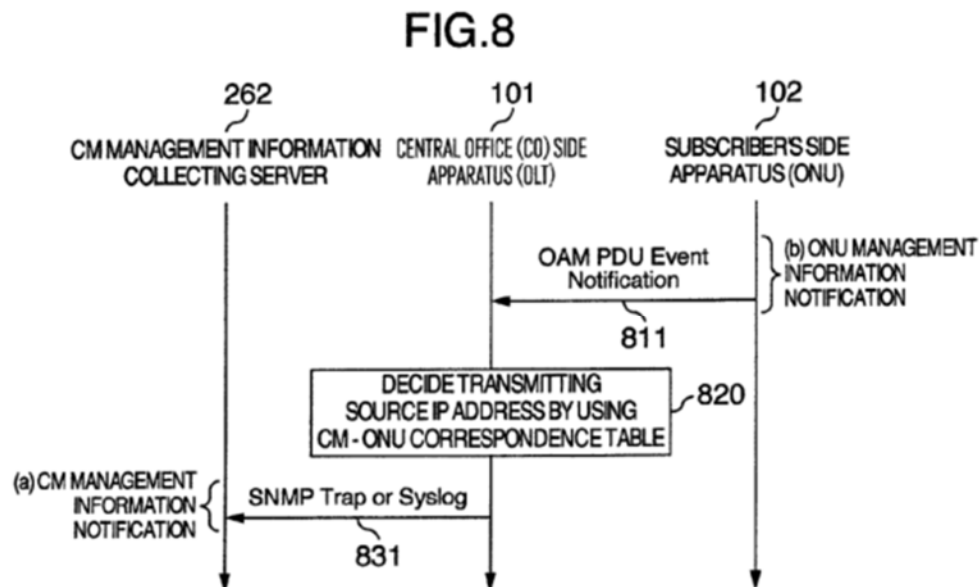
Element 6[a] 6. The apparatus of claim 5, further wherein the generator includes: a detector that detects a configuration change need for the ONU; and

250. Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or in further view of Noel. See Element 2[a].

251. With respect to the recited "detector," the '035 Patent's specification notes that at "some point in time, a network operator identifies the need to modify the set of services configured on a D-ONU[.]"EX1001, 5:32-36.

252. Tsuge's system is controlled and managed by a network operator who can change services on an ONU by updating the configuration. EX1010, 8:27-33 ("network administrator of the communication carrier operates and monitors the CMTS/CM apparatus management system 250, thereby managing the ... PON system of the invention.").

253. Tsuge also detects issues arising during an ONU's operation, reporting of those issues to the CMTS/CM apparatus management system 250. Specifically, Tsuge describes a CM management information notifying process that forms part of the CM information converting function provided for the OLT. EX1006, 13:50-54, Fig. 8. Pursuant to this process, the OLT receives an OAM PDU Event Notification from the ONU. EX1006, 13:50-54, Fig. 8 (Step 811). This Event Notification can be spontaneously generated by the ONU itself, or may be prompted periodically by a message sent by the OLT to the ONU. EX1006, 14:10-19. The event notification is converted by the OLT into a SNMP Trap message and communicated to the CM management information collecting server 262. EX1006, 13:65-14:19, Fig. 8 (Step 831).



254. Both an OAM PDU Event Notification and a SNMP Trap message are designed to report issues with respect to remotely managed devices. These issues may include issues relevant to bandwidth allocation, or other issues that may require a change in configuration. As discussed above in connection with Figure 7 and Element 1[b], receipt by the CMTS/CM apparatus management system 250 of information concerning the ONU can prompt the issuance of a CM information setting request (SNMP SetRequest) that results in the retrieval of a generated updated configuration file and its application to the ONU.

255. Thus, Tsuge discloses an interface through which a network operator may manage the network and/or a CMTS/CM apparatus management system 250 and SNMP protocol operating on the ONU/OLT, each of which constitutes the claimed detector.

256. To the extent that Tsuge does not disclose the generation of an updated configuration file which includes detection of a need for a configuration change to the ONU, a POSA would have viewed such a step as obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or in further view of Noel. A POSA would have been motivated to detect needed changes to the ONU in order to address those needed changes. To the extent that the need detected could be addressed by a configuration change, a POSA would have viewed it as obvious to generate an updated configuration file in connection with detecting a needed change.

257. McKinnon, for example, describes Data Collector 88 that initiates data collection from each CM at predetermined time intervals. EX1007, 16:1-10. Data is collected using SNMP from information stored in the DOCSIS-compliant CM's management information base (MIB). EX1007, 15:53-67. A Database Manager 90, in turn, receives information from Data Collector 88 relating to performance of these CMs. Database Manager 90 provides information to Bandwidth Allocator 92 for its use in generating updated configuration files. EX1007, 15:21-27, 16:17-22 (“Database Manager 90 “stores the information is a user statistics table (“stats”) for later use by the Bandwidth Allocator 92[.]”).

258. McKinnon further discloses that Bandwidth Allocator 92 detects the need for configuration changes that may have occurred due to changes in a user(s) service level agreement. EX1007, 26:30-55. Bandwidth Allocator 92 retrieves information from Database Manager 90, including information contained in the SLAs for users and/or classes of users. *Id.* This information is “updated from time to time by Administrator 106.” *Id.*

259. As discussed above in connection with Element 1[b], McKinnon teaches the allocation of bandwidth in response to the information reflecting changes needed in the configuration of the CM, and the generation of an update configuration file. As further discussed above in connection with Element 1[b], a POSA would have viewed as obvious the generation of an updated CM

configuration file (*i.e.* CM setting information file) and its communication to Tsuge's CM Apparatus Control Signal Converting Functions 304 (*i.e.* vCM) for conversion into OAM messages to configure the ONU to implement these updates.

Element 6[b]: a modifier that modifies at least one service listed in the configuration file to generate the updated configuration file.

260. Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or in further view of Noel. See Element 2[b].

261. With respect to the recited "modifier," the '035 Patent specification explains that the modification of services in the configuration file may be accomplished by the "network operator" interfacing with the network. EX1001, 5:32-39.

262. Tsuge describes a DPoE network that is controlled and managed by a network operator who can change services on an ONU by updating the configuration. EX1006, 8:27-33 ("network administrator of the communication carrier operates and monitors the CMTS/CM apparatus management system 250, thereby managing the ... PON system of the invention.").

263. Tsuge contemplates provision of multiple services to users of its systems. EX1006, 1:33-42 (noting services such as video on demand, Internet data services); 19:58-20:11 (referencing VoIP services delivered via ONUs). Tsuge discloses the use of CM setting information files to configure the ONU with respect

to the provision of such services. EX1006, 3:22-38 (describing configuration of cable modem in typical HFC communications network to provide typical services and replication of that functionality using Tsuge's hybrid Ge-PON system); 21:4-16 (describing configuring ONU for voice services through CM setting obtaining/converting process illustrated in Fig. 9, discussed above in connection with Element 1[b]). As discussed above, a POSA would understand Tsuge to disclose the generation of updated configuration files by making modifications to one or more services listed therein. See Element 1[b], above.

264. A POSA would have viewed such a step as obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or in further view of Noel. A POSA would have been motivated to modify at least one service in the configuration file to generate the updated configuration file because any update or change to a service listed in the existing configuration file would require generation of an updated configuration file having a modification to that service.

264a. Noel's configuration generation module (390) generates updated configuration files and is implemented in hardware, firmware or hardware. EX1008, [0065]. These files change services. EX1008, [0029].

265. Moreover, McKinnon discloses generating an updated configuration file in which modifications are made to at least one service listed. For example, McKinnon describes a process in which either the Administrator, or an individual

user, may make changes that affect the service level agreements stored in the system which are used by the Bandwidth Allocator to generate updated configuration files. McKinnon describes these changes as modifications to existing services being received by the user. A POSA would have viewed it as obvious to have generated an updated configuration file (*i.e.* CM setting information file) for use in Tsuge's system to update the configuration of its ONUs to provide modify services provided to users of that system, such as changes in the bandwidth or priorities afforded users of such services.

266. For the foregoing reasons, the apparatus recited in Claim 6 is disclosed by Tsuge and/or would have been obvious to a POSA in light of Tsuge alone and/or in view of McKinnon and/or in further view of Noel.

6. Claim 8

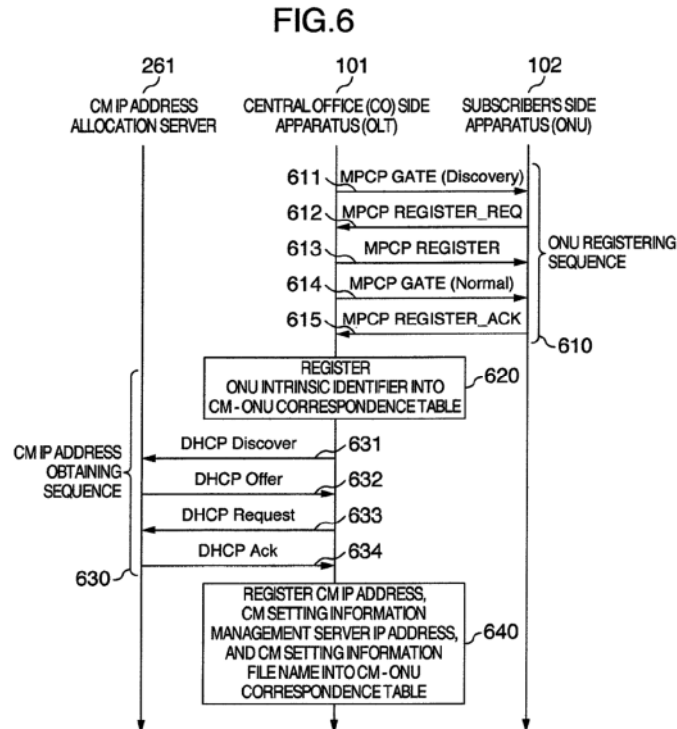
Element 8[a]: 8. The apparatus of claim 5, wherein the file provider includes: a receiver receiving a dynamic host control protocol (DHCP) request from the vCM;

267. Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or in further view of Noel. *See* Elements 1[preamble]–[c], 4[a].

268. With respect to the recited “receiver,” the '035 Patent notes that the vCM uses the “standard mechanism defined in DPoE 101 specifications” including DHCP. EX1001, 5:55-60) (“The vCM uses the standard mechanism defined in

DPoE 101 specifications to obtain the said CM config file, starting with DHCP request message (402) and then following with (T)FTP download (404) of the new CM config file into the DPoE System for further processing.”). The ’035 Patent explains that the DHCP request from the vCM is received by the “back-office system[.]” EX1001, 4:53-59.

269. Tsuge discloses a DPoE network wherein the back-office system is configured to receive a DHCP request from the vCM. Tsuge discloses that the configuration file is retrieved by the vCM using DHCP. Tsuge explains that the CM IP Address Allocation Server 261 comprising part of the CMTS/CM Apparatus Management System 250 (*i.e.* back-office system) receives from OLT 101 a DHCP request to obtain a CM IP Address identifying a target ONU, as well as the server address and file name for the configuration file, which it then uses to retrieve the configuration file and configure the ONU. EX1006, 4:43-51, 12:51-13:6, Fig. 6 (Step 630).



270. Tsuge further explains that, in a fashion identical to the description of its use in the '035 Patent, the OLT uses the standard DPoE/DOCSIS mechanism, including DHCP to obtain the configuration file. EX1006, 12:51-63 (“[a]ccording to the DOCSIS standard, the DHCP is used and the packet transmission and reception are executed in order of a transmission of a Discovery message to the CM IP address allocation server 261 (Step 631), a reception of an Offer message from the CM IP address allocation server 261 (step 632), a transmission of a Request message to the CM IP address allocation server 261 (step 633), and a reception of an Ack message from the CM IP address allocation server 261 (step 634).”).

271. As discussed above in connection with Element 1[a], Tsuge discloses to a POSA, or it would have otherwise been obvious to a POSA, that the configuration file retrieved would have been an updated configuration file.

272. For the foregoing reasons, use of a receiver in the file provider to receive a DHCP request from the vCM would have been obvious in order to facilitate the download of the updated configuration file. *See* Elements 8[b]-[c], below.

Element 8[b]: a location provider that provides the vCM information about a location of the updated configuration file; and
--

273. Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in further view of McKinnon. *See* Elements 1[b], 1[c] and 4[b], above.

274. With respect to the recited "location provider," the '035 Patent specification explains that the DHCP request from the vCM is received by the "back-office system[.]" EX1001, 4:53-59. "In response, the back-office system informs the vCM about the ... list of (T)FTP address servers holding [sic] [the configuration] file. EX1001, 4:53-63.

275. As discussed above in Elements 1[b] and 4[a], Tsuge's CM IP Address Allocation Server 261 comprising part of the CMTS/CM Apparatus Management System 250 (*i.e.* back-office system) provides CM Apparatus Control Signal Converting Function 304 operating on OLT 101 (*i.e.* the vCM) with information

about the location of the configuration file, which it records in CM-ONU correspondence table 551 in association with information identifying the target ONU. EX1006, 8:39-42, 12:51-13:6, 14:25-61 (“According to the DOCSIS standard, ... the file [is obtained] by the TFTP.”), Fig. 6 (Step 630), Fig. 11 (CM Setting Information Management Server IP Address 1102).

276. As discussed above in connection with Element 1[a], Tsuge discloses to a POSA, or it would have otherwise been obvious to a POSA, that the configuration file retrieved would have been an updated configuration file.

Element 8[c]: a file transferor that permits the vCM to download the updated configuration file using a file transfer protocol (FTP).

277. Tsuge discloses this element, or it would have been obvious in light of Tsuge’s disclosures and/or in view of McKinnon and/or in further view of Noel. See Elements 1[b], 1[c] and 4[c], above.

278. With respect to the recited “file transferor,” the ’035 Patent explains that the “vCM uses the standard mechanism ... to obtain the” configuration file, “starting with DHCP request message” and then “following with (T)FTP download” of the updated configuration file. EX1001, 5:55-60.

279. Tsuge discloses that the CMTS/CM Apparatus Management System 250 (*i.e.* back-office system) provides the configuration file via a form of file transfer protocol referred to as Trivial File Transfer Protocol (TFTP). EX1006, 8:39-42, 14:40-61 (“According to the DOCSIS standard, ... the file [is obtained] by

the TFTP.”). Tsuge discloses that CM Apparatus Control Signal Converting Function 304 operating on OLT 101 (*i.e.* the vCM) is allowed to download the configuration file from the CMTS/CM Apparatus Management System 250 (*i.e.* back-office system) using TFTP. EX1006, 14:40-46, 14:51-61, Fig. 9 (Step 920).

280. As discussed above in connection with Element 1[a], Tsuge discloses to a POSA, or it would have otherwise been obvious to a POSA, that the configuration file retrieved would have been an updated configuration file. McKinnon, for example, discloses that the updated configuration files are sent by the Bandwidth Allocator 92 to a Trivial File Transfer Protocol Server, which maintains those files for the cable modems, from which they may be acquired by the cable modem. EX1007, 27:13-21.

281. For the foregoing reasons, the apparatus recited in Claim 8 would have been obvious to a POSA

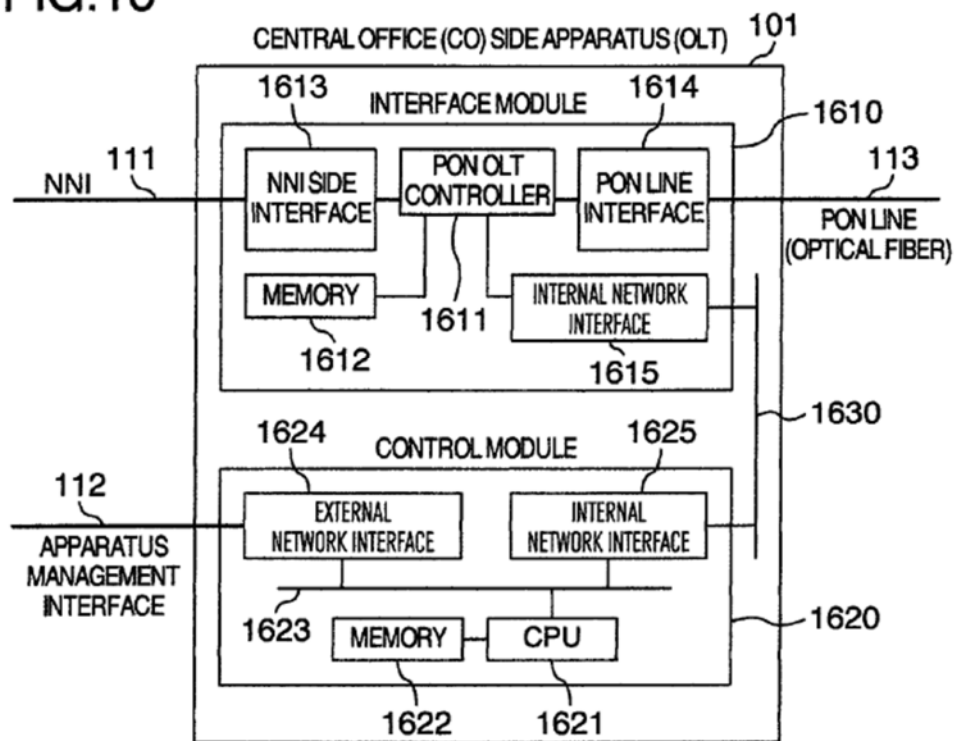
7. Independent Claim 9

Element 9[preamble]: 9. A computer program product comprising a non-transitory computer-readable medium having code stored thereon, the code, when executed by a processor, causing the processor to implement a method of causing an update to a configuration file used for operation of an Optical Network Unit (ONU) operable in an Ethernet Passive Optical Network (EPON), the method comprising:

282. To the extent the preamble is limiting, this element would have been obvious to a POSA based upon the disclosures in Tsuge and/or in further view of McKinnon and/or Noel’s use of software executing on Bandwidth Allocator 92

and/or configuration generation module 390 software executing on Configuration Server 310, respectively. EX1006, 8:25-9:12; EX1007, 8:16-35 (software stored on hardware); 11:64-12:8 (using “hardware, firmware, or software, or various combinations thereof”); 12:24-26, 12:52-54, 14:24-63; EX1008, [0036], [0044], [0065] (may be implemented in software embodied in ROM)); Element 1[a], 5[a], 6[a]-[b] As discussed above, Tsuge discloses a method for provisioning services on an ONU in an EPON. See Element 1[preamble]. Tsuge discloses implementing this method using, *inter alia*, an OLT 101 comprising an interface module 1610 and a control module 1620, as shown in Figure 16:

FIG. 16



EX1006, 17:25-18:17, FIG. 16.

