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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

Attorney Docket No.	U.S. Application No. (if known, see 37 CFR 1.5)
95-1008	TBA

International Application No.	International Filing Date	Priority Date Claimed
PCT/CN2012/072633	March 20, 2012	April 13, 2011

Title of Invention
DPOE SYSTEN AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON

First Named Inventor
ZANG, Meiyan

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. ☑ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). NOTE: The express request under 35 U.S.C. 371(f) will not be effective unless the requirements under 35 U.S.C. 371(c)(1), (2), and (4) for payment of the basic national fee, copy of the International Application and English translation thereof (if required), and the oath or declaration of the inventor(s) have been received.
2. ☑ A copy of the International Application (35 U.S.C. 371(c)(2)) is attached hereto (not required if the International Application was previously communicated by the International Bureau or was filed in the United States Receiving Office (RO/US)).
3. An English language translation of the International Application (35 U.S.C. 371(c)(2))
   a. ☑ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
4. An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4))
   a. ☑ is attached.
   b. ☐ was previously filed in the international phase under PCT Rule 4.17(iv).

Items 5 to 8 below concern amendments made in the international phase.

PCT Article 19 and 34 amendments

5. ☐ Amendments to the claims under PCT Article 19 are attached (not required if communicated by the International Bureau) (35 U.S.C. 371(c)(3)).
6. ☐ English translation of the PCT Article 19 amendment is attached (35 U.S.C. 371(c)(3)).
7. ☐ English translation of annexes (Article 19 and/or 34 amendments only) of the International Preliminary Examination Report is attached (35 U.S.C. 371(c)(5)).

Cancellation of amendments made in the international phase

8a. ☐ Do not enter the amendment made in the international phase under PCT Article 19.

8b. ☐ Do not enter the amendment made in the international phase under PCT Article 34.

NOTE: A proper amendment made in English under Article 19 or 34 will be entered in the U.S. national phase application absent a clear instruction from applicant not to enter the amendment(s).

The following items 9 to 17 concern a document(s) or information included.

9. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
10. ☑ A preliminary amendment.
11. ☑ An Application Data Sheet under 37 CFR 1.76.
12. ☐ A substitute specification. NOTE: A substitute specification cannot include claims. See 37 CFR 1.125(b).
13. ☐ A power of attorney and/or change of address letter.
14. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.3 and 37 CFR 1.821-1.825.
15. ☑ Assignment papers *(cover sheet and document(s))*. Name of Assignee: ZTE CORPORATION, ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen City, Guangdong Province 518057, P.R. China
16. ☐ 37 CFR 3.73(c) Statement *(when there is an Assignee)*.

This collection of information is required by 37 CFR 1.414 and 1.491-1.492. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggesti
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FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Bo

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

U.S. APPLN. No. (if known – see 37 CFR 1.5)	INTERNATIONAL APPLICATION No.	ATTORNEY DOCKET No.
TBA	PCT/CN2012/072633	95-1008

17. ☐ Other items or information:

The following fees have been submitted.	CALCULATIONS	PTO USE ONLY
18. ☑ Basic national fee (37 CFR 1.492(a)) **$280**	$ 280.00	
19. ☑ Examination fee (37 CFR 1.492(c)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... **$0** All other situations **$720**	720.00 $	
20. ☑ Search fee (37 CFR 1.492(b)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... **$0** Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority ..... **$120** International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB ..... **$480** All other situations **$600**	480.00 $	
TOTAL OF 18, 19, and 20 =	$ 1,480.00	
☐ Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing in compliance with 37 CFR 1.821(c) or (e) in an electronic medium or computer program listing in an electronic medium) (37 CFR 1.492(j)). Fee for each additional 50 sheets of paper or fraction thereof **$400**		

Total Sheets	Extra Sheets	Number of each addition 50 or fraction thereof (round **up** to a whole number)	RATE	
- 100 =	/ 50 =		x **$400**	$