283. Tsuge notes that the control module controls the interface module and the ONU, as well as processing and converting the control signals from both the apparatus management interface and the ONU. EX1006, 18:1-25 (“The control module 1620 has therein the CPU 1621, an external network interface 1624, and an internal network interface 1625. They are connected through a control module internal bus 1623. The control module 1620 also has a memory 1622 and is connected to the CPU 1621. The internal network interface 1625 is connected to the internal network 1630. The external network interface 1624 provides the apparatus management interface 112 to the outside of the OLT apparatus.”)) and FIG. 16. Tsuge’s CMTS/CM apparatus management network 232 also includes non-transitory readable media having stored code executed by processors that generate updated configuration files for configured ONUs

284. The control module includes a processor (CPU) that implements the method of Tsuge, including causing an update to a configuration file for an ONU. EX1006, 18:1-15 (“The CPU 1621 of the control module 1620 transmits and receives the CMTS/CM control signal 122 ..., processes this control signal, and makes control communication of the interface module 1610 and the ONU based on a processing result[.]”), 18:15-17 (“The memory 1622 is a storage device for storing programs and data which are necessary for the CPU 1621 to operate properly.”).

285. A POSA would understand this disclosure of this functionality of the control module's CPU (i.e. storing programs that cause the CPU to receive, transmit and process signals in accordance with each of Elements 9[a]-[d], as further explained below) to be refer to "a computer program product comprising a non-transitory computer-readable medium having code stored thereon, the code, when executed by a processor, causing the processor to implement a method of causing an update to a configuration file used for operation of an Optical Network Unit (ONU) operable in an Ethernet Passive Optical Network (EPON)."

286. To the extent that Tsuge fails to expressly describe a computer program product causing a processor to implement the method of Claim 1, a POSA would have viewed it as obvious in light of Tsuge and/or in further view of McKinnon.

287. A POSA would have understood that the configuration files would have been computer-readable files generated by a computer and that this element is integrated into a computer program product. *See e.g.*, EX1007, 7:60-63 (describing method as "generating" configuration file using bandwidth allocation based upon dynamic algorithm); 27:4-17, 14:12-63 (describing the generation of updated configuration files forwarded by the Bandwidth Allocator 92, a software module operating on the network access manager 86 consisting of computer hardware). If a POSA would not have viewed such a step as obvious based upon his own

knowledge, a POSA would have viewed the computer generation of configuration files obvious in view of the cited disclosures in McKinnon.

288. As discussed above in connection with Element 1[a], McKinnon describes the updating of configuration files in a Data-Over-Cable network comprising both fiber optical and coaxial cabling (*i.e.* a DPoE network). McKinnon explains that this “may be embodied in or performed by hardware, firmware, or software, or various combinations thereof.” EX1007, 11:64-12:8). McKinnon discloses a network access manager 86, which “preferably comprises a hardware component having software modules for performing methods in accordance with the present invention.” EX1007, 12:24-26, 12:52-54 (“The software modules include a Data Collector 88, a Database Manager 90, Bandwidth Allocator 92, and GUI & Report Generating Engine 94.”). A POSA would understand and that these elements are integrated into a computer program product.

289. As discussed above, a POSA would appreciate that McKinnon’s method of updating CM configuration files using software modules could be employed in Tsuge’s system without requiring modification of either McKinnon’s updated files or Tsuge’s hybrid system. *See* Element 1[a].

290. A POSA would have further been motivated to use McKinnon’s software modules to perform the method of updating configuration files to increase flexibility and decrease cost. EX1007, 12:24-38 (“... the software modules may be

incorporated into the EMS, CMTS, and control plane server group of a DOC Network, thereby avoiding the expense of additional computer hardware components.”).

Element 9[a]: generating, using at least one computer, an updated configuration file for the ONU, wherein the ONU is configured with an existing configuration file;

291. As discussed above in connection with Element 1[a], 2, 5[a], and 6[a]-[b], Tsuge discloses this element, or it would have been obvious in light of Tsuge’s disclosures and/or in view of McKinnon and/or in further view of Noel. See Element 1[a], 5[a], and 6[a]-[b]. A POSA would have also understood that the configuration files would have been computer-readable files generated by a computer and that this element is integrated into a computer program product. See Element 9[preamble], above. Tsuge’s CMTS/CM apparatus management network 232 would employ non-transitory readable media having stored ***computer program executed by processors generating updated configuration files*** for configured ONUs and/or servers employing such code in Tsuge’s network would have been obvious in light of Tsuge and/or in view of McKinnon’s and/or Noel’s use of software executing on Bandwidth Allocator 92 and/or configuration generation module 390 software executing on Configuration Server 310, respectively. EX1006, 8:25-9:12; EX1007, 8:16-35 (software stored on hardware); 11:64-12:8 (using “hardware, firmware, or software, or various combinations thereof”); 12:24-

26, 12:52-54, 14:24-63; EX1008, [0036], [0044], [0065] (may be implemented in software embodied in ROM)); Element 1[a], 5[a], 6[a]-[b]. POSAs would have been motivated to use software to update configuration files in Tsuge to increase flexibility and revenues and decrease cost. EX1007, 27:41-29:3.

Element 9[b]: notifying a virtual cable modem (vCM), prior to successful update of the ONU, that the updated configuration file is available for the ONU;

292. Tsuge's CMTS/CM apparatus management network 232 employs stored software to ***notify a vCM of the availability of an updated configuration file*** via an SNMP SetRequest and/or a DHCP response as claimed, or it would have been obvious in light of Tsuge and/or in view of McKinnon's and/or Noel's use of software to issue commands by TFTP Server and/or Element Management System 350, respectively. EX1002, ¶¶283, 292 (EX1006 8:25-9:12); Element 1[b], 3, 5[b], 7, 9[a].

Element 9[c]: providing, when requested by the vCM, to the vCM, the updated configuration file; and

293. Tsuge's CM setting information server 263 employs stored software to ***provide the updated configuration file when requested*** by vCM via TFTP as claimed, or it would have been obvious in light of Tsuge and/or in view of McKinnon's and/or Noel's use of software executing on TPFT Servers and/or Configuration Server 310, respectively, to so provide. EX1006 8:25-9:12; Elements 1[c], 4[a]-[c], 5[c], 8[a]-[c], 9[a].

Element 9[d]: monitoring the vCM for an indication of successful update of the ONU by the vCM using the updated configuration file.

294. Tsuge's CMTS/CM apparatus management system 250, OLT 101 and ONU 102 employ stored software to *monitor the vCM for successful update* of ONUs as claimed, or it would have been obvious in light of Tsuge and/or in view of McKinnon and/or Noel to update configuration files used in Tsuge's configuration process. EX 1006, 8:25-9:12, 18:1-17; Elements 1[d], 5[d], 9[a].

295. For the foregoing reasons, the computer program product recited in Claim 9 would have been obvious to a POSA.

8. Claim 10

Element 10[a]: 10. The computer program product comprising the non-transitory computer-readable medium of claim 9, further wherein the operation of generating the updated configuration file includes:
detecting a configuration change need for the ONU; and

296. Tsuge's employs stored software *to detect a configuration change need* as claimed executing on OLTs (receiving/causing receipt of OAM PDU Event Notifications) and/or CM management information collecting server 262 (responding to SNMP Trap messages or syslogs), or it would have been obvious in light of Tsuge and/or in view of McKinnon's and/or Noel's use of software executing on Bandwidth Allocator 92 and/or Configuration Server 310 to do so. Elements 1[a], 2[a], 6[a], 9[a]. .

Element 10[b]: modifying at least one service listed in the configuration file to generate the updated configuration file.

297. Tsuge's CMTS/CM apparatus management network 232 employs stored software ***to modify at least one service*** in a configuration file as claimed, or it would have been obvious in light of Tsuge and/or in view of McKinnon's and/or Noel's use of software to so modify files. Element 1[a], 2[b], 6[b], 9[a].

298. For the foregoing reasons, the computer program product recited in Claim 10 would have been obvious to a POSA.

9. Claim 12

Element 12[a]: 12. The computer program product comprising the non-transitory computer-readable medium of claim 9, wherein the operation of providing the updated configuration file includes:
receiving a dynamic host control protocol (DHCP) request from the vCM;

299. As discussed above in connection with Elements 1[c], 4[a]-[c], 5[b]-[c], 8[a]-[c], 9[a]-[c]. Tsuge discloses this element as CM apparatus management system 250 would employ stored software, and/or it would have been obvious to do so, to receive a DHCP request from its vCM, or it would have been obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or in further view of Noel. See Elements 1[c], 4[a]-[c], 5[b]-[c], 8[a]-[c], 9.

Element 12[b]: providing the vCM information about a location of the updated configuration file; and

300. As discussed above in connection with Elements 1[c], 4[a]-[c], 5[b]-[c], 8[a]-[c], 9. Tsuge discloses this element as CMTS/CM apparatus management

system 250 would employ stored software, and/or it would have been obvious to do so, to provide its vCM with location information as claimed (*e.g.* CM IP Address obtaining sequence (630)), or it would have been obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or in further view of Noel. *See* Elements 1[c], 4[a]-[c], 5[b]-[c], 8[a]-[c], 9.

Element 12[c]: permitting the vCM to download the updated configuration file using a file transfer protocol (FTP).

301. As discussed above in connection with Elements 1[c], 4[a]-[c], 5[c], 8[a]-[c], Tsuge discloses this element as CMTS/CM apparatus management system 250 would employ stored software, and/or it would have been obvious to do so, to permit its vCM to download the configuration file using FTP as claimed, or it would have been obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or in further view of Noel. *See* Elements 1[c], 4[a]-[c], 5[c], 8[a]-[c], 9.

302. For the foregoing reasons, the computer program product recited in Claim 12 would have been obvious to a POSA.

10. Independent Claim 13

Element 13[Preamble]: 13. An apparatus for causing an update to a configuration file used for operation of an Optical Network Unit (ONU) operable in an Ethernet Passive Optical Network (EPON), the apparatus comprising:

303. As discussed above in connection with Claims 1-9 and Elements 13[a]-[d] herein, to the extent the preamble is limiting, Tsuge discloses an apparatus for causing an update to a configuration file used for operation of an ONU in an EPON,

or it would have been obvious in light of Tsuge's disclosures and/or in view of McKinnon and/or in further view of Noel.

Element 13[a]: means for generating an updated configuration file for the ONU, wherein the ONU is configured with an existing configuration file;

304. As construed in Section VI(E), Tsuge discloses “means for generating an updated configuration file” at least because it discloses a network operator that can “easily manage[]” a DPoE system, including by editing configuration files to change services, thereby “generating an updated configuration file[.]” EX1006, 5:8-23, 8:25-42, 10:17-20); *see also* Element 1[a], 2, 5[a], 6[a]-[b] and 9[a].

Element 13[b]: means for notifying a virtual cable modem (vCM), prior to successful update of the ONU, that the updated configuration file is available for the ONU; and

305. As construed in Section VI(E), Tsuge discloses “means for notifying a virtual cable modem (vCM), prior to successful update of the ONU, that the updated configuration file is available for the ONU.” *See* Elements 1[b], 3, 5[b], 7 and 9[b].

Element 13[c]: means for providing, when requested by the vCM, to the vCM, the updated configuration file; and

306. As construed in Section VI(E), Tsuge discloses “means for providing, when requested by the vCM, to the vCM, the updated configuration file.” *See* Elements 1[c], 4[a]-[c], 5[c], 8[a]-[c] and 9[c].

Element 13[d]: means for monitoring the vCM for an indication of successful update of the ONU by the vCM using the updated configuration file.

307. As construed in Section VI(E), Tsuge discloses “means for monitoring the vCM for an indication of successful update of the ONU by the vCM using the updated configuration file.” See Elements 1[d], 5[d] and 9[d].

IX. GROUND 2: CLAIMS 3, 7 AND 11 ARE OBVIOUS OVER TSUGE ALONE AND/OR IN VIEW OF MCKINNON AND/OR NOEL AND FURTHER VIEW OF GO

1. Claim 3

3. The method of claim 1, wherein the operation of notifying the vCM includes: changing a variable in a management information base (MIB) of the vCM.

308. Tsuge discloses this element, or it would have been obvious in light of Tsuge’s disclosures and/or in view of McKinnon and/or Noel and in further view of Go. See Elements 1[preamble]-[d] and 2[a], above.

309. Tsuge discloses that cable modems complying with the DOCSIS standard employ control signal data structures called Management Information Bases (“MIBs”) and that the Simple Network Management Protocol (SNMP) is used to interact with those data structures. EX1006, 3:3-18. A POSA would have understood a MIB to be a hierarchical database used to manage network devices that contains configuration and other vital management information for those devices in the form of addressable data objects.

310. A POSA would have understood Tsuge’s disclosures to teach the notification of a vCM by means of a variable change effected in its MIB. For example, the applicant acknowledged that the download of the updated

configuration file proceeds using “the standard mechanism defined in [prior art] DPoE 101 specifications[.]” EX1001, 5:55-60. The ’035 Patent acknowledges that these “existing mechanisms” with which a POSA would have been familiar included variable changes in a vCM’s MIB:

Next, **using the existing OSS mechanisms**, the operator may trigger the vCM to download the updated CM config file (304). This can be achieved by setting the dpoeVcmDynCfgNow MIB object to set. The vCM changes the dpoeVcmDynCfgState object state to “downloadInProgress” in order to reflect the current status of the process. Note that the vCM is permitted to initiate the process of dynamic configuration update only when it is in the “Operational” or “Forwarding Disabled” state and the dpoeVcmDynCfgState state is “notStarted” or “updateComplete”.

In the result of setting the dpoeVcmDynCfgNow MIB object, the vCM is requested to re-download the CM config file, which was previously updated by the operator to reflect the new set of service definitions.

EX1001, 5:41-55 (emphasis added).

311. To the extent that Tsuge does not disclose notifying the vCM of the availability of an updated configuration file by changing a variable in its management information base (MIB), a POSA would have viewed such a step as obvious in light of Tsuge’s disclosures and his knowledge of the art as described above in the ’035 Patent. As discussed herein, Tsuge expresses a desire that its system be seamlessly compatible with existing configuration techniques employed by networks employing CMTSs communicating with CMs. EX1006, 4:13-15 (“can be easily installed by a communication carrier in which a CMTS and a CM have

already been installed[.]”), 4:13-21; *see also* Element 1[b], above. A POSA would have been motivated to employ an addressable MIB data structure in conjunction with Tsuge’s vCM in order to comply with existing communications methods.

312. To the extent that Tsuge does not disclose this limitation, a POSA would have viewed it as obvious in further view of Go.

313. Go discloses a method for “the convenient and rapid automatic upgrade of software for cable modems in a cable network[.]” EX1009/EX1018, (54)). Go explains that once a cable modem is identified as an upgrade target, the cable modem is instructed to upgrade its configuration file by changing variables in the modem’s MIB. EX1009/EX1018, pp. 4-5 (“[T]he process moves from step (208) to step (210) to instruct the software upgrade for the corresponding cable modem using the 'docsDevSoftware' information. ... 'docsDevSwAdminStatus' is set to 'upgradeFromMgt(1)' through SNMP. Consequently, the corresponding cable modem will download the software from the TFTP server (118).”).

314. As discussed above in connection with Elements 1[a]–[d] and herein, a POSA would reasonably have expected success in notifying the vCM of the availability of an updated configuration file through changing a variable in a management information base (MIB) of the vCM. As acknowledged by the ’035 Patent and Go, a POSA would have been familiar with such use of a MIB to provoke an upgrade of the cable modem. It would have been nothing more than the exercise

of ordinary skill for a POSA to implement a MIB for such purposes on a vCM consisting of software operating on hardware, such as Tsuge's CM Apparatus Control Signal Converting Functions 304 operating on the OLT 101.

315. For the foregoing reasons, the method of Claim 3 would have been obvious to a POSA.

2. Claim 7

7. The apparatus of claim 5, wherein the notifier includes: a changer that changes a variable in a management information base (MIB) of the vCM.

316. Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in view of McKinnon and Noel and/or in further view of Go. See Claim 3, above.

317. The '035 Patent specification explains that a *changer* may "be implemented in digital electronic circuitry, or in computer software, firmware, or hardware[.]" EX1001, 8:25-6. As discussed above, the '035 Patent explains that "the operator may trigger the vCM to download the updated CM config file ... by setting the dpoeVcmDynCfgNow MIB object to set." EX1001, 5:42-45. The '035 Patent explains that the *changer* may include "**existing OSS mechanisms[.]**" EX1001, 5:41-55.