Surcharge of **$140.00** for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1.492(h)).	$	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	13 - 20 =		x **$80**	$	
Independent claims	3 - 3 =		x **$420**	$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ **$780**	$	
Processing fee of **$140.00** for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i)). +				$	
TOTAL OF ABOVE CALCULATIONS =				$	
☐ **Applicant asserts small entity status.** See 37 CFR 1.27. Fees above are reduced by ½.					
☐ **Applicant certifies micro entity status.** See 37 CFR 1.29. Fees above are reduced by ¾. Applicant must attach form PTO/SB/15A or B or equivalent.					
TOTAL NATIONAL FEE =				$ 1,900.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property. +				$	
TOTAL FEES ENCLOSED =				$ 1,900.00	
				Amount to be refunded:	$
				Amount to be charged:	$

a. ☐ A check in the amount of $_____ to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees.

c. ☑ The Director is hereby authorized to charge additional fees which may be required, or credit any overpayment, to Deposit Account No. 502846 as follows:

i. ☑ any required fee.

ii. ☐ any required fee except for excess claims fees required under 37 CFR 1.492(d) and (e) and multiple dependent claim fee required under 37 CFR 1.492(f).

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Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File)Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013, and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: A U.S. national stage application may not claim priority to the international application of which it is the national phase. The filing date of a U.S. national stage application is the international filing date. See 35 U.S.C. 363.

Correspondence Address

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Country		Telephone			
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Signature	/Patricia E. Hong/	Date	October 3, 2013
Name (Print/Type)	Patricia E. Hong	Registration No. (Attorney/Agent)	34,373

(12) 按照专利合作条约所公布的国际申请

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(81) 指定国 (除另有指明, 要求每一种可提供的国家保护): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW。

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[见续页]

(54) Title: DPOE SYSTEM AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON

(54) 发明名称 : 一种 DPOE 系统及基于该系统业务自动配置方法和网络

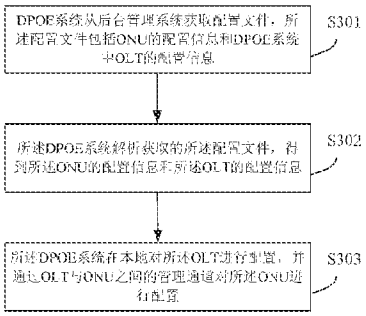


图 3 / Fig. 3

S301 A DPOE SYSTEM ACQUIRING A CONFIGURATION FILE FROM THE BACKGROUND MANAGEMENT SYSTEM, THE CONFIGURATION FILE COMPRISING THE CONFIGURATION INFORMATION OF THE ONU AND THE CONFIGURATION INFORMATION OF AN OLT IN THE DPOE SYSTEM
S302 THE DPOE SYSTEM PARSING THE ACQUIRED CONFIGURATION FILE, OBTAINING THE CONFIGURATION INFORMATION OF THE ONU AND THE CONFIGURATION INFORMATION OF THE OLT
S303 THE DPOE SYSTEM CONFIGURING THE OLT LOCALLY AND CONFIGURING THE ONU VIA A MANAGEMENT CHANNEL BETWEEN THE OLT AND THE ONU

(57) Abstract: A DPOE system and a service auto-configuration method and network based thereon, the DPOE system comprising an acquisition unit, an parsing unit and a configuration unit; the service auto-configuration network based on the system comprising a DPOE system, a background management system and an optical network unit (ONU); the service auto-configuration method based on the system comprising: the DPOE system acquiring a configuration file from the background management system, the configuration file comprising the configuration information of the ONU and the configuration information of an OLT in the DPOE system; the DPOE system parsing the configuration file, obtaining the configuration information of the ONU and the configuration information of the OLT; configuring the OLT locally and configuring the ONU via a management channel between the OLT and the ONU; thus the service can be activated without separately configuring the OLT after completing the initialization process of the ONU.

(57) 摘要: DPOE 系统以及基于该系统业务自动配置的方法及网络, 其中 DPOE 系统包括获取单元、解析单元和配置单元;基于该系统业务自动配置的网络包括 DPOE 系统、后台管理系统以及光网络单元(ONU), 基于该系统业务自动配置的方法包括: DPOE 系统从后台管理系统获取配置文件, 所述配置文件包括 ONU 的配置信息和 DPOE 系统中 OLT 的配置信息; 所述 DPOE 系统解析所述配置文件, 得到 ONU 的配置信息和 OLT 的配置信息, 在本地对所述 OLT 进行配置, 并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。从而在 ONU 的初始化过程完成后, 不需要对 OLT 单独另行进行配置, 即可使业务进行开通。

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IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)。

根据细则 4.17 的声明:

---- 关于申请人有权申请并被授予专利(细则 4.17(ii))