318. As discussed above in connection with Claim 3, Tsuge alone and/or further view of GO renders obvious the use of a *changer* in the form of standard

OSS mechanisms to notify the vCM of the availability of an updated configuration file.

319. For the foregoing reasons, the apparatus of Claim 7 would have been obvious to a POSA.

3. Claim 11

11. The computer program product comprising the non-transitory computer-readable medium of claim 9, wherein the operation of notifying the vCM includes: changing a variable in a management information base (MIB) of the vCM.

320. As discussed above in connection with Claim 3, Tsuge discloses this element, or it would have been obvious in light of Tsuge's disclosures and/or in view of Noel and/or McKinnon, in further view of Go. *See* Claim 3, Element 9[preamble].

321. For the foregoing reasons, the computer program product changing a variable in the vCM's MIB as recited in Claim 11 would have been obvious to a POSA.

X. GROUND 3: CLAIMS 14, 20, 26 AND 32 ARE OBVIOUS OVER BOURGART ALONE AND/OR IN VIEW OF BARROW

322. Bourgart and Barrow are concerned with same field of endeavor as inventions claimed in the '035 Patent. Specifically, the invention and this reference are each concerned with updating configuration files to reconfigure services provided over a group of telecommunication networking equipment such as Optical Network Units (ONUs) within Passive Optical Networks (PONs). *Id.* A reference

is analogous art if from the same field of endeavor as the claimed invention. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). Bourgart also is concerned with updating configuration files to reconfigure services on telecommunication networking equipment such as network termination devices, including in an EPON. EX1010, Abstract. Barrow similarly concerns dynamically updating configuration files to reconfigure services provided by telecommunication networking equipment. EX1011, Abstract. Thus, Bourgart and Barrow are analogous prior art.

323. The disclosures in Bourgart and Barrow are also reasonably pertinent to the problems which the application sought to solve, such that Bourgart would have "logically [] have commended itself to an inventor's attention in considering his problem." *In re ICON Health and Fitness, Inc.*, 496 F.3d 1374, 1379-80 (Fed. Cir. 2007). The '035 Patent is directed to solutions for updating the configuration of ONUs in an EPON. EX1001, 1:38-46. Bourgart and Barrow are similarly concerned with the problem of reconfiguring telecommunication network termination devices (*e.g.* ONUs) in an EPON. EX1010, Abstract, 5:51-54 and EX1011, Abstract and 1:21-24.

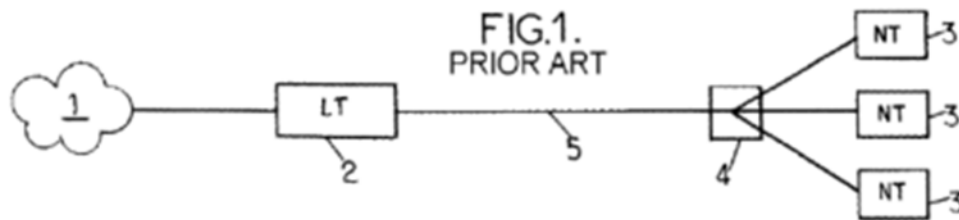
1. Independent Claim 14

Element 14[Preamble]: 14. A method of updating configuration of an Optical Network Unit (ONU) in an Ethernet Passive Optical Network (EPON), the method comprising:
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324. To the extent the preamble is deemed limiting, as more fully described below in connection with Elements 14[a]-[f], Bourgart discloses a method of

updating the configuration of an Optical Network Unit (ONU) in an Ethernet Passive Optical Network (EPON), or a POSA would otherwise have found such a method obvious based on the disclosures of Bourgart alone, and/or in view of Barrow.

325. Bourgart notes this its invention relates to telecommunications networks, and in particular to those involving communications over at least one line between a line-termination device and a group of network-termination devices. EX1008, 1:15-18. Bourgart represented such a network schematically in Figure 1:



EX1010, 1:22-23.

326. The network-termination devices [*i.e.* NTs] may comprise ONU (“Optical Network Unit”) devices. EX1010, 5:51-54. The line-termination device [*i.e.* LTs] may comprise an OLT (“Optical Line Terminations”) devices. EX1010, 5:5:47-50; 6:3-9 (“network-termination device comprises a device of the ONU-type[.]”). Line 5 may be an optical line supporting EPON protocols. EX1010, 1:59-2:6.

327. Bourgart notes the need to anticipate that communications protocols are “likely to change.” EX1010, 1:59-60; *see also* 2:11-14 and 2:15-16. Bourgart proposes a “low-cost solution for the reconfiguration of network-termination devices” that is simple to apply and that “does not require service interruption.” EX1010, 2:32-34. Bourgart observes that previously these protocol upgrades were accomplished by “replac[ing] the network-termination devices[.]” EX1010, 2:17-18. Alternatively, each user was provided with a storage medium (*e.g.* USB drive) containing a stored program for reconfiguring the network device. *Id.*, EX1010, 2:24-26.

328. Bourgart notes, however, that these approaches were disadvantageous. The former is costly and complex, requiring not only the manufacture of new, upgraded devices, but also arranging replacement operations that necessitate undesirable service interruptions. EX1010, 2:19-23. The latter must be carefully coordinated across point-to-multipoint networks to ensure simultaneous upgrade of a plurality of network devices required for proper operation of shared communications. EX1010, 2:26-31.

329. Bourgart discloses a line termination device that communicates reconfiguration instructions to connected network termination devices. EX1010, 2:38-55. By such means, for example, an OLT may update an ONU’s clock frequency, its line coding, scrambling and data encryption, the way in which

bandwidth is shared, the format of data interchanged, and communications modes, among other parameters. EX1008, 8:15-23.

Element 14[a]: receiving a notification that an updated configuration file is available for the ONU, wherein the ONU is configured with a current configuration file;

330. Bourgart discloses this element. Bourgart describes an OLT's receipt of a notification that an updated configuration file is available for a previously configured ONT.

331. Bourgart discloses that its line-termination device (*e.g.* OLT) receives an instruction (*i.e.* notification) to update the configuration of one or more network-termination devices (*e.g.* ONTs). EX1010, 11:16-17 (“[T]he LT receives, during step 45, an instruction to modify the MAC layer format.”) The notification concerns available files relating to the desired configuration update. EX1010, 11:28-34 (noting that the instruction (*i.e.* notification) prompts the line-termination device to collect all necessary firmware files for the desired configuration or to have them generated, Fig. 4 (Steps 50-52)).

332. These network-termination devices include those currently configured. EX1010, 2:38-67 (variously noting that the network-termination devices are “reconfigured” and/or “reprogramed,” their configurations are “modified” or “changed,” where the changes consist of “new parameters” or where the changes are limited to only “certain” existing functionalities). As part of its upgrade, Bourgart describes the LT (line termination device) “interrogating” the NT

(network termination device) “concerning its hardware and firmware versions[.] EX1010, 11:25-27; *see also* 9:49-63, 11:34-35 (the LT “poll[s]” each NT for its existing configuration)).

Element 14[b]: obtaining the updated configuration file;

333. Bourgart discloses this element. Bourgart discloses that the LT obtains the necessary updated configuration files. EX1010, 11:28-34 (in phase 42, the LT “collect[s] the necessary firmware” for the upgrade, including existing files and, if necessary, files newly generated). The NTs, in turn, obtain the updated configuration file via download phase 43. EX1010, 11:35-47 (during step 55, “one or more configuration download fields” are used to download the new configuration, and in step 56, a test is run to confirm that the new configuration has in fact been received (*i.e.* “obtained”) by the NT.

Element 14[c]: performing, using at least one computer, a first validation of the updated configuration file for structural errors;

334. Bourgart discloses this element. Bourgart discloses using a computer to perform a first validation of the updated configuration file for structural errors. Bourgart also discloses that “[a]fter the download [of the updated configuration file]; the LT [*i.e.* a computer] can verify the integrality of the downloaded configurations.” EX1010, 9:59-60). Bourgart discloses the inclusion of “checksum bits” as part of the downloaded configuration file, through which the NT (a computer) can “ensure that the whole of the file has been received, that the file

transmission instruction has been obeyed and that the content of the file has indeed been retrieved without error.” EX1010, 10:11-19.

Element 14[d]: determining changes between the current configuration file of the ONU and the updated configuration file to identify ONU resources to implement to the changes;

335. Bourgart discloses this element and/or this element would have been obvious to a POSA from Bourgart’s disclosures alone, and/or in further view of those of Barrow.

336. Bourgart determines differences between the existing configuration file and the updated file in order to identify the resources needed to implement the changes, and verify the ONU has such resources. EX1010, 9:49-57. Bourgart’s method “envisage[s]” taking account “of the hardware limitations of the equipment” in updating an NT’s configuration. EX1010, 3:25-31. Bourgart describes “interrogat[ing] the NTs concerning their hardware features in order to list the NTs that *are capable of supporting the change*” to the configuration embodies in the updated configuration file. EX1010, 9:49-57; *see also* 11:23-27 (LT “interrogates” the NT concerning its hardware and firmware version). In other words, Bourgart teaches determining if changes in the updated configuration file compared to that currently in use by ONUs would exceed the capabilities of those ONUs. *See e.g.*, 3:18-24 (noting that NTs are “updated on the initiative of the line-termination device, within the limit of their compatibility with the required

performance.”)(Emphasis added); 3:37-48 (noting that the line-termination device has “real-time knowledge of the nature and the version of the connected network-termination devices and of the state of the communications over the shared line[,]” and therefore the reconfiguration may “be carried out with no risk of disruption[.]”).

337. To the extent that Bourgart does not explicitly describe determining changes between the current configuration and updated configuration files, a POSA would have deemed the performance of such a step to have been obvious in view of Bourgart’s disclosures of a verification step and/or in further view of Barrow’s disclosures.

338. Bourgart discloses that the LT interrogates the NT to determine its current configuration, and whether its resources are sufficient to the support the update. EX1010, 9:52-54, 3:25-31. To a POSA, it would have been self-evident that determining an ONU has insufficient resources to implement the updated configuration, requires one to have identified a change from the ONU’s existing configuration which it was incapable of supporting. Thus, it necessarily/obviously determines the update’s changes and identifies the resources necessary. Alternatively, to determine if an ONU could support configuration update, it would have been obvious to identify changes in that update nor present in the existing configuration to focus on the ONUs capacity to implement those changes, because

doing so would simplify the update process, saving time, processing resources and avoiding unnecessary messaging overhead.

339. Bourgart teaches that a POSA would have reasonably expected to be able to successfully identify the changes between the two configuration files, in light of its disclosures that the additional or new resources required of the updated configuration could successfully be identified prior to application of the updated configuration. EX1010, 4:24-30, 9:52-54, 3:25-31.

340. To the extent that Bourgart does not explicitly disclose and/or render obvious this limitation, a POSA would have deemed it obvious, as part of an update process, to identify the changes between the existing and updated configurations in further view of Barrow.

341. The disclosures in Barrow are reasonably pertinent to the problems which the '035 Patent sought to solve, such that Barrow would "logically [] have commended itself to an inventor's attention in considering his problem." *In re ICON Health and Fitness, Inc.*, 496 F.3d 1374, 1379-80 (Fed. Cir. 2007). The '035 Patent discloses solutions for remotely reconfiguring network elements (*i.e.* ONUs) that provide one or more of voice, video and data (Internet) services. EX1001, Abstract. Barrow is similarly concerned with the remote reconfiguration of network elements that provide one or more of voice, video and data (Internet) services. EX1011, 1:21-24 ("The present invention relates to a method for updating

parameters in a customer premises telecommunications hub, and more particularly to a method for dynamically updating configuration files.”)). Thus, Barrow is also analogous prior art. *Id.*

342. Barrow discloses an advantageous method of reconfiguring remote networked telecommunications elements, such as an integrated services hub (ISH). EX1011, 2:1-67. An ISH is “a hardware component that links business or residential user devices such as telephones and computers to the broadband, wide area network through a plurality of user interfaces and at least one network interface.” *Id.* Barrow explains that the controller for the ISH “requires configuration files to set parameters for the various interfaces for the POTS ports, Ethernet ports, etc.” *Id.*

343. Barrow notes that “[t]here is also a need to quickly and efficiently update parameters in the configuration file from time to time.” EX1011, 2:1-67. While an initial configuration file is downloaded during system initialization, Barrow noted that later “these parameters may need to be changed or updated” for various. *Id.* EX1011, 7:59-67 (“For example, the level of comfort noise or the flash hook delay time for POTS module 51 may need to be adjusted. The operating speed of Ethernet module 67 may need to be changed, *e.g.* from 10 Megabyte to 100 Megabyte rate.”)).

344. Barrow teaches an “update module” that dynamically updates the configuration of an ISH without rebooting. EX1011, 3:3-20. Barrow’s update module functions to identify configuration changes and updates dynamically those elements that do not require a reboot:

When a new configuration file is received by the update module, it stores the new configuration file and issues a check function call to each of the other modules. Each module checks the new configuration file against its current parameters, determines if any changes require it to reboot, and notifies the update module if reboot is needed. ... If no reboot is needed, the update module issues an update function call to all modules, which then update their parameters to the new configuration file setting dynamically, *i.e.* without a reboot.

EX1011, 3:3-20, 9:3-9; *see also* 8:25-60 (“Each module starts by reading the new configuration file in flash memory, or at least by reading the parameters which affect it. Then each module compares the new parameters to the previously stored parameters to see if any changes have actually been made. Each parameter used in a module is designated as to whether or not it can be dynamically changed or requires a system reboot.”).

345. Barrow also determines whether the changes entailed in an updated configuration file may be implemented dynamically. If all changes may be applied dynamically, the system dynamically applies the changes to the ISH. EX1011, 8:58-60 (“A reboot is not needed if there is no parameter change or the change which is needed can be made dynamically, *i.e.* without a reboot.”) Barrow visually depicts

this process in FIG. 3, which shows changes being applied in step 220 without requiring a reboot (step 208):

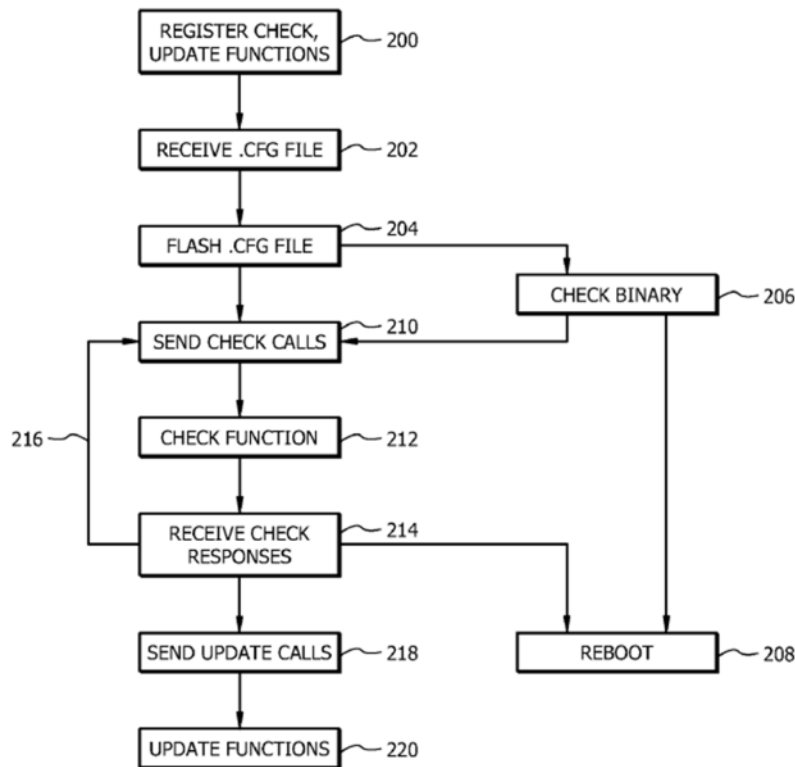


FIG. 3

EX1011, FIG. 3, 9:3-9 (“If none of the modules reports [at Sep 214] that a reboot is needed, then, at step **218**, update module **53** calls the update function at each of the registered modules. At step **220** each module performs the update function by reading the configuration parameters from flash memory **54** which affects it, storing a local copy of the new parameters and operating with the new parameters”).

346. Thus, a POSA would find it obvious to implement Barrow’s method for efficient reprogramming of network devices for providing integrated services such

as voice and data by determining the changes between a current and updated configuration file and applying those changes to update the ONU configurations described in Bourgart's method. A POSA would be motivated to determine the changes as it would reduce the amount of computing and thereby time and cost of evaluating whether the resources are sufficient to implement the updated configuration on the ONU..

347. A POSA would have reasonably expected the differential-based approach described in Barrow to work in the system of Bourgart because comparing file data is a straightforward task for computers to perform when comparing files of the same structure or type (i.e. two configuration files of the same format) that a POSA would expect the methods of Barrow to work in Bourgart's system because Bourgart's system also has access to both the current configuration and updated configuration files when applying updates. EX1010, 9:49-63 ("The LT may also verify the current MAC layer format versions before downloading the configuration files.").