---- 发明人资格(细则 4.17(iv))

本国际公布:

---- 包括国际检索报告(条约第 21 条(3))。

一种 DPOE 系统及基于该系统业务自动配置方法和网络

技术领域

本发明涉及通信领域，具体涉及一种无源光网络（Passive Optical Network，简称 PON），特别是基于有线传输数据业务接口规范（Data over Cable Service Interface System，DOCSIS）后台管理系统的以太网无源光网络系统的业务自动配置方法。

背景技术

基于 DOCSIS 管理后台的 PON 系统，以 DPOE（基于 DOCSIS 管理后台的以太网无源光网络）网络为例，图 1 是 DPOE 网络的拓扑结构图，该网络由包含 TFTP（Trivial File Transfer Protocol，简单文件传送协议）服务器的后台管理系统，包含 vCM(虚拟同轴电缆调制解调器)、OLT(Optical Line Terminal，光线路终端)以及其他设备的 DPOE 系统，DPOE ONU(Optical Network Unit，光网络单元)以及连接在 ONU 上的 CPE(Customer Premise Equipment，用户终端设备)终端组成。ONU 发起注册的过程是模拟同轴调整解调器的初始化过程，由 vCM 发起，并从 TFTP 服务器获取配置文件，DPOE 系统再把获取的配置文件的配置信息配置通过管理通道发送给 ONU。

如图 2 所示，目前的 ONU 的数据配置过程主要是通过如下过程完成：

S201：ONU 上电，开始初始化过程；

S202：ONU 和 DPOE 系统完成 PON 层的初始化过程；

S203：DPOE 系统对 ONU 进行认证，认证通过，完成注册；

S204 ~S205：DPOE 系统中的 vCM 会发起根据 DOCSIS 3.0 规范中规定的初始化过程，向后台管理系统发送 TFTP 请求，从后台管理系统的 TFTP 服务器上下载配置文件；

S206 ~S207：经过相关处理后，然后再通过相应的配置管理通道，配置到相关的 ONU 上，配置文件中包含运营商为 ONU 上连接的用户提供的服务属性和参数；

S208：对 ONU 完成数据配置后，ONU 通知 DPOE 系统，整个 ONU 的注册过程结束。

但是完成对 ONU 的配置，要使 ONU 上的业务正常运行，还需要对 OLT 进行相应的配置。一般情况下，对 OLT 的配置需要单独通过手工进行配置，或者通过命令行，或者通过网元管理系统（Element Management System，EMS）和 OLT 之间的简单网络管理协议（Simple Network Management Protocol，SNMP）接口进行。

对应企业用户开通业务，一般需要大量的对 DPOE 系统的 OLT 的配置，完成业务的开通，所以对于开通这些业务的 ONU，需要同时配置 OLT 的相关参数。

例如，一般针对以太网虚拟专网（Ethernet Virtual Private LAN，EVP-LAN）业务的正常开通，需要在 OLT 和 ONU 进行如虚拟局域网（Virtual Local Area Network，VLAN）的相关配置，包括

在 ONU 上需要进行的配置为：

1、ONU 上标识端口 UNI 上运行的具体业务的 VLAN;

2、ONU 上标识 UNI 端口的相应业务对应的逻辑链路标记（Logical Link Identifier，LLID）/通用封装方法（Generic Encapsulation Method，GEM ）端口标识 PORT ID。

DPOE 系统的 OLT:

1、DPOE 系统的 OLT 上（PON 线卡）与 UNI 端口上运行的具体业务关联的 LLID/GEM PORT ID;

2、DPOE 系统的 OLT PON 线卡上针对 ONU 上端口 UNI 上运行的具体业务使用的 VLAN;

3、DPOE 系统的 OLT 业务处理板上标识 ONU 上 UNI 端口上运行的具体业务对应的 VLAN;

4、DPOE 系统的 OLT 业务处理板上与 ONU UNI 端口上运行的具体业务关联的多协议标签交换（Multi-Protocol Label Switching，MPLS）实例;

5、DPOE 系统的 OLT 上与 ONU UNI 端口上运行的具体业务关联的 MPLS 伪线标识;

6、DPOE 系统的 OLT 启动 MPLS 协议;

7、DPOE 系统的 OLT 上对应 ONU 上 UNI 端口上运行的具体业务，对应的上联口的 VLAN 标识。

由此可见，运行该业务，需要在 DPOE 系统的 OLT 上进行的相应多次配置，比较复杂，这种分别配置 ONU 和 OLT 的方式，在配置效率上不高。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，更会影响整个系统的配置效率。

发明内容

本发明需要解决的技术问题是提供一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统以及基于该系统业务自动配置的方法及网络，以使 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通，以提高整个系统的配置效率。

为了解决上述技术问题，本发明提供了一种基于 DOCSIS 管理后台的无源光网络（DPOE）系统业务自动配置的方法，包括:

DPOE 系统从后台管理系统获取配置文件，该配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息;

DPOE 系统解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息;

DPOE 系统在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

优选地，OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

优选地，ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种;

OLT 的配置信息包括与 ONU 开通的业务相关的 OLT 的 VLAN、用户端

口和用户 MAC 地址中的一种或多种。

优选地，DPOE 系统解析获取的配置文件时，还将 ONU 的配置信息转换为 ONU 可以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

优选地，方法是在 ONU 初始化过程中执行的。

此外，为了解决上述技术问题，本发明还提供了一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统，包括获取单元、解析单元和配置单元；其中，

获取单元设置为：从后台管理系统获取配置文件，该配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中 OLT 的配置信息；

解析单元设置为：解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息；

配置单元设置为：在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

优选地，解析单元还设置为：解析获取的配置文件时，将 ONU 的配置信息转换为 ONU 可以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

此外，为了解决上述技术问题，本发明还提供了一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统业务自动配置的网络，包括 DPOE 系统、后台管理系统以及光网络单元(ONU)，其中，

DPOE 系统采用如上面所述的 DPOE 系统；

后台管理系统设置为：保存配置文件，并将配置文件下载到 DPOE 系统中， 该配置文件包括 ONU 的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息。

优选地，后台管理系统包括简单文件传送协议（TFTP）服务器，设置为：接收 DPOE 系统发起的 TFTP 请求，并响应该 TFTP 请求，将配置文件下载到 DPOE 系统中。

优选地，OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

优选地，ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种；

OLT 的配置信息包括与 ONU 开通的业务相关的 OLT 的 VLAN、用户端口和用户 MAC 地址中的一种或多种。

本发明实施例提供的 DPOE 系统以及基于该系统业务自动配置的方法及网络，通过一个包括有 ONU 配置信息和 DPOE 系统中 OLT 配置信息的配置文件，同时完成 OLT 和 ONU 的自动化配置，在 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，可以非常好地提高整个系统的配置效率。

附图概述

图 1 为 DPOE 网络的拓扑结构图；

图 2 为常规 ONU 数据配置流程图；

图 3 为本发明实施例 DPOE 系统业务自动配置的方法流程图；

图 4 为本发明实施例的 OLT 和 ONU 的自动配置的流程图。

本发明的较佳实施方式

为使本发明的目的、技术方案和优点更加清楚明白，下文中将结合附图对本发明的实施例进行详细说明。需要说明的是，在不冲突的情况下，本申请中的实施例及实施例中的特征可以相互任意组合。

如图 3 所示，本发明实施例提供了一种 DPOE 系统业务自动配置的方法，包括以下步骤：

S301：DPOE 系统从后台管理系统获取配置文件，配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息；

在ONU初始化过程中，DPOE系统中的vCM(虚拟同轴电缆调制解调器)向后台管理系统发起TFTP请求，DPOE系统从该后台管理系统获取配置文件，配置文件中包含了增加了的针对DPOE系统的OLT的配置信息，OLT的配置信息是和ONU开通的业务相关的配置信息，这样DPOE系统获取的配置文件包括配置ONU和OLT的配置信息。

S302：DPOE系统解析获取的配置文件，得到ONU的配置信息和OLT的配置信息；

DPOE系统解析获取的配置文件时，还将ONU的配置信息转换为ONU可以识别的消息格式，将OLT的配置信息转换为OLT可以识别的消息格式。

S303：DPOE系统在本地对OLT进行配置，并通过OLT与ONU之间的管理通道对ONU进行配置。

DPOE系统获取配置文件后解析配置文件，并区分配置ONU和OLT的配置信息，在本地对OLT进行配置，配置ONU的信息通过DPOE系统和ONU之间的管理通道进行传递，并配置ONU的相关参数。管理通道可以包括GPON的OMCI通道或EPON系统的扩展OAM。