Element 14[e]: performing a second validation about whether the ONU resources to implement the changes are available or not at the ONU; and
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348. Bourgart discloses this element. As noted above in element 14[d] Bourgart determines whether the ONU has the resources needed to implement the changes. EX1010, 9:49-57 (Bourgart's method "interrogat[es] the NTs concerning their hardware features in order to list the NTs that are capable of supporting the

change”), *see also* 3:25-31 (method “envisage[s]” taking account “of the hardware limitations of the equipment” in updating an NT’s configuration”), 11:23-27 (LT “interrogates” the NT concerning its hardware and firmware version), 3:18-24 (noting that NTs are “updated on the initiative of the line-termination device, within the limit of their compatibility with the required performance”), 3:37-48 (noting that the line-termination device has “real-time knowledge of the nature and the version of the connected network-termination devices and of the state of the communications over the shared line[,]” and therefore the reconfiguration may “be carried out with no risk of disruption[.]”). Bourgart’s method excludes from the update those ONUs that are found to lack the necessary resources. EX1010, 9:49-57 (scheduling the update only for NT’s “capable of supporting the change”); *see also* 11:30-34 (“As an alternative, it is possible to disinvest the NT or NTs corresponding to unavailable firmware.”).

348a. POSAs also would have deemed this step obvious in view of Barrow’s update module. *See* Element 14[d].

Element 14[f]: applying the changes to the ONU when it is determined that the ONU resources to implement the changes are available at the ONU.

349. Bourgart discloses this element. Bourgart discloses applying the changes where it is determined that the ONU has sufficient available resources. *See also* Elements 14[d] and 14[e], above.

350. For example, updated configuration field are only downloaded to NTs that have been determined to be “capable of supporting the change[.]” EX1010, 9:49-63 (the LT determines which updated configuration field to send based upon an interrogation of the NT’s “hardware, software and/or firmware versions,” and develops a list of NTs for update that are capable of supporting that change).

351. Thereafter, “in a switchover phase 44, the LT transmits, during a step 58, an instruction to switch [to the updated configuration].” EX1010, 9:49-63 and 11:48-51). Bourgart thus discloses applying the changes to an ONU determined to have the resources necessary to implement them.

352. The claim does not preclude the application of configurations that include, but are not limited to, those in which parameters have changed from those of an ONU’s existing configuration. Nevertheless, Bourgart further discloses that the configuration update may be limited to changed parameters, while leaving other existing parameter unaffected. EX1010, 2:61-67 (noting that the modification made to the “reprogrammed component” may be limited only to “certain functionalities,” such as its modulation), 2:58-60 (“the reconfiguration data may, for example, comprise a reconfiguration file designed to reprogram at least **one component** of these network-termination devices.”)(Emphasis added), and 5:30-40 (noting that the system is “not limited by the type of reconfiguration data” and may involve a “file for programming a component” of the NT).

352a. This would also have been obvious in view of Barrow's "update module" (applier) which issues update function calls when new configurations are determined dynamically applicable. EX1011, 3:3-20, 9:3-9, 8:25-60.

353. While the '035 Patent's specification makes various mention of techniques for updating the configuration of ONUs without having to reboot them, Claim 14 of the Patent does not restrict the application of the updated configuration file to circumstances in which the configuration changes take effect without a reboot. Nevertheless, based upon Bourgart's disclosures it would have been obvious to a POSA, who would have reasonably expected, that the system described in Tsuge could successfully implement modifications in configuration without rebooting. EX1010, 3:37-48 (noting that the reconfiguration may "be carried out with no risk of disruption[.]"); *see also* 2:61-67 (noting that only "certain functionalities" need be modified, while remaining functionality is persistent) and 3:32-36 (noting that the method makes it possible to carry out switchovers that "avoiding possible interference making the link [between the LT and NT] inoperative[.]").

354. For the foregoing reasons, the method of Claim 14 would have been obvious to a POSA.

2. Independent Claim 20

355. Claim 20 recites the terms “receiver,” “obtainer,” “validator,” “determiner” and “applier,” each of which would not have been understood by POSAs at the time of the priority date as having a sufficiently definite meaning as a name for particular structure or class of structures. The ’035 Patent explains that, “The disclosed and other embodiments, modules and the functional operations described in this document (e.g., a generator, a notifier, a file provider, a monitor, a detector, a modifier, a changer, a receiver, a location provider, a file transferor, a validator, an applier, a sender, an obtainer, etc.) can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this document and their structural equivalents, or in combinations of one or more of them. The disclosed and other embodiments can be implemented as one or more computer program products, i.e., one or more modules of computer program instructions encoded on a computer readable medium for execution by, or to control the operation of, data processing apparatus.” EX1001, 8:20-37.

356. Bourgart and Barrow each employ software stored in non-transitory memory executing on a CPU. EX1010, 5:1-29 (“computer program designed to be stored in a memory of a line-termination device . . . comprising instructions for

executing[.]”); EX1011, 4:40-63 (“CPU 50 loads the control software into RAM from which it is executed by the CPU 50”).

Element 20[preamble]: 20. An apparatus for updating configuration of an Optical Network Unit (ONU) in an Ethernet Passive Optical Network (EPON), the apparatus comprising:

357. To the extent the preamble is limiting, Bourgart describes an apparatus for updating an ONU in an EPON network. *See* element 14[preamble] above.

Element 20[a]: a receiver that receives a notification that an updated configuration file is available for the ONU, wherein the ONU is configured with a current configuration file;

358. The term “receiver” would not have been understood by a POSA at the time of the priority date as having a sufficiently definite meaning as a name for particular structure or class of structures. The limitation recites the function of receiving a notification that an updated configuration file is available for the ONU. *Id.* The ’035 Patent explains that, “The disclosed and other embodiments, modules and the functional operations described in this document (e.g., a generator, a notifier, a file provider, a monitor, a detector, a modifier, a changer, a receiver, a location provider, a file transferor, a validator, an applier, a sender, an obtainer, etc.) can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this document and their structural equivalents, or in combinations of one or more of them. The disclosed and other embodiments can be implemented as one or more computer program products, i.e., one or more modules of computer program instructions encoded on a

computer readable medium for execution by, or to control the operation of, data processing apparatus.” EX1001, 8:20-37.

359. The ’035 Patent specification explains that “module 802 is for receiving a notification that an updated configuration file is available for the ONU is received.” EX1001, 7:58-8:7. Thus, the ’035 Patent specification acknowledges that the structure may be software or an electronic circuit capable of receiving a notification that an updated configuration file is available for the ONU.

360. Bourgart discloses this element. See element 14[a] above.

Element 20[b]: an obtainer that obtains the updated configuration file;

361. The term “obtainer” would not have been understood by a POSA at the time of the priority date as having a sufficiently definite meaning as a name for particular structure or class of structures. The limitation recites the function of obtaining the updated configuration file. *Id.* The ’035 Patent explains that, “The disclosed and other embodiments, modules and the functional operations described in this document (e.g., a generator, a notifier, a file provider, a monitor, a detector, a modifier, a changer, a receiver, a location provider, a file transferor, a validator, an applier, a sender, an obtainer, etc.) can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this document and their structural equivalents, or in combinations of one or more of them. The disclosed and other embodiments can be implemented as

one or more computer program products, i.e., one or more modules of computer program instructions encoded on a computer readable medium for execution by, or to control the operation of, data processing apparatus.” *Id.* citing EX1001, 8:20-37.

362. The ’035 Patent specification explains that the “module 804 is for obtaining the updated configuration file.” EX1001, 7:58-8:7. Thus, the ’035 Patent specification acknowledges that the structure may be software or an electronic circuit capable of obtaining a configuration file constitutes the claimed obtainer.

363. Bourgart discloses the claimed obtainer. *See* element 14[b] above.

Element 20[c]: a first validator that performs a first validation of the updated configuration file for structural errors;

364. The term “validator” would not have been understood by a POSA at the time of the priority date as having a sufficiently definite meaning as a name for particular structure or class of structures. The limitation merely recites the function of validating the updated configuration file for structural errors. *Id.* The ’035 Patent explains that, “The disclosed and other embodiments, modules and the functional operations described in this document (e.g., a generator, a notifier, a file provider, a monitor, a detector, a modifier, a changer, a receiver, a location provider, a file transferor, a validator, an applier, a sender, an obtainer, etc.) can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this document and their structural equivalents, or in combinations of one or more of them. The disclosed and other embodiments

can be implemented as one or more computer program products, i.e., one or more modules of computer program instructions encoded on a computer readable medium for execution by, or to control the operation of, data processing apparatus.” EX1001, 8:20-37.

365. The '035 Patent specification explains that the “module 806 is for performing a first validation of the updated configuration file for structural errors.” EX1001, 7:58-8:7. Thus, the '035 Patent specification acknowledges that the structure may be software or an electronic circuit capable of validating the configuration file constitutes the claimed first validator.

366. Bourgart discloses this element. See element 14[c] above.

Element 20[d]: a determiner that determines changes between the current configuration file of the ONU and the updated configuration file to identify ONU resources to implement to the changes;

367. The term “determiner” would not have been understood by a POSA at the time of the priority date as having a sufficiently definite meaning as a name for particular structure or class of structures. The limitation merely recites the function of determining changes between configuration files. *Id.* The '035 Patent explains that, “The disclosed and other embodiments, modules and the functional operations described in this document (e.g., a generator, a notifier, a file provider, a monitor, a detector, a modifier, a changer, a receiver, a location provider, a file transferor, a validator, an applier, a sender, an obtainer, etc.) can be implemented in digital

electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this document and their structural equivalents, or in combinations of one or more of them. The disclosed and other embodiments can be implemented as one or more computer program products, i.e., one or more modules of computer program instructions encoded on a computer readable medium for execution by, or to control the operation of, data processing apparatus.” EX1001, 8:20-37.

368. The '035 Patent specification explains that the “module 808 is for determining changes between a current configuration of the ONU and the updated configuration file to identify ONU resources to implement [sic] the changes.” EX1001, 7:65-8:1. Thus, the '035 Patent specification acknowledges that the structure may be software or an electronic circuit capable of determining changes between configuration files constitutes the claimed determiner.

369. Bourgart alone and/or in view of Barrow renders obvious the claimed determiner. *See* element 14[d] above.

Element 20[e]: a second validator that performs a second validation about whether the ONU resources to implement the changes are available or not at the ONU; and
--

370. Bourgart alone and/or in view of Barrow renders obvious the **second validator**. Software on Bourgart’s LT excludes from updates those ONUs lacking necessary resources. *See* element 20[c] above (regarding term “validator”) and element 14[e] above. It would further have been obvious to do so in view of

Barrow's update module that issued update function call only to devices capable of updating without interruption. *Id.*

Element 20[f]: an applier that applies the changes to the ONU when it is determined that the ONU resources to implement the changes are available at the ONU.

371. The term “applier” would not have been understood by a POSA at the time of the priority date as having a sufficiently definite meaning as a name for particular structure or class of structures. The limitation merely recites the function of applying the changed configuration to the ONU. *Id.* The '035 Patent explains that, “The disclosed and other embodiments, modules and the functional operations described in this document (e.g., a generator, a notifier, a file provider, a monitor, a detector, a modifier, a changer, a receiver, a location provider, a file transferor, a validator, an applier, a sender, an obtainer, etc.) can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this document and their structural equivalents, or in combinations of one or more of them. The disclosed and other embodiments can be implemented as one or more computer program products, i.e., one or more modules of computer program instructions encoded on a computer readable medium for execution by, or to control the operation of, data processing apparatus.” *Id.* citing EX1001, 8:20-37.

372. The '035 Patent specification explains that the “module 812 is for applying the changes to the ONU when it is determined that the ONU resources to

implement the changes are available at the ONU.” EX1001, 8:4-8. Thus, the ’035 Patent specification acknowledges that the structure may be software or an electronic circuit capable of applying changes to the ONU constitutes the claimed applier.

373. Bourgart alone and/or in view of Barrow renders this element obvious. *See* element 14[f] above.

374. For the foregoing reasons, the apparatus of Claim 20 would have been obvious to a POSA.

3. Independent Claim 26

375. Claim 26 claims a computer program implementing the method of claim 14. As discussed above, Bourgart alone and/or in view of Barrow renders obvious the method of claim 14. *Id.*; *see* Claim 14. A POSA would understand Bourgart and Barrow each perform functions/operations described in Claim 26 using processors executing ***computer programs stored on non-transitory computer-readable media***. EX1010, 5:1-29 (“According to yet another aspect, the subject of the invention is a computer program designed to be stored in a memory of a line-termination device designed to be connected by at least one line to at least one network-termination device, and/or stored on a memory medium designed to interact with a drive of said line-termination device and/or downloaded, the program comprising instructions for executing the following steps: transmitting, via

said line to at least one of said at least one network-termination device, frames comprising content data, and reconfiguration data specific to a communication protocol to be used for the transmission of said frames and allowing a reconfiguration of a modem of said destination network-termination device.”), EX1011, 4:40-63. Thus, claim 26 is also rendered obvious by Bourgart alone and/or in view of Barrow.

Element 26[preamble]: 26. A computer program product comprising a non-transitory computer-readable medium having code stored thereon, the code, when executed by a processor, causing the processor to implement a method of updating configuration of an Optical Network Unit (ONU) in an Ethernet Passive Optical Network (EPON), the method comprising:

376. To the extent deemed a limitation, these limitations would have been obvious in based upon Bourgart alone and/or in view of Barrow. *See* 26[a]-[f], *See* element 14[preamble] above.

Element 26[a]: receiving a notification that an updated configuration file is available for the ONU wherein the ONU is configured with a current configuration file;

377. A POSA would interpret Bourgart’s disclosure of an LT/OLT as disclosing a computing device having a processor executing programs stored in non-transitory memory causing receipt of an instructions (*i.e.* notification) to update ONT configurations, or would have viewed such elements as obvious in view thereof. *See* element 14[a] above.

Element 26[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;

378. A POSA would interpret Bourgart's disclosure of an LT/OLT as disclosing a computing device having a processor executing such stored programs causing it to collect (*i.e.* obtain) the necessary firmware files (*i.e.* updated configuration files), or would have viewed such elements as obvious in view thereof. *See* element 14[b] above.

Element 26[c]: performing a first validation of the updated configuration file for structural errors;

379. A POSA would interpret Bourgart's disclosure of an LT/OLT "verify[ing] the integrity of downloaded configurations" as disclosing a processor executing stored programs to causing a validation for structural errors, or would have viewed such elements as obvious in view thereof. *See* element 14[c] above.

Element 26[d]: determining changes between the current configuration file of the ONU and the updated configuration file to identify ONU resources to implement to the changes;

380. A POSA would interpret Bourgart's disclosure of an LT/OLT's interrogation of NTs as disclosing a processor executing stored programs causing it to determine changes between current and updated ONU configuration files and identify ONU resources needed to implement, or would have viewed such elements as obvious in view thereof and/or further view of Barrow whose "update module" is software designed to be stored in non-transitory memory (flash memory 54) and

to operate on a CPU (*e.g.* CPU 50). EX1010, 9:49-57, 11:23-27, 3:18-48; EX1011, 4:40-63. *See* element 14[d] above.

Element 26[e]: performing a second validation about whether the ONU resources to implement the changes are available or not at the ONU; and

381. A POSA would interpret Bourgart's disclosure of an LT/OLT downloaded updated configuration files only to NTs "capable of supporting the change" as disclosing a processor executing stored programs to perform validation of ONU's resources, or would have viewed such elements as obvious in view thereof and/or further view of Barrow whose "update module" identifies the ONUs capable of immediately applying the updates with existing resources. *See e.g.* EX1011, 8:42-9:9; *see* element 14[e] above.

Element 26[f]: applying the changes to the ONU when it is determined that the ONU resources to implement the changes are available at the ONU.

382. A POSA would interpret Bourgart's disclosure of an LT/OLT that transmits an instruction to switch as disclosing a processor executing store programs causing it apply changes to an INU when necessary ONU resources are determined available, or would have viewed such elements as obvious in view thereof and/or further view of Barrow whose "update module" causes the application of changes to the remote networked telecommunications elements. *See* element 14[f] above.

4. Independent Claim 32

383. Claim 32 claims an apparatus comprising means for carrying out the functions of the claimed elements of the apparatus of claim 20 (i.e. to perform the method of claim 14), so for at least the reasons above regarding claims 14 and 20, claim 32 is also obvious over Bourgart in view of Barrow.

Element 32[preamble]: An apparatus for updating configuration of an Optical Network Unit (ONU) in an Ethernet Passive Optical Network (EPON), the apparatus comprising:

384. To the extent deemed a limitation, these limitations would have been obvious in based upon Bourgart alone and/or in view of Barrow. *See* elements 32[a]-[f], below, and 14[preamble], 20[preamble] and 26[preamble], above.

Element 32[a]: means for receiving a notification that an updated configuration file is available for the ONU, wherein the ONU is configured with a current configuration file;

385. Bourgart's LT/OLT receives instructions (*i.e. means for receiving notifications*) indicating updated configuration files are available. *See* elements 14[a], 20[a] and 26[a] above.

Element 32[b]: means for obtaining the updated configuration file;

386. Bourgart's LT/OLT obtains necessary updated configuration files (*i.e. means for obtaining*). *See* elements 14[b], 20[b] and 26[b] above.

Element 32[c]: means for performing a first validation of the updated configuration file for structural errors;

387. Bourgart's LT/OLT verifies the integrality of the downloaded configurations (*i.e. means for performing first validation*). See elements 14[c], 20[c] and 26[c] above.

Element 32[d]: means for determining changes between the current configuration file of the ONU and the updated configuration file to identify ONU resources to implement to the changes;

388. POSAs would interpret LT/OLT's interrogation of NTs as disclosing *means for determine changes* between current and updated ONU configuration files *to identify ONU resources needed* to implement, or would have viewed such elements as obvious in view thereof and/or further view of Barrow's "update module." See elements 14[d], 20[d] and 26[d] above.