对应企业用户开通业务，一般开通的业务包括但不限于基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务和基于以太网的局域网（E-LAN）业务。需要大量的对DPOE系统的OLT的配置，完成业务的开通，所以对于开通这些业务的ONU，需要同时配置OLT的相关参数，比如VLAN、用户端口和用户媒体访问控制（Medium Access Control，MAC）地址等信息。

相应地，本发明实施例还提供了一种DPOE系统，包括获取单元、解析单元、配置单元，其中，

获取单元，用于从后台管理系统获取配置文件，该配置文件包括光网络单元(ONU)的配置信息和DPOE系统中光线路终端(OLT)的配置信息；

解析单元，用于解析获取的配置文件，得到ONU的配置信息和OLT的配置信息；

解析单元解析获取的配置文件时，还将ONU的配置信息转换为ONU可

以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

配置单元，用于在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

在一个应用示例中，DPOE 系统的 Vcm 可以实现上述获取单元、解析单元和配置单元的相应功能。

在具体实施时，Vcm 可以作为单独的功能实体，也可以集成在 OLT 上成为 OLT 的一部分。

相应地，本发明实施例还提供了一种 DPOE 系统业务自动配置的网络，包括 DPOE 系统、后台管理系统以及光网络单元 ONU，其中，

DPOE 系统可以采用上面提供的 DPOE 系统；

后台管理系统，用于保存配置文件，并将配置文件下载到 DPOE 系统中，该配置文件包括 ONU 的配置信息和 DPOE 系统中 OLT 的配置信息。

该后台管理系统包括 TFTP 服务器，TFTP 服务器用于接收 DPOE 系统发起的 TFTP 请求，并响应该 TFTP 请求，把配置文件下载到 DPOE 系统中。

其中 OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

ONU 开通的业务包括 E-LINE 业务、E-TREE 业务和 E-LAN 业务中的一种或多种；

OLT 的配置信息包括与 ONU 开通的业务相关的 OLT 的 VLAN、用户端口和用户 MAC 地址中的一种或多种。

在一个应用示例中，如图 4 所示，在 ONU 上电注册的过程中，同时完成对 ONU 和 DPOE 系统的 OLT 进行配置的过程为：

S401：ONU 上电，开始初始化过程；

S402：ONU 和 DPOE 系统完成 PON 层的初始化过程；

S403：DPOE 系统对 ONU 进行认证，认证通过；

S404：vCM 向后台管理系统的动态主机配置协议（Dynamic Host Configuration Protocol，DHCP）服务器起 DHCP 请求；

S405：后台管理系统的 DHCP 服务器针对 DHCP 请求进行响应，给 vCM

分配 IP 地址;

S406: vCM 向后台管理系统的 TFTP 服务器发起 TFTP 请求，请求获取该 vCM 对应的 ONU 的配置数据文件;

S407: 后台管理系统的 TFTP 服务器响应 vCM 发起的 TFTP 请求，把该 vCM 对应的 ONU 的配置文件下载到 DPOE 系统中;

S408：对上述配置文件进行分析处理，该配置文件中包含有针对 EVP-LAN 业务自动运行需要针对 DPOE 系统的 OLT 进行配置的 TLV，比如：在 OLT 上增加针对 ONU 上端口 UNI1 运行的业务 V1 进行标识的 VLAN 为 V2，该 TLV 为现有 DOCSIS3.0 标准中新增加的 TLV，该 TLV 的格式如表 1 所示如下:

表 1: DOCSIS3.0 标准中新增加的 TLV 的格式

长度 (octets)	字段(name)		取值 (hex)	备注（Notes）
1	Type(类型)		0x02	DPOE 系统的 OLT 上标识某业务对应的 VLAN 标识
1	长度（Length）		可变	11+N
6	取值（Value）	ONU 标识	可变（varies）	ONU 的 MAC 地址标识
1		ONU 端口号	可变（varies）	
2		ONU 上运行的业务对应的 VLAN 标识	可变（varies）	
2		OLT 上对 ONU 某 UNI 端口运行的某业务的 VLAN 标识	可变 (varies)	
N		自定义字段（Vendor-specific field）	可变（varies）	