Element 32[e]: means for performing a second validation about whether the ONU resources to implement the changes are available or not at the ONU; and

389. POSAs would interpret LT/OLT's downloading updated configuration files to NTs "capable of supporting the change" as disclosing *means for performing a second validation*, or would have viewed such elements as obvious in view thereof and/or further view of Barrow whose "update module" identifies the ONUs capable of immediately applying the updates with existing resources. See elements 14[e], 20[e] and 26[e] above.

Element 32[f]: means for applying the changes to the ONU when it is determined that the ONU resources to implement the changes are available at the ONU.

390. POSAs would interpret LT/OLT's instruction to switch as disclosing *means for applying* change to the ONU, or would have viewed such elements as obvious in view thereof and/or further view of Barrow whose "update module" issues a call and updates parameters when it determines new configurations may be applied dynamically. *See* elements 14[f], 20[f] and 26[f] above.

XI. GROUND 4: CLAIMS 15-17, 19, 21-23, 25, AND 27-31 ARE RENDERED OBVIOUS OVER BOURGART IN VIEW OF BARROW AND TSUGE

391. Claims 15-19, 21-25, and 27-29 and 31 would have been obvious to a person of ordinary skill based on the disclosures of Bourgart in view of Barrow and Tsuge.

392. Bourgart, Barrow and Tsuge are concerned with the same field of endeavor as inventions claimed in the '035 Patent. Specifically, the invention and these references are each concerned with managing services on a group of network termination devices or Optical Network Terminals (ONTs) within Passive Optical Networks (PONs). *Id.* A reference is analogous art if from the same field of endeavor as the claimed invention. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004).

393. The disclosures in Bourgart, Barrow and Tsuge are also reasonably pertinent to the problems which the application sought to solve, such that they would have "logically [] have commended itself to an inventor's attention in

considering his problem.” EX1003, ¶58; *In re ICON Health and Fitness, Inc.*, 496 F.3d 1374, 1379-80 (Fed. Cir. 2007). The '035 Patent discloses DPoE solutions that provide DOCSIS services over an EPON. EX1001 1:38-46. Bourgart is concerned with reconfiguring services on network termination devices, including in an EPON. EX1010, Abstract. Tsuge is concerned with providing DOCSIS services over a Passive Optical Network (PON) to seamlessly transition subscribers from cable hardware to optical hardware. EX1006, 1:21-31, 3:3-12, 4:12-21). Both Bourgart and Tsuge are analogous prior art.

1. Claim 15

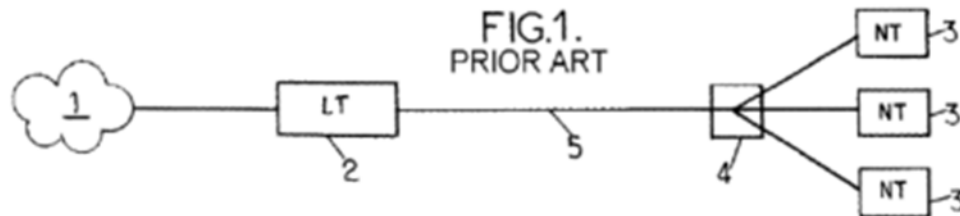
15. The method recited in claim 14, wherein the operation of receiving the notification includes detecting a change to a management information base (MIB) entry.

394. Claim 15 would have been obvious to a POSA from Bourgart’s disclosures and/or in further view of those of Barrow, Tsuge and/or Go.

395. The Bourgart discloses a communication network, a portion of which may consist of an Ethernet passive optical network employing an OLT communicating with one or more ONTs. See Element 14[preamble], above. Bourgart’s Figure 1 “represents schematically such a tree-structure network.” EX1010, 1:15-24. In Figure 1,

[a] line-termination device 2 is connected by a line 5, for example an optical fiber or a copper line, to a group of network-termination devices 3. Dividers shown under reference number 4, for example optical dividers, may be used for sharing the

signals originating from the line-termination device 2 between the network-termination devices 3. **The device 2 provides the interface with the rest of the telecommunications network shown under reference number 1[.]**



EX1010, 1:22-32(emphasis added).

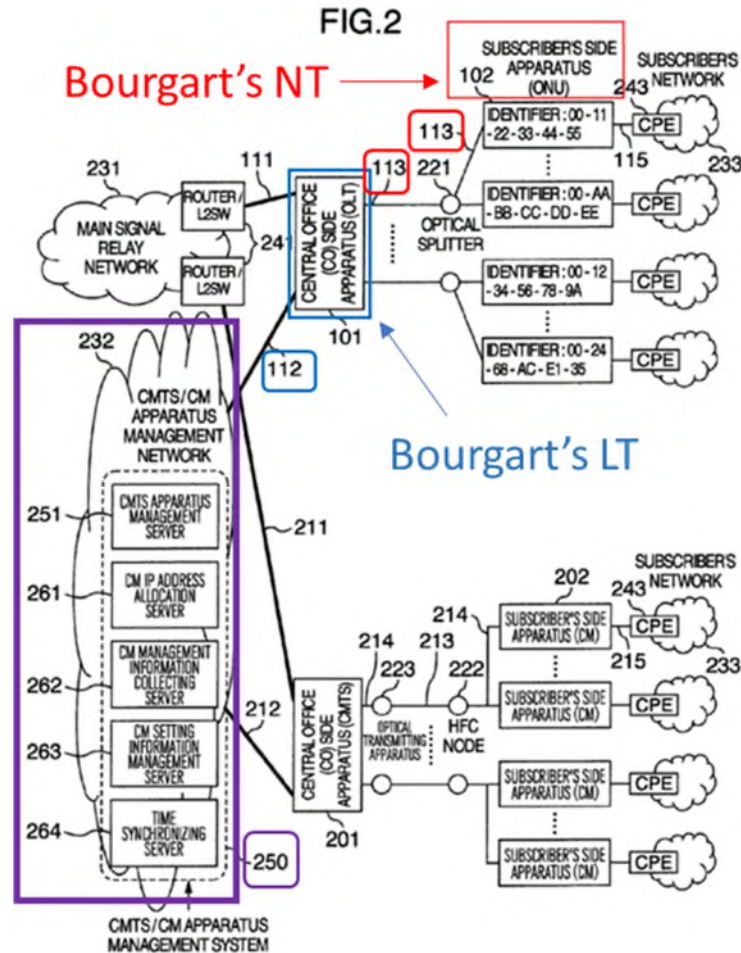
396. Bourgart observes that its system advantageously allows the “network operator” to reconfigure network termination devices. EX1010, 3:49-56. Bourgart discloses “the LT receives, during a step 45, an instruction to modify the MAC layer format [i.e. current configuration].” EX1010, 11:16-17. During Step 50, the LT seeks “all of the firmware corresponding to the desired configuration” update, and these files may be stored or dynamically generated. EX1010, 11:28-30. A POSA would understand or view as obvious that the necessary configuration files are communicated from the network.

397. Bourgart does not explicitly disclose that the notification (*i.e.* instruction) includes detecting a change to a MIB entry, but a POSA would have viewed the use of a MIB as part of a line-termination device to be obvious, particularly in light of Tsuge. *See e.g.*, EX1010, 1:60 (Bourgart noting that “other access technologies may be used”), 5:30-31 (further noting that reconfiguration data

is not limited to a particular type), 6:15-16 (not limited by the nature of the supported).

398. Tsuge explains that it is advantageous to employ a passive optical network, such as disclosed in Bourgart, as part of communications network employing the DOCSIS standard. EX1006, 1:33-2:32 (noting the need for high-speed communications has led to the use of optical fiber and the simplest and most effective method of raising access speed in a cable Internet network is to replace the traditional CMTS/CM components with and OLT/ONU).

399. Tsuge illustrates an embodiment of his system in Figure 2 (below). Tsuge's system aligns with that of Bourgart, wherein Bourgart's line-termination device 2 corresponds to Tsuge's OLT 101 [BLUE], Bourgart's network termination devices 3 correspond to Tsuge's ONUs 102 [RED], and Bourgart's telecommunications network 1 corresponds to Tsuge's CMTS/CM apparatus management system 250 [PRUPLE].



EX1006, Fig. 2 (annotated).

400. As discussed above with respect to Elements 1[a]-[d], Tsuge teaches configuring the OLT with software modules that permit it to “transmit[] and receive[] control signals of the same format as that of apparatus control signals of a CMTS and a CM[.]” EX1006, 4:22-40. In this manner, Tsuge’s system uses “the same apparatus management system as that for the CMTS and the CM[.]” but with a PON employing ONUs. EX1006, 5:20-32.

401. Tsuge notes that its system thus includes a Management Information Base employing a Simple Network Management Protocol (SNMP). EX1006, 3:5-28 (noting that in the DOCSIS standard, the CMTS/CM must cope with “a data structure called MIB (Management Information Base)” using a protocol called SNMP[.]). Tsuge explains that its CMTS/CM apparatus management system 250 may communicate a SetRequest message to its configured OLT using the Simple Network Management Protocol (SNMP) of the DOCSIS standard. EX1006, 13:16-20.

402. SNMP is a standard protocol for remotely managing and monitoring network-connected devices. Communications are made to and from a software module installed on the managed device referred to as an SNMP agent. *Id.* The SNMP agent manages a **Management Information Base or** MIB consisting of information on the device’s managed resources. The MIB consists of a hierarchical organization of objects having variable values. *Id.* A SetRequest is a manager-initiated command to set or change the value of a parameter on a device via SNMP and can be used to manage or update that device’s configuration settings or other parameters.

403. Go discloses a method for “the convenient and rapid automatic upgrade of software for cable modems in a cable network[.]” EX1009/EX1018, (54). Go explains that once a cable modem is identified as an upgrade target, the cable

modem is instructed to upgrade its configuration file by changing variables in the modem's MIB. EX1009/EX1018, pp. 4-5 (“[T]he process moves from step (208) to step (210) to instruct the software upgrade for the corresponding cable modem using the 'docsDevSoftware' information. ... 'docsDevSwAdminStatus' is set to 'upgradeFromMgt(1)' through SNMP. Consequently, the corresponding cable modem will download the software from the TFTP server (118).”).

404. In view of the disclosures in Tsuge and/or Go, a POSA would be motivated to employ a MIB in an EPON as disclosed in Bourgart when such an optical network formed a portion of a cable network operating using DOCSIS. A POSA would have viewed it as obvious to employ a change made to a MIB entry as a means to notify the OLT that an updated configuration file is available. The use of such a MIB would have made it possible to realize the advantages DOCSIS provided to a cable operator, while also realizing the EPON hardware management benefits of Bourgart.

405. A POSA would also have reasonably expected success in employing a MIB in Bourgart's EPON network, where employed as part of a cable network using DOCSIS, and in receiving a notification that the updated configuration file is available for the ONU by detecting a change in a MIB entry. A reasonable expectation is shown where POSA could have combined the elements as claimed by known methods with no change in their respective functions, and the

combination would have yielded nothing more than predictable results. *see KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007).

406. For example, a POSA would have understood that both Bourgart and Tsuge use PON parameters to configure ONU and OLT hardware. Therefore, a POSA would recognize that Tsuge's teachings to translate DOCSIS parameters to PON parameters would result in a format of data (PON parameters) that could be readily utilized by Bourgart's EPON management system, and would have been motivated to do so in order to enable to the wide variety of industry-defined DOCSIS services available to EPON systems.

407. For the foregoing reasons, it would have been obvious to detect a change to a MIB entry to receive the notification that an updated configuration file is available.

2. Claim 16

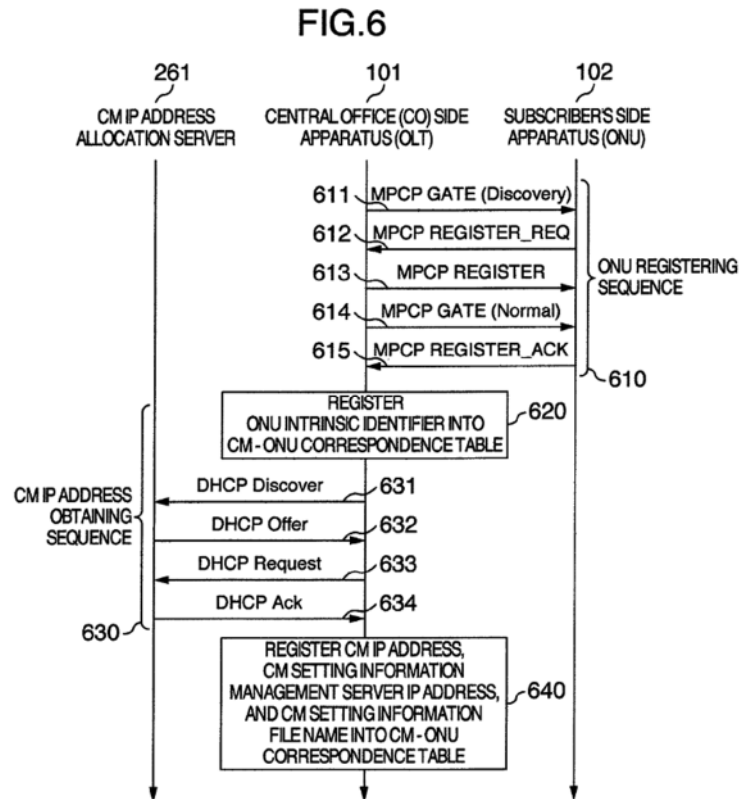
Element 16[a]: 16. The method recited in claim 14, wherein the operation of obtaining the updated configuration file includes: sending a dynamic host control protocol (DHCP) message;

408. Bourgart in view of Barrow and/or Tsuge renders this element obvious. Bourgart does not explicitly disclose sending a dynamic host control protocol (DHCP), but a POSA would have viewed the use of DHCP to obtain an updated configuration file to be obvious, particularly in light of Tsuge. *See also* Element 4[a], above.

409. As discussed above in connection with Claim 15, it would have been obvious to a POSA to employ Bourgart's PON system as part of the DPoE cable network described in Tsuge. *See* Claim 15.

410. As discussed in connection with Claim 15 and in Elements 1[a]-[d], Tsuge describes a method by which cable modem configuration files traditionally employed in DOCSIS CMTS/CM systems can be retrieved by an OLT and thereafter used to configure ONUs operating within the PON segment of the network.

411. In its Figure 9, Tsuge depicts a "diagram showing an example of the operation of a CM setting obtaining/converting function provided for the OLT[.]" EX1006, 14:20-23. Tsuge discloses the function's first step is obtaining a "CM IP address." EX1006, 12:51-62, FIG. 9 (Step 910). Figure 6 depicts "the operation of a CM IP address obtaining function provided for the OLT[.]" EX1006, 14:20-23. That operation includes the OLT sending one or more dynamic host control protocol (DHCP) messages to the CM IP address allocation server forming part of the CMTS/CM apparatus management system 250:



EX1006, 12:53-56, Fig. 6.

412. Thus, a POSA would have been motivated to utilize sending a DHCP message, as taught by Tsuge, with the PON system of Bourgart, including as part of the operation of obtaining the updated configuration file. For the foregoing reasons, it would have been obvious to send a DHCP message as part of obtaining the updated configuration file, as claimed 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 3, element 9.

Element 16[b]: receiving one or more identities of servers storing the updated configuration file; and

413. Bourgart in view of Barrow and/or Tsuge renders this element obvious. Bourgart does not explicitly disclose receiving one or more identities of servers storing the updated configuration file, but a POSA would have viewed this step as obvious, particularly in light of Tsuge. *See also* Element 4[b], above.

414. As discussed above in connection with Claim 15, it would have been obvious to a POSA to employ Bourgart's PON system as part of the DPoE cable network described in Tsuge. *See* Claim 15.

415. As discussed in connection with Claim 15 and in Elements 1[a]-[d], Tsuge describes a method by which cable modem configuration files traditionally employed in DOCSIS CMTS/CM systems can be retrieved by an OLT and thereafter used to configure ONUs operating within the PON segment of the network.

416. Bourgart does not explicitly disclose receiving one or more identities of servers storing the updated configuration file, but a POSA would have viewed this step to be obvious, particularly in light of Tsuge.

417. Bourgart discloses that during Step 50, the LT seeks "all of the firmware corresponding to the desired configuration" update. EX1010, 11:28-30. Bourgart explains that if the LT cannot locate the necessary files, the "new firmware is developed." EX1010, 11:30-32. Bourgart also envisages that updated

configuration files might be communicated to the LT for modifying that device. EX1010, 3:57-61. A POSA would understand from these disclosures and/or view it as obvious that the LT seeks the necessary configuration files stored at a different location—one that is alternatively capable of generating necessary configuration files if not already existing. A POSA would understand from these disclosures and/or view it as obvious that these files are retrieved from a computing device (*i.e.* a server) and that such server must be addressable by the LT (*i.e.* be identifiable).

418. Tsuge discloses an OLT that retrieves a configuration file from a CM setting information management server. EX1006, 11:57-12:2, Fig. 9 (Step 920). Tsuge explains that to obtain the updated configuration file, the OLT is first provided with the identity and location of the server storing the updated configuration file. EX1006, 14:24-29 (“the OLT obtains ... the IP address of the CM setting information management server”), 14:40-45 (“The OLT executes the CM setting information obtaining sequence by using the information obtained by the foregoing procedure [and thereby] the CM setting information file is obtained from the CM setting information management server[.]”).

419. Thus, a POSA would have been motivated to utilize receiving the identity of one or more servers storing the updated configuration file, as taught by Tsuge, with the PON system of Bourgart, including as part of the operation of obtaining the updated configuration file. For the foregoing reasons, it would have

been obvious to include receiving one or more identities of servers storing the updated configuration file, as claimed.

Element 16[c]: obtaining the updated configuration file from one of the servers using a file transfer protocol (FTP).

420. Bourgart in view of Barrow and/or Tsuge renders this element obvious. Bourgart does not explicitly disclose obtaining the updated configuration file from one of the servers using a file transfer protocol, but a POSA would have viewed this step as obvious, particularly in light of Tsuge. *See also* Element 4[b], above.

421. As discussed above in connection with Claim 15, it would have been obvious to a POSA to employ Bourgart's PON system as part of the DPoE cable network described in Tsuge. *See* Claim 15.

422. As discussed in connection with Claim 15 and in Elements 1[a]-[d], Tsuge describes a method by which cable modem configuration files traditionally employed in DOCSIS CMTS/CM systems can be retrieved by an OLT and thereafter used to configure ONUs operating within the PON segment of the network.

423. As explained above, Tsuge explains that updated configuration files are obtained from the "CM setting information management server" (CMTS systems) by Trivial File Transfer Protocol (TFTP). EX1006, 14:40-61 ("the CM setting

information file is obtained from the CM setting information management server ... in a form of obtaining the file by the TFTP.”).

424. A POSA would have been motivated to utilize TFTP as taught by Tsuge to obtain an updated configuration file in the PON system of Bourgart. For the foregoing reasons, it would have been obvious to obtain an updated configuration file from a server using a file transfer protocol, as claimed.

424a. Thus, the elements of Claim 16 would have been obvious.

3. Claim 17

17. The method recited in claim 14, further including: indicating an ongoing configuration update using a MIB entry during the updating operation.

425. As discussed above, a POSA would have viewed the use of a MIB as a control data structure in Bourgart’s EPON to be obvious in view of Barrow, Tsuge and/or Go . See Claim 15. A POSA would have understood that existing MIB mechanisms included indications of ongoing configuration updates via MIB entries. EX1009/EX1018, 4-5 (“docsDevSwOperStatus’ reflects the status of the cable modem software upgrade, consisting of ‘inProgress(1)’ for indicating that an upgrade is ongoing[.]”); EX1001, 5:41-55 (same).

1. Claim 19

19. The method of claim 14, further comprising: performing a third validation about whether an Optical Line Terminal (OLT) and a DOCSIS Ethernet passive optical network (DPoE) system include resources to implement the changes in the updated configuration file.

426. Bourgart in view of Barrow and in further view of Tsuge renders this element obvious. As noted above, a POSA would find it obvious to determine differences in configuration files as taught by Barrow in Bourgart's reconfiguration method, thereby rendering obvious the method of claim 14.

427. Bourgart discloses verifying that the PON system and its components have sufficient resources to implement the changes in an updated configuration file. Bourgart notes that his method "envisage[s]" taking account "of the hardware limitations of the equipment[.]" EX1010, 3:25-31.

428. The LT may interrogate NTs "concerning their hardware, software and/or firmware versions, in order to determine which configuration file to send, in order to implement a new frame format." EX1010, 9:52-54. Bourgart also teaches that resource limitations of other components of the system, such as the OLT, and the system as a whole, should be considered:

The envisaged protocol modifications are compatible with the performance required in that account is taken of the hardware limitations of the equipment used. For example, the speed of modulation, the granularity of the allocation of timeslots between clients, etc. can be limited because of the non-zero up and down time of the components of the line- and/or network-termination devices.

EX1010, 3:25-31 (emphasis added)). Bourgart's method further "envisage[s] modifications of the line-termination device" and evaluates the resource limitations of the OLT and the network, in addition to evaluating the resource limitations of the ONU.

EX1010, 3:57-61, 8:15-23 (allowing “upgrades of the communication protocol between the LT and the NTs ... to the extent of the hardware limitations of the NTs, **of the LT and of the line** ... is possible.”) (emphasis added). It would have been obvious to validate the OLT and DPoE network to ensure compatibility with the upgrade.

429. As such, Bourgart discloses performing a validation of whether a line-termination device (*i.e.* OLT) and line (*i.e.* DPoE system) include resources to implement the changes in the updated configuration file. A ***third validation*** of OLTs and DPoE networks would have been obvious to ensure compatibility with the upgrade.

430. Neither Bourgart nor Barrow explicitly disclose the use of DOCSIS, and thereby a DPoE system. However, a POSA would understand a DPoE system to be encompassed by the types of systems disclosed in Bourgart. Moreover, as discussed above, Bourgart in view of Barrow and further in view of Tsuge renders obvious a DPoE system using the reconfiguration method of Bourgart in view of Barrow. *See supra* Claim 15.

2. Claim 21

21. The apparatus recited in claim 20, wherein the receiver includes: a detector that detects a change to a management information base (MIB) entry.
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431. Claim 21 claims an apparatus comprising components to perform the method of claim 15. So, for at least the reasons above regarding claim 15, claim 21

is also rendered obvious because MIB detecting changes (i.e. detector) would have been obvious in light Bourgart, Barrow, Tsuge and/or Go. *See supra* Claim 15.

3. Claim 22

432. Claim 22 claims an apparatus comprising components to perform the method of claim 16, so for at least the reasons above regarding claim 16, claim 22 is also rendered obvious by Bourgart, Barrow, and/or Tsuge. *See supra* Claim 16.

a. Element 22[a]

22. The apparatus recited in claim 20, wherein the operation of obtaining the updated configuration file includes: a sender that sends a dynamic host control protocol (DHCP) message;

433. Bourgart's use of Tsuge's CMTS/CM management system 250 and/or OTL 101 with control signal converting function 304 (*i.e.* senders) to send DHCP messages would have been obvious in view of Bourgart, Barrow, Tsuge and/or Go. EX1010, 5:1-29; EX1006, 18:1-25, FIG. 16; *See supra* element 16[a], claim 20.

b. Element 22[b]

another receiver that receives one or more identities of servers storing the updated configuration file; and

434. Bourgart's use of Tsuge's OLT obtaining function 501 to receive server identities (*i.e.* another receiver) would have been obvious. EX1010, 5:1-29; EX1006, 18:1-25, FIG. 16; *See supra* element 16[b], claim 20.

c. Element 22[c]

another obtainer that obtains the updated configuration file from one of the servers using a file transfer protocol (FTP).

435. Bourgart's use of Tsuge's OLT obtaining function 503 (*i.e.* another obtainer) to obtain updated configuration files using TFTP would have been obvious *See supra* element 16[c], claim 20; EX1006, 8:39-42, 14:40-61, 18:1-25; Fig. 9 (Step 920); EX1010, 5:1-29.

4. Claim 23

23. The apparatus recited in claim 20, further including:
an indicator that indicates an ongoing configuration update using a MIB entry during the updating operation.

436. Claim 23 claims an apparatus comprising components to perform the method of claim 17, so for at least the reasons above regarding claim 17, claim 23 is also rendered obvious because an apparatus including ***an MIB entry indicating ongoing configuration update, such as*** docsDevSwOperStatus, (*i.e. indicator*) would have been obvious in view of Bourgart, Barrow, Tsuge and/or Go. *See supra* Claim 17.

5. Claim 25

25. The apparatus recited in claim 20, further comprising: a third validator that performs a third validation about whether an Optical Line Terminal (OLT) and a DOCSIS Ethernet passive optical network (DPoE) system include resources to implement the changes in the updated configuration file.

437. Claim 25 claims an apparatus comprising components to perform the method of claim 19, so for at least the reasons above regarding claim 19, claim 25

is also rendered obvious because an apparatus including ***a third validator performing Claim 19's method*** would have been obvious in view of Bourgart and Barrow. *See supra* Claim 19.

6. Claim 27

27. The computer program product comprising the non-transitory computer-readable medium recited in claim 26, wherein the operation of receiving the notification includes detecting a change to a management information base (MIB) entry.

438. POSAs would view as obvious in view of Tsuge and/or Go having a processor in Bourgart's LT/OLT execute programs stored in non-transitory memory to detect a change to MIBs notifying availability of updated configuration files. *See supra* Claims 15, 26; EX1006, 18:1-17, FIG. 16; EX1009/10018, p. 4; .

7. Claim 28

439. Claim 28 claims a computer program performing the method of claim 16, so for at least the reasons above regarding claim 16, claim 28 is also rendered obvious in view of Bourgart, Barrow and Tsuge. *See supra* Claim 16.

a. Element 28[a]

28. The computer program product comprising the non-transitory computer-readable medium recited in claim 26, wherein the operation of obtaining the updated configuration file includes: sending a dynamic host control protocol (DHCP) message;

440. POSAs would view as obvious Bourgart's LT/OLT's processor executing programs stored in non-transitory memory to transmit a DHCP

message(s) to obtain the identity of the server storing an updated configuration file, in view of Tsuge. *See supra* element 16[a].

b. Element 28[b]

receiving one or more identities of servers storing the updated configuration file; and

441. POSAs would view as obvious so executing such programs to receive responses from CM IP address allocation servers identifying servers storing updated configuration files, in view of Tsuge. *See supra* element 16[b].

c. Element 28[c]

obtaining the updated configuration file from one of the servers using a file transfer protocol (FTP).

442. POSAs would view as obvious so executing such programs to obtain updated configuration files using TFTP, in view of Tsuge. *See supra* element 16[c].

8. Claim 29

29. The computer program product comprising the non-transitory computer-readable medium recited in claim 26, further including: indicating an ongoing configuration update using a MIB entry during the updating operation.

443. POSAs would view as obvious so executing such programs to indicate ongoing updates using MIB entries, in view of Tsuge and Go and his/her knowledge. *See supra* Claim 17.

9. Claim 31

31. The computer program product comprising the non-transitory computer-readable medium of claim 26, further comprising: performing a third validation about

whether an Optical Line Terminal (OLT) and a DOCSIS Ethernet passive optical network (DPoE) system include resources to implement the changes in the updated configuration file.

444. POSAs would view as obvious executing such programs to perform a third validation to verify the Bourgart's OLT and the DPoE system taught by Tsuge includes resources necessary to implement the changes. . *See supra* Claim 19.

XII. GROUND 5: CLAIMS 18, 24 AND 30 ARE RENDERED OBVIOUS BY BOURGART IN VIEW OF BARROW AND KOSHY

445. Claims 18, 24 and 30 would have been obvious to a person of ordinary skill based on the disclosures of Bourgart in view of Barrow and Koshy. See claim 14.

1. Claim 18

18. The method recited in claim 14, further including: deleting the updated configuration file from a local memory after successful completion of the applying operation.

446. Bourgart in view of the knowledge of a POSA, and/or in view of Barrow, and/or in further view of Koshy, renders this element obvious.

447. To the extent that Bourgart, or the combination of Bourgart and Barrow, does not explicitly describe deleting the updated configuration file from a local memory after successful completion of the applying operation, a POSA would have viewed it as obvious to perform such a step. A POSA would find it obvious, in utilizing the reconfiguration method of Bourgart, to delete the updated

configuration file from a local memory after successful completion of the applying operation, to save memory and cost and ensure efficient, non-fragmented operation.

448. The deletion of this file would further have been obvious in view of Koshy. The disclosures in Koshy are reasonably pertinent to the problems which the '035 Patent sought to solve, such that Barrow would "logically [] have commended itself to an inventor's attention in considering his problem." *ICON Health*, 496 F.3d at 1379-80. The '035 Patent discloses solutions for remotely reconfiguring network elements (*i.e.* ONUs) using configuration files that includes determining differences between current and updated configuration files. EX1001, Abstract. Koshy is similarly concerned with solutions for the remote reconfiguration of network elements that includes determining differences between current and existing configuration files. EX1011, Abstract ("With sensor networks expected to be deployed for long periods of time, the ability to reprogram them remotely is necessary for providing new services, fixing bugs, and the enhancing applications and system software."). Thus, Koshy is also analogous prior art. *Id.*

449. Koshy discloses that, after generating a delta encapsulating the differences between a current configuration file and an updated configuration file, and successfully applying the changes, the local memory is cleared, including deleting the updated configuration file. EX1012, 356 (explaining that "the entire page is buffered in SRAM and modified. The flash page is erased, and the modified

page is transferred from SRAM to flash.”). A POSA would find it obvious to delete the updated configuration file after successfully applying the update (i.e. changes) to the ONU, as taught by Koshy. A POSA would be motivated to delete the updated configuration file once successfully implemented, to free up memory space and reduce resource usage and constraints, as well as cost of reconfiguration. The deletion of this now unnecessary local copy would have been well within the ordinary skill of a POSA..

2. Claim 24

24. The apparatus recited in claim 20, further including: a deleter that deletes the updated configuration file from a local memory after successful completion of the applying operation.

450. Bourgart alone in view of the knowledge of a POSA, and/or in further view of Barrow and Koshy, renders this element obvious. *See* Claims 18, 20; EX1010, 5:1-29; EX1011, 4:40-63; EX1012, p. 355.

451. The term “deleter” would not have been understood by a POSA at the time of the priority date as having a sufficiently definite meaning as a name for particular structure or class of structures. The limitation merely recites the function of deleting an updated configuration file once the ONU has been successfully updated. *Id.* The ’035 Patent explains that, “The disclosed and other embodiments, modules and the functional operations described in this document (e.g., a generator, a notifier, a file provider, a monitor, a detector, a modifier, a changer, a receiver, a

location provider, a file transferor, a validator, an applier, a sender, an obtainer, etc.) can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this document and their structural equivalents, or in combinations of one or more of them. The disclosed and other embodiments can be implemented as one or more computer program products, i.e., one or more modules of computer program instructions encoded on a computer readable medium for execution by, or to control the operation of, data processing apparatus.” *Id.* citing EX1001, 8:20-37.

452. The ’035 Patent specification further explains that “[o]nce the committing process has been successfully completed (420) and the DPoE ONU is operating according to [the updated configuration], [the current configuration file] is discarded on the vCM and [the] vCM saves [the updated configuration file] as [the current configuration file.]” EX1001, 7:12-16. Thus, the ’035 Patent specification acknowledges that any structure which does not keep both the current and updated configuration files in local memory constitutes the claimed deleter.

453. To the extent that Bourgart does not explicitly describe a deleter which deletes the updated configuration file from a local memory after successful completion of the applying operation, a POSA would have viewed it as obvious to include a deleter. A POSA would find it obvious, in utilizing the reconfiguration method and apparatus of Bourgart, to delete the updated configuration file from a

local memory after successful completion of the applying operation, to save memory and cost and ensure efficient, non-fragmented operation.

454. To the extent it would not have been deemed obvious to a POSA based upon Bourgart's disclosures alone, a POSA would have deemed the deletion of this file to have been obvious in view of Koshy. Koshy discloses that, after generating the delta and successfully applying the changes, the local memory is cleared, including deleting the updated configuration file. EX1012, 356 (explaining that "the entire page is buffered in SRAM and modified. The flash page is erased, and the modified page is transferred from SRAM to flash."). A POSA would find it obvious to delete the updated configuration file after successfully applying the update (i.e. changes) to the ONU, as taught by Koshy. A POSA would be motivated to delete the updated configuration file once successfully implemented, to free up memory space and reduce resource usage and constraints, as well as cost of reconfiguration. The deletion of this now unnecessary local copy would have been well within the ordinary skill of a POSA.

455. Thus, Bourgart alone in view of the knowledge of a POSA, and/or in further view of Barrow and/or Koshy, renders this element obvious.

3. Claim 30

30. The computer program product comprising the non-transitory computer-readable medium recited in claim 26, further including: deleting the updated configuration file from a local memory after successful completion of the applying operation.

456. POSAs would view as obvious Bourgart's processor executing programs recited in Claim 26 to delete updated configuration file from local memory after successful application, in view of Barrow and/or Koshy.. *See supra* Claims 18, 20, 26.

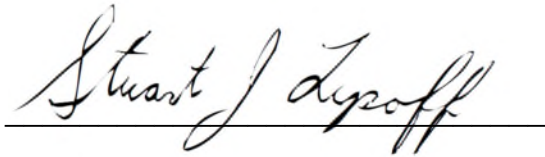
XIII. CONCLUSION

457. The inventions recited in Claims 1-2, 4-6, 8-10, and 12-13 are Obvious Based on Tsuge alone and/or in View of McKinnon and/or in Further View of Noel; the inventions recited in Claims 3, 7 and 11 are Obvious Based on Tsuge alone and/or in View of McKinnon and/or Noel and in Further View of Go; the inventions recited in Claims 14, 20, 26 and 32 Are Obvious Over Bourgart Alone and/or in View of Barrow; the inventions recited in Claims 15-17, 19, 21-23, 25, and 27-31 are Rendered Obvious Over Bourgart in View of Barrow and Tsuge; and the inventions recited in Claims 18 and 24 are Rendered Obvious by Bourgart in View of Barrow and Koshy.

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 January 14, 2025

A handwritten signature in cursive script, reading "Stuart J. Lipoff", is written over a horizontal line.

Stuart Lipoff

APPENDIX A

Stuart J. Lipoff

Mr. Lipoff is president of IP Action Partners Inc, a consulting practice in TIME (telecommunications, information technology, media, electronics, and ebusiness) industries and technologies. He draws upon his over 50 years of experience in a wide variety of technologies and industries to assist clients with knowledge based consulting services involving complex business decisions and problem resolution.

Mr. Lipoff was employed 25 years by Arthur D Little, Inc (ADL) as VP and Director of Communications, Information Technology, and Electronics (CIE); 4 years by Bell & Howell Communications Company as a Section Manager, and 3 years by Motorola's Communications Division as a Project Engineer. At ADL he was responsible for the firm's global CIE practice in laboratory based contract engineering, product development, and technology based consulting. At both Bell & Howell and Motorola, he had project design responsibility for wireless communications and paging products.

Stuart Lipoff has Bachelor's Degrees in Electrical Engineering and in Engineering Physics, both from Lehigh University. He also has received a Masters Degree in Electrical Engineering from Northeastern University, and a MBA degree from Suffolk University.

Mr. Lipoff is a fellow of the IEEE Consumer Electronics, Communications, Computer, Circuits, and Vehicular Technology groups. He is a member of the IEEE Consumer Electronics Society National Board of Governors, and was the Boston Chapter Chairman of the IEEE Vehicular Technology Society. He served as 1996-7 President of the IEEE Consumer Electronics Society and as Chairman of the Consumer Electronics Society Technical Activities and Standards Committee. He served as VP of Publications for The Society and last year as VP of Industry and Standards for The IEEE Consumer Electronics Society. He is currently the historian for The Consumer Technology Society (formerly CESoc). He has also chaired the search committee for Sony supported Mazura Ibuka Award in consumer electronics and is a current committee member. As Vice President and Standards Group Chairman of the Association of Computer Users, he served as the ACU representative to The ANSI X3 Standards group. For the Federal Communications Commission's Citizens advisory committee on CB radio (PURAC), he served as Chairman of the task group on user rule compliance. He has been elected to membership in the Society of Cable Television Engineers (SCTE), The Association of Computing Machinery (ACM), and The Society of Motion Picture and Television Engineers (SMPTE). He was also elected to membership in The Cable Television Pioneers.

Stuart Lipoff holds a FCC General Radiotelephone License and a Certificate in Data Processing (CDP) from the ACM supported Institute for the Certification of Computing Professionals (ICCP). He is a registered professional engineer (by examination) in The Commonwealth of Massachusetts and The State of Nevada.

Mr. Lipoff holds nine USA patents and has published articles in Electronics Design, Microwaves, EDN, The Proceedings of the Frequency Control Symposium, Optical Spectra, and numerous IEEE publications. He has presented papers at many IEEE and other meetings. In the fall of 2000, he served as general program chair for The IEEE Vehicular Technology Conference on advanced wireless communications technology. He has organized sessions at The International Conference on Consumer Electronics and was the 1984 program chairman. He

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conducted an eight week IEEE sponsored short course on Fiber Optics Systems Design. In 1984, he was awarded IEEE's Centennial Medal and in 2000 IEEE's Millennium Metal.

He has served as a member of the USA advisory board to the National Science Museum of Israel and has presented a short course on international product development strategies as a faculty member of Technion Institute of Management in Israel. He also served as a member of the board of directors of The Massachusetts Future Problem Solving Program.

Mr Lipoff is internationally recognized as an authority and opinion leader in new economy related businesses and technology. Citations supporting his recognition can be found on his web site at <http://www.ipaction.com>.

Some examples of projects he has performed in the cable TV and broadband telecommunications sector include:

- Leadership of the project which developed the series of DOCSIS specifications for high speed residential cable modems. The scope of work included developing a roadmap and strategic framework for evolving the business from simple high speed internet services to multimedia broadband services combining voice, data, and secure electronic content delivery. This project was performed under contract to the MCNS consortium of cable TV operators representing 85% of the subscriber base in North America and has since been adopted by the United Nations as a global telecommunications standard.
- Under contract to The National Cable Telecommunications Association (NCTA), I represented the point of view of the cable industry in an FCC workshop on universal broadband availability. This project involved a presentation on the technical capabilities of the cable industry DOCSIS cablemodem infrastructure, a comparison of cablemodem services with DSL, fiber to home, and wireless broadband. Issues related to net neutrality were included in the discussion. Following the FCC workshop, I was further commissioned by NCTA to prepare a white paper comparing DOCSIS cablemodem services with fiber to the home services such as FiOS.
- For Next Generation Network Architecture llc (NGNA llc) consortium of Comcast, Cox, and Time-Warner; I managed the project that produced a five year planning horizon vision for the services and technology the cable industry will seek to deploy. The services and vision were then mapped to overall architectures impacting network elements in the back office, head-end, outside plant, and customer premises and documented in next generation network recommendations. The project involved coordination with over fifty senior technical staff in the three cable MSO sponsors as well as interactions with over 100 suppliers of systems, software, and products to the cable industry. The recommendations and findings were wide ranging including, for example: software defined downloadable conditional access (CA) systems, migration of the outside plant from low to mid split, bridging from network CA to in-home network digital rights management systems (DRM), and migration from 1way to 2way digital TV.

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- For The National Association of Broadcasters (NAB) I managed a project to engage NAB members in the development of new applications and services for over-the-air radio and television broadcasting. The project included developing a list and priority recommendations for research projects for consideration of funding by NAB which would explore the most promising candidate research projects.
- For the cable operator consortium SpectrumCo I supported exploration of alternative means to provide competitive public network wireless services to existing cable and new customers. The project involves exploring 3rd and 4th generation wireless air-interface technologies and developing models that integrate capital expenditures forecasts with operating profits to develop financial performance perspectives of alternatives. A unique aspect of this project includes developing technology forecasts and estimates of subscriber equipment capable of supporting video and multimedia content delivery to handsets.
- For COMCAST Cablevision of Philadelphia, I assisted in the development of a family of advanced two-way, residential digital services, including: development of system/service concepts and specification/selection of a range of equipment to provide this service. Detailed operating and balance sheet financial models of were developed to measure financial attractiveness of alternatives and use as a tool to select specific strategies.
- For a division of Westinghouse in cooperation with Kansai Electric (Japan), I developed detailed business plans for the launch of cable TV and associated broadband services. The project involved demand studies to assess adoption and desires of consumers followed by recommendations on marketing, operating, and technology strategies.
- For the Westinghouse Teleprompter Cable Company, I studied the market for a fiberoptic based institutional data network in Pittsburgh and developed the business and financial models to examine the financial attractiveness of offering these services.
- For Times Mirror Cable TV, I developed business plans for the upgrade of selected systems to 2way capability and exploration of alternative telephony and other advanced services to be provided. I worked with the client to develop risk/reward perspectives for specific service options and develop a roadmap in order of most attractive priorities.
- Analysis and recommendations in a study funded by CableLabs which led to today's hybrid-fiber coax architecture widely deployed worldwide for delivering broadband multimedia services to the home. The project involved developing forecasts of technology trends in parallel with projecting the business applications. Detailed proforma financial models were developed to make the cost/benefit of deploying this technology visible to the cable industry, and strategies were developed and recommended to the industry.
- Leadership of a project jointly funded by The National Association of Broadcasters and Maximum Service TV Association to analyze options to accelerate the adoption of digital TV technology by consumers. My recommendations were provided to the FCC and were the basis for the August 2002 report and order the FCC issued to mandate a roll-out schedule for digital TV receivers.

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- For Bell South I contributed to a major operations improvement project involving developing forecasts of the future competitive environment, customer needs, a strategy to compete, and new business models. These forecasts were then applied to develop business redesign recommendations and a list of new services offerings.
- For Magnavox Cable TV (a division of N.A. Philips) I performed comparative cost and technical analysis of fiber optics versus conventional coax systems. This analysis was followed by the development of strategies and sales support materials to pitch the new HFC systems to cable TV operators.
- I performed additional work for The Cable Television Laboratories in which I studied the application of remote and distributed antennas supporting microcellular PCS on hybrid fiber-coax cable TV systems. A key issue explored was the requirement for the fiber optic portion of the plant to carry the PCS carriers in analog form and deal with the wide dynamic range demands for inbound signals.
- For a consortium of the major cable TV operators consisting of Comcast, Time Warner, Cox, and Rogers; I developed models for prediction of reliability of alternative HFC architectures and their suitability to provide local exchange voice services competitive with ILECs. The project required understanding the reliability specifications employed in conventional local exchange carrier telephone plant and the contributions between hardware, power, and workmanship failures. Each of three alternative fiber optic architectures for cable delivered voice telephony were studied and modeled to develop reliability predictions and recommendations were made as to which aspects of the three alternatives were the best choice for cable delivered voice telephony.
- For GTE Systems I prepared a presentation on developing commercial opportunities for wide-bandwidth ATM switching. The scope of applications included: metro area network LAN interconnect, broadcast studio digital video routing and switching, and distributed switching for digital wireless personal communications networks. The goal of the project was to explore cable TV and other commercial applications for their military systems broadband switching technology.
- For Bellcore (now Telcordia division of SAIC), I evaluated the R&D portfolio of their Applied Research Group. The main components of this portfolio were DWDM technologies for long haul interLATA communications as well as optical multiplexing components for passive optical network applications in cable TV and advanced broadband residential services. I provided R&D planning assistance on the allocation of funding and priorities to the R&D efforts and identified opportunities for securing intellectual property rights to critical R&D efforts.
- For the ViaSat Division of Modern Times Group (Sweden) I developed business plans for the launch of a new service that bundled discounted long distance telephone services with direct to home satellite TV services and other interactive services including gambling via the set-top box.

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- For Magnavox Cable TV, I supported the development of a set-top-box cable converter with a microcomputer based user interface and conditional access system. The product was sold in both the USA and Canada.
- For Southern New England Telephone (SNET), he supported the launch of a video dial tone service. He contribution to the project included engineering and cost analysis of system alternatives as well as assisting with the preparing of RFPs for set-top-boxes and other network elements.

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

- Provided expert report and deposition testimony as technical expert, retained by Samsung in the cases captioned below:

UNITED STATES PATENT AND TRADEMARK
OFFICE BEFORE THE PATENT TRIAL AND APPEAL
BOARD
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner vs
PARUS HOLDINGS, LLC, Patent Owner
IPR2023-00163
Patent
7,386,455 and
IPR2023-00162
Patent 6,721,705

- Provided expert report as technical expert, retained by Local Networks in the case captioned below:

NORTHERN DISTRICT OF INDIANA
FORT WAYNE DIVISION
Civil Action No. 1:21-cv-00088
WESTWOOD ONE, LLC Plaintiff
vs
LOCAL RADIO NETWORKS, LLC, Defendant

U.S. Patent Nos. 7,412,203 and 7,860,448

- Provided expert report as technical expert, retained by KAJEET in the case captioned below:

UNITED STATES PATENT AND TRADEMARK
OFFICE
BEFORE THE PATENT TRIAL AND APPEAL
BOARD NORTON LIFELOCK, INC., Petitioner
v.
KAJEET, INC., Patent Owner
U.S. Patent No. 8,667,559
Inter Partes Review Case No.: IPR2022-00001

- Provided Declaration and Deposition as technical expert, retained by GoTV in the case captioned below:

THE UNITED STATES PATENT AND TRADEMARK OFFICE
ex parte review (“EPR”) of U.S. Patent No. 8,989,715

and

IN THE UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA—WESTERN DIVISION
Case No. 2:22-cv-07556-RGK-SHK
GOTV STREAMING, LLC, Plaintiff
v.
NETFLIX, INC., Defendant
REGARDING PATENTABILITY AND NON-INVALIDITY OF U.S. PATENT
NOS. 8,478,245; 8,989,715; AND 8,103,86

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

- Provided declaration as technical expert, retained by Google in the case captioned below:

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

SONOS, INC., Petitioner,
v.
GOOGLE, LLC, Patent Owner.

Case No. IPR2023-00118
U.S. Patent No. 10,134,398

and

Case No. IPR2023-00119
U.S. Patent No. 10,593,330

and

Case No. IPR2023-00118
U.S. Patent No. 10,134,398

- Provided expert report as technical expert, retained by BMW in the case captioned below:

UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION
Case No. 2:22-cv-00486-JRG (Lead Case)

NORTHSTAR SYSTEMS LLC, Plaintiff,
v.
VOLKSWAGEN AG, Defendant.

AND Case No. 2:22-cv-00496-JRG (Member Case)

NORTHSTAR SYSTEMS LLC, Plaintiff,
v.
BAYERISCHE MOTOREN WERKE AG, Defendant

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

- Provided declaration as technical expert, retained by Google in the case captioned below:

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

GOOGLE LLC, Petitioner,
v.
DH INTERNATIONAL LTD., Patent Owner.

Case No. IPR2024-01322
Patent No. 9,022,294

Case IPR2024-01321
Patent No. 7,628,333

- Provided expert report and deposition testimony as technical expert, retained by Samsung in the cases captioned below:

UNITED STATES PATENT AND TRADEMARK
OFFICE BEFORE THE PATENT TRIAL AND APPEAL
BOARD
SAMSUNG ELECTRONICS AMERICA, INC,
Petitioner vs
PARUS HOLDINGS, LLC, Patent Owner
IPR2023-00163
Patent
7,386,455 and
IPR2023-00162
Patent 6,721,705

- Provided expert report and deposition testimony as technical expert, retained by HID in the cases captioned below:

THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD
ASSA ABLOY AB, ASSA ABLOY Inc., ASSA ABLOY Residential Group, Inc.,
August Home, Inc., HID Global Corporation, and ASSA ABLOY Global Solutions,
Inc., Petitioners,
vs
CPC Patent Technologies PTY LTD., Patent
Owner. Case No. IPR2022-01006
Patent No.
9,665,705 and
Case IPR2022-01045
Patent 9,269,208 (Claims 1-9)
and
Case IPR2022-01089
Patent 9,269,208 (Claims 10-13)

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

- Provided expert report and deposition testimony as technical expert, retained by HID in the cases captioned below:

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

ASSA ABLOY AB, ASSA ABLOY INC., ASSA ABLOY RESIDENTIAL GROUP,
INC., AUGUST HOME, INC., HID GLOBAL CORPORATION, ASSA ABLOY
GLOBAL SOLUTIONS, INC.,

Petitioner, vs

CPC PATENT TECHNOLOGIES PTY LTD., Patent Owner.

Case IPR2022-01093 (US Patent No. 8,620,039)

and

Case IPR2022-01094 (US Patent No. 8,620,039)

- Provided expert report and deposition testimony as technical expert, retained by Google in the cases captioned below:

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

GOOGLE LLC, Petitioner,

v.

PARUS HOLDINGS INC., Patent Owner.

Case No. IPR2022-00358

Patent No. 7,881,941

and

Case No. IPR2022-00523

Patent No. 8,185,402

- Provided expert report and deposition testimony as technical expert, retained by Samsung in the case captioned below:

IN THE UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT
OF TEXAS, WACO DIVISION

PROXENSE, LLC, Plaintiff,

vs.

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

Case No. 6:21-cv-00210-ADA

- Provided expert report and deposition testimony as technical expert, retained by WSOU INVESTMENTS in the case captioned below:

In THE UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT
OF TEXAS. WACO DIVISION

WSOU INVESTMENTS, LLC D/B/A, BRAZOS LICENSING AND
DEVELOPMENT, Plaintiff,

vs. . . . :

MICROSOFT CORPORATION, Defendant

No. 6:20-CV-00464-ADA

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

- Provided expert declarations and deposition testimony as a technical expert in support of IPRs before The United States Patent Office Trial and Appeal Board

Clients: 3G LICENSING S.A.-Sisvel Patent Owner

Adverse Party: DELL, INC, Petitioners

In the matter of PTAB Case No. IPR2020-1157 U.S. Patent No. 7,274,933
 PTAB Case No. IPR2021-0584 U.S. Patent No. 7,551,625
 PTAB Case No. IPR2020-1162 U.S. Patent No. 8,948,756
 PTAB Case No. IPR2020-1158 U.S. Patent No. 7,460,868
 PTAB Case No. IPR2020-1159 U.S. Patent No. 7,596,375
 PTAB Case No. IPR2020-1160 U.S. Patent No. 8,275,374
 PTAB Case No. IPR2020-1161 U.S. Patent No. 8,472,955

- Provided expert report, deposition testimony, and testified at ITC hearing as technical expert, retained by Roku in the case captioned below:

Before The UNITED STATES INTERNATIONAL TRADE COMMISSION
CERTAIN ELECTRONIC DEVICES, INCLUDING STREAMING PLAYERS,
TELEVISIONS, SET TOP BOXES, REMOTE CONTROLLERS, AND
COMPONENTS THEREOF
Investigation No. 337-TA-1200

- Provided expert report and deposition testimony as technical expert, retained by Sisvel International in the case captioned below:

UNITED STATES DISTRICT COURT SOUTHERN DISTRICT OF FLORIDA
Miami Division
SISVEL INTERNATIONAL S.A., 3G
LICENSING S.A., and SISVEL S.p.A.,
Plaintiffs,
v.
HMD AMERICA, INC. and
HMD GLOBAL OY,
Defendants.
Case No.: 20-22051-CIV-GAYLES

- Provided expert report and deposition testimony as technical expert, retained by Sisvel International in the case captioned below:

UNITED STATES DISTRICT COURT NORTHERN DISTRICT OF TEXAS
SISVEL INTERNATIONAL S.A., 3G LICENSING S.A.,
Plaintiffs,
v.
ZTE (USA), INC. AND ZTE CORPORATION,
Defendants.
Civil Action No. 3:19-cv-01694-N

- Provided expert declarations and deposition testimony as a technical expert in support of an IPR before The United States Patent Office Trial and Appeal Board

Clients: GOOGLE LLC., Petitioners

Adverse Party: PARUS HOLDINGS INC., Patent Owner.

In the matter of PTAB Case No. IPR2022-00279 U.S. Patent No. 6,721,705

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

- Provided expert declarations and deposition testimony as a technical expert in support of IPRs before The United States Patent Office Trial and Appeal Board

Clients: GOOGLE LLC, SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS AMERICA, INC., LG ELECTRONICS INC., and LG ELECTRONICS U.S.A., INC., Petitioners

Adverse Party: PARUS HOLDINGS INC., Patent Owner.

In the matter of PTAB Case No. IPR2020-00846 U.S. Patent No. 7,076,431

PTAB Case No. IPR2020-00847 U.S. Patent No. 9,451,084

PTAB Case No. IPR2022-00355 U.S. Patent No. 7,386,455

PTAB Case No. IPR2022-00358 U.S. Patent No. 7,881,941

- Provided expert declarations and deposition testimony as a technical expert in support of IPRs before The United States Patent Office Trial and Appeal Board

Client: GOOGLE LLC Petitioner

Adverse Party: HAMMON DEVELOPMENT INTERNATIONAL, INC. Patent owner

In the matter of: PTAB CASES IPR2020-00020 and IPR2020-00080

U.S. Patent No. 9,264,483 and U.S. Patent No. 10,264,032

- Provided expert reports and deposition testimony on invalidity and trial testimony retained by DISH Network L.L.C. and EchoStar Technologies L.L.C. as a technical expert in the case captioned below:

THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF UTAH
Case No. 2:14-cv-00191-DN

In the Matter of United States Patent Numbers 7,577,970; 7,526,784;
7,543,318; and 6,898,799

Plaintiffs: ClearPlay, Inc.,

Defendants: DISH Network L.L.C. and EchoStar Technologies L.L.C

- Provided expert declarations and deposition testimony as a technical expert in support of IPRs before The United States Patent Office Trial and Appeal Board

Client: TCT MOBILE (US) INC. & TCT MOBILE, INC. Petitioners,

Adverse Party: WIRELESS PROTOCOL INNOVATIONS, INC. Patent Owner

In the matter of U.S. Patent No. 8,274,991 PTAB Case IPR2016-01494

- Provided expert report, deposition testimony, and trial testimony as a technical expert retained by Samsung in the case captioned below:

The United States International Trade Commission

Investigation No. 337-TA-1170

In the Matter of CERTAIN MOBILE DEVICES WITH MULTIFUNCTION
EMULATORS

Complainants: DYNAMICS INC

Respondents: SAMSUNG ELECTRONICS CO. LTD

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

- Provided expert report, deposition testimony, and testified at ITC hearing as technical expert, retained by ONE WORLD in the case captioned below:

The United States International Trade Commission

Investigation No. 337-TA-1016 (Modification Proceeding)

In the Matter of—CERTAIN ACCESS CONTROL SYSTEMS AND
COMPONENTS THEREOF

Complainants: THE CHAMBERLAIN GROUP, INC
Respondents: ONE WORLD TECHNOLOGIES, INC. D/B/A
TECHTRONIC INDUSTRIES POWER EQUIPMENT.

- Provided hearing testimony before The U.S. Court of International Trade on behalf of ONE WORLD TECHNOLOGIES relative to U.S. PATENT NO. 7,161,319 in the matter captioned below:

Court No. 18-00200

ONE WORLD TECHNOLOGIES, INC., :Plaintiff,

v.

UNITED STATES, UNITED STATES :

DEPARTMENT OF HOMELAND SECURITY, :

UNITED STATES CUSTOMS AND BORDER :

PROTECTION, and COMMISSIONER KEVIN K. MCALEENAN, Defendants. :

- Provided declarations in support of IPRs before The United States Patent Office Trial and Appeal Board

Client: SECURUS TECHNOLOGIES, INC.

Adverse Party: GLOBAL TEL*LINK

CORPORATION In the matters of: U.S. PATENT
No. 9,521,250

U.S. PATENT No.
9,307,386

U.S PATENT No.
9,094,500

U.S PATENT No.
8,929,525

U.S PATENT No.
7,248,685

U.S. PATENT No.
9,509,856

- Provided declarations and deposition testimony in support of IPRs before The United States Patent Office Trial and Appeal Board

Client: SECURUS TECHNOLOGIES, INC.

Adverse Party: GLOBAL TEL*LINK

CORPORATION In the matters of: U.S. PATENT
No. 8,855,280 and U.S PATENT No. 8,606,229

- Provided declarations in support of an IPR before The United States Patent Office Trial and Appeal Board

Client: TCT MOBILE (US) INC. & TCT MOBILE, INC

Adverse Party: WIRELESS PROTOCOL INNOVATIONS,
INC. In the matter of: U.S. PATENT NO. 9,125,051

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

- Provided declarations in support of a petition for covered business method review before The United States Patent Office Trial and Appeal Board

Client: COMCAST CABLE COMMUNICATIONS, LLC, Petitioner

Adverse Party: PROMPTU SYSTEMS CORPORATION, Patent Owner.

In the matters of: U.S. Patent RE44,326

U.S. Patent 7,047,196

- Provided declarations and deposition testimony in support of IPRs before The United States Patent Office Trial and Appeal Board

Client: TCT MOBILE (US) INC. & TCT MOBILE, INC

Adverse Party: WIRELESS PROTOCOL INNOVATIONS,

INC. In the matters of: U.S. PATENT NO. 8,565,256

U.S. PATENT NO. 8,274,991

- Provided expert report and testified at ITC hearing as technical expert, retained by ONE WORLD in the case captioned below:

The United States International Trade Commission

Investigation No. 337-TA-1016

In the Matter of—CERTAIN ACCESS CONTROL SYSTEMS AND
COMPONENTS THEREOF

Complainants: THE CHAMBERLAIN GROUP, INC

Respondents: ONE WORLD TECHNOLOGIES, INC. D/B/A
TECHTRONIC INDUSTRIES POWER EQUIPMENT.

- Provided declarations in support of IPRs before The United States Patent Office Trial and Appeal Board

Client: Comcast Cable Communications, LLC, Petitioner

Adverse Party: Adverse Party: OpenTV, Inc., Patent Owner

In the matters of: U.S. Patent 7,028,327

U.S. Patent 6,345,389

- Provided declarations in support of IPRs before The United States Patent Office Trial and Appeal Board

Client: ONE WORLD TECHNOLOGIES, INC. D/B/A

TECHTRONIC INDUSTRIES POWER EQUIPMENT

Adverse Party: THE CHAMBERLAIN GROUP,

INC In the matters of: U.S. PATENT NO.

7,224,275

U.S. PATENT NO.

7,161,319

U.S. PATENT NO.

7,339,336

U.S. PATENT NO.

7,196,611

U.S. PATENT NO.

7,635,966

U.S. PATENT NO.

6,998,977

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

- Provided expert reports and deposition testimony on invalidity, retained by Google as a technical expert in the case captioned below:

In The United States District Court for the District of Delaware
Civil Action No. 13-429-SLR
Plaintiffs: HBAC MATCHMAKER MEDIA,
INC Defendants: GOOGLE INC., et al
In the matter of U.S. PATENT NOS. 5,774,170 AND 6,002,393

- Provided declarations in support of IPRs before The United States Patent Office Trial and Appeal Board in the matter captioned below:

Client: GOOGLE ,INC., Petitioner,
Adverse Party: UNILOC USA,INC.and UNILOC LUXEMBOURG,S.A., Patent
Owner.

In the matters of: U.S.Patent No.7,853,000
U.S.Patent No.7,804,948
U.S.Patent No.8,571,194

- Provided declarations in support of IPRs before The United States Patent Office Trial and Appeal Board

Client: LIVE PERSON, INC., PETITIONER
Adverse Party: 24/7 CUSTOMER, INC. 24/7 CUSTOMER INTERNATIONAL
HOLDINGS, LTD., PATENT OWNER
In the matters of: U.S. Patent 6,798,876
U.S. Patent 7,027,586
U.S. Patent 7,751,552
U.S. Patent 9,077,804

- Provided declarations in support of IPRs before The United States Patent Office Trial and Appeal Board

Client: DTS, Inc. and Phorus, Inc., PETITIONER
Adverse Party: Broadcom Limited and Avago Technologies General IP (Singapore)
Pte. Ltd., PATENT OWNER
In the matter of: U.S. Patent 6,684,060

- Provided expert reports and deposition testimony on invalidity, retained by DirecTV as a technical expert in the case captioned below:

In The United States District Court for the District of Delaware
Civil Action No. 13-432-SLR
Plaintiffs: HBAC MATCHMAKER MEDIA,
INC Defendant : THE DIRECTV GROUP, INC.

- Provided expert report and testified at ITC hearing as technical expert, retained by Samsung in the case captioned below:

The United States International Trade Commission
Investigation No. 337-TA-882
In the Matter of CERTAIN DIGITAL MEDIA DEVICES, INCLUDING
TELEVISIONS, BLU-RAY DISC PLAYERS, HOME THEATER
SYSTEMS, TABLETS AND MOBILE PHONES, COMPONENTS
THEREOF AND ASSOCIATED SOFTWARE

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

Complainants: Black Hills Media, LLC

Respondents: Samsung Electronics Co. Ltd.

- Provided expert reports and deposition testimony on invalidity and rebuttal to infringement, retained by Comcast et al as a technical expert in the case captioned below:

The United States District Court, Eastern District of Texas, Marshall Division
Civil Action No. 2:11-CV-30 (DF)

In the Matter of United States Patent Number 5,563,883

Plaintiffs: C-Cation Technologies, LLC

Defendants: Comcast Corporation, Charter Communications, Inc., cequel
Communications, LLC dba Suddenlink Communications, Cable One, Inc.,
Almega Cable Inc., Longview Cable Television Company, Inc., and
Kilgore Video, Inc

- Provided declaration in support of plaintiff Maxell, LTD's opposition to defendant's motion for judgment on the pleadings under Fed. R. Civ P. 12(c) as a technical expert in the case captioned below:

The United States District Court for the Central District of California
Case No. 2:17-cv-07534-AG-(SSx)

MAXELL, LTD., Plaintiff,

v.

FANDANGO MEDIA, LLC, Defendant.

FANDANGO MEDIA, LLC, Counter-Plaintiff,

v.

MAXELL, LTD., Counter-Defendant.

- Provided expert reports on invalidity and rebuttal to infringement, retained by Apple in the case captioned below:

The United States District Court, Eastern District of Texas, Tyler Division
Civil Action No. 6:10-cv-74-LED-JDL

In the Matter of Certain Digital Set-Top Boxes Components Thereof

Plaintiffs: Smartphone Technologies LLC

Defendants: LG Electronics Inc, LG Electronics USA, Inc, Apple Inc, and AT&T
Mobility LLC

- Provided expert report and presented tutorial at ITC hearing as technical expert, retained by Apple in the case captioned below:

The United States International Trade Commission

Investigation No. 337-TA-808

In the Matter of Certain Electronic Devices with Communication Capabilities,
Components Thereof, and Related Software

Complainants: HTC Corporation

Respondents: Apple Inc

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

- Provided expert report and testified at ITC hearing as technical expert, retained by Cablevision in the case captioned below:

The United States International Trade Commission
Investigation No. 337-TA-712
In the Matter of Certain Digital Set-Top Boxes Components Thereof
Complainants: Verizon Services Corporation and Verizon Communications Inc.
Respondents: Cablevision Systems Corporation

- Provided declarations as a technical expert, retained by Comcast in the case captioned below:

The United States District Court for the Eastern District of Virginia, Norfolk Division
Civil Action No. 2:11 CV 103 RAJ/TEM
Plaintiffs: Bear Creek Technologies, Inc
Defendants: Comcast Corporation et al

- Provided declarations and expert report as technical expert, retained by Active Video in the case captioned below:

The United States District Court for The Eastern District of Virginia, Norfolk Division
Civil Action No. 2:10-cv-248 RAJ/FBS
Plaintiffs: Active Video Networks Inc
Defendants: Verizon Communications Inc., Verizon Services Corp.
Verizon Virginia Inc. and Verizon South Inc.

- Provided expert report and deposition testimony as a technical and industry expert, retained by eleven member joint defense group in the case captioned below:

The United States District Court for The District of Maryland, Southern Division
Civil Action No.8:07-cv-03012-AW (D.Md.)
Plaintiffs: Technology Patents LLC
Defendants: Deutsche Telekom AG et al: AT&T Mobility LLC, Microsoft Corporation, Yahoo! Inc., Sprint Nextel Corporation, Motorola, Inc., Palm, Inc., Samsung Electronics Co., LTD., Samsung Telecommunications America LLP, LG Electronics Mobilecomm U.S.A., Inc., Helio, LLC, Clickatell (PTY) LTD., Cellco Partnership (d/b/a Verizon Wireless), and T-Mobile USA, Inc.)

- Provided declarations as a technical expert, retained by BigBand Networks in the case captioned below:

The United States District Court for The District of Delaware
Civil Action No. 07-351 (JJF) Plaintiffs:
BigBand Networks, Inc. Defendants:
Imagine Communications, Inc.

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

- Provided declarations as a technical expert, retained by Romek Figa in the case captioned below:
The United States District Court for The District of Massachusetts
Civil Action No. 08-cv-10304-NG
Plaintiffs: Romek Figa d/b/a Abraham & Son
Defendants: Apple Inc
- Provided declarations as a technical and industry expert, retained by ODS Technologies in the case captioned below:
The United States District Court Central District of California, Western Division
Civil Action No. CV 07-03265 DDP (RCx)
Plaintiffs: ODS Technologies, L.P., d/b/a TVG Network, and ODS Properties, Inc
Defendants: Magna Entertainment Corporation; HRTV, LLC., ; and Xpressbet, Inc
- Provided expert report and declarations as a technical and industry expert, retained by Motorola in the case captioned below:
The United States District Court for the District of Delaware
Civil Action No. 07-752-GMS
Plaintiffs and Counter-Defendants: Motorola, Inc., ET AL
Defendants and Counter-Plaintiffs: Rembrandt Technologies, LP, ET AL
- Provided expert report and deposition testimony as a technical and industry expert, retained by Amino Communications in the case captioned below:
The United States District Court, Central District of California
Civil Action No. CV-07-1829
Plaintiffs: Amino Communications, LLC
Defendants: Guest-Tek Interactive Entertainment, LTD, Guest-Tek Inc, and
DOES 1 through 10
- Provided expert report and deposition testimony as a liability industry expert, retained by JTMD and Ascion in the case captioned below:
The United States District Court, District of Massachusetts
Civil Action No. 07-CV-10207-RGS
Plaintiffs: L& P Property Management Company and Legget & Platt Incorporated
Defendant: JTMD, LLC d/b/a Reverie, and Ascion, LLC
- Provided deposition testimony as an liability expert, retained by National Semiconductor in the case captioned below:
The Superior Court of California, County of Santa Clara
Civil Action No. 1 -02-CV8 1 0872
Plaintiff: Itech Group, Inc.
Defendant: National Semiconductor Corporation
- Provided expert report, deposition, and trial testimony as a liability technical expert, retained by Charter Communications in the case captioned below:
The United States District Court, Eastern District of Texas, Marshall Division
Civil Action No. 2-05-CV-436
Plaintiff: Hybrid Patents Incorporated
Defendant: Charter Communications, Inc.

Stuart J. Lipoff
Litigation Support Projects as a Disclosed Expert
Current as of January 2025

- Provided expert report and deposition testimony as a liability industry expert, retained by Lutron in the case captioned below:

The United States District Court, District of Utah
Case No. 2:03-CV-00488TC
Plaintiff-Counter defendant: Vantage Controls, Inc.
Defendant-Counter plaintiff: Lutron Electronics Co., Inc.

- Provided expert report and trial and deposition testimony as a liability industry expert, retained by Telewizja Polska in the case captioned below:

The United States District Court, Illinois, Eastern Division
Civil Action No. 02-C-3293
Plaintiffs: Telewizja Polska USA
Defendant: EchoStar Satellite

- Provided expert report and deposition testimony as a liability technical expert, retained by Broadcom in the case captioned below:

The United States District Court, Eastern District of Texas, Sherman Division
Civil Action No. 4:03CV159
Plaintiffs: Broadcom Corporation
Defendant: Microtune (Texas), L.P.

- Provided expert report, deposition testimony and trial testimony as a damages expert, retained by IPPV and MAAST in the case captioned below:

The United States District Court For the District of Delaware
Civil Action No. 99-577-RRM
Plaintiffs: IPPV Enterprises, LLC and MAAST, Inc.
Defendant: EchoStar Communications Corp

- Provide expert report and deposition testimony as a damages expert, retained by the TVJCOM in the case captioned below:

The United States District Court For the Middle District of Florida.
Case No. 3:00-CV-1045-5-2 1 A
Plaintiffs: TVJCOM International, Inc.
Defendants: Mediaone of Greater Florida, Inc., Canal Plus Technologies, S.A.,
Canal Plus U.S. Technologies, Inc., and Societe Europeene de Controle D'Acces

- Provided expert report and deposition testimony as a liability expert, retained by Sony in the case captioned below:

The United States District Court for the Eastern District of New York
Civil Action No. 92-01 28-ARR (Consolidated), Civil Action No. 91 -5056-ARR
Plaintiffs: Loral Fairchild Corporation
Defendants: Sony Company of Japan, LTD.

- Provided expert report and deposition testimony as a liability expert, retained by General Instrument in the case captioned below:

The United States District Court for the Eastern District of Pennsylvania
General Instrument Corporation v. Scientific-Atlanta, Inc.
Civil Action No. 91 -6923
Plaintiffs: General Instrument Corporation
Defendants: Scientific-Atlanta, Inc.