再如：配置 OLT 上与 ONU 端口 UNI1 上运行的业务 V1 关联的 MPLS 伪线标识 PW1，该 TLV 可如表 2 所示如下：

表 2：DOCSIS3.0 标准中新增加的 TLV 的格式

长度 (octets)	字段(name)		取值 (hex)	备注（Notes）
1	Type(类型)		0x05	OLT 上标识某业务对应的 MPLS 的 PW 的标识
1	长度（Length）		可变	13+N
6	取值（Value）	ONU 标识	可变（varies）	ONU 的 MAC 地址标识
1		ONU 端口号	可变（varies）	
2		ONU 上运行的业务对应的 VLAN 标识	可变（varies）	
4		OLT 上对 ONU 某 UNI 端口运行的某业务的 PW 标识	可变 (varies)	
N		自定义字段（Vendor-specific field）	可变（varies）	

S409：经过步骤 S408 的分析处理，把配置文件中的基于 DOCSIS 的 TLV 分别转换为 ONU 和 OLT 可以识别的消息格式。DPOE 系统会识别哪些配置消息针对 OLT，哪些配置消息针对 ONU。比如，DPOE 系统可以根据 type 字段的内容自动识别 OLT 的配置数据以及 ONU 的配置数据，如果是针对 OLT 进行配置的，则使配置消息在 OLT 本地生效，如果是针对 ONU 进行配置的数据，则进行步骤 S410。

S410：OLT 把针对 ONU 进行配置的数据通过 OLT 和 ONU 之间的管理通道，比如扩展 OAM、OMCI，把相关数据配置到 ONU 上。

S411：对 ONU 完成数据配置后，ONU 通知 DPOE 系统，整个 ONU 的注册过程结束

此时，即可开通 ONU 上 UNI1 连接的用户的 EVP-LAN 业务，而不再需要其他额外配置。

从上述实施例可以看出，相对于现有技术，本发明在配置文件中增加了针对 DPOE 系统的 OLT 的配置信息，同时完成对 OLT 和 ONU 进行自动化配置，在 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，可以非常好地提高整个系统的配置效率。

以上，仅是本发明的最佳实施例而已，并非用于本发明的保护范围。凡在本发明的精神和原则之内，所做的任何修改都应包含在本发明的保护范围之内。

工业实用性

本发明实施例提供的 DPOE 系统以及基于该系统业务自动配置的方法及网络，通过一个包括有 ONU 配置信息和 DPOE 系统中 OLT 配置信息的配置文件，同时完成 OLT 和 ONU 的自动化配置，在 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，可以非常好地提高整个系统的配置效率。

权 利 要 求 书

1、 一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统业务自动配置的方法，包括:

所述 DPOE 系统从后台管理系统获取配置文件，所述配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息;

所述 DPOE 系统解析获取的所述配置文件，得到所述 ONU 的配置信息和所述 OLT 的配置信息;

所述 DPOE 系统在本地对所述 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对所述 ONU 进行配置。

2、 如权利要求 1 所述的方法，其中，

所述 OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

3、 如权利要求 2 所述的方法，其中，

所述 ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种;

所述 OLT 的配置信息包括与所述 ONU 开通的业务相关的 OLT 的虚拟局域网（VLAN）、用户端口和用户媒体访问控制（MAC）地址中的一种或多种。

4、 如权利要求 1 所述的方法，其中，

所述 DPOE 系统解析获取的所述配置文件时，还将所述 ONU 的配置信息转换为 ONU 可以识别的消息格式，将所述 OLT 的配置信息转换为 OLT 可以识别的消息格式。

5、 如权利要求 1 所述的方法，其中，

所述方法是在 ONU 初始化过程中执行的。

6、 一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统，包

括获取单元、解析单元和配置单元;

所述获取单元设置为：从后台管理系统获取配置文件，所述配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中 OLT 的配置信息;

所述解析单元设置为：解析获取的所述配置文件，得到所述 ONU 的配置信息和所述 OLT 的配置信息;

所述配置单元设置为：在本地对所述 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对所述 ONU 进行配置。

7、 如权利要求 6 所述的系统，其中，

所述解析单元还设置为：解析获取的所述配置文件时，将所述 ONU 的配置信息转换为 ONU 可识别的消息格式，将所述 OLT 的配置信息转换为 OLT 可识别的消息格式。

8、 一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统业务自动配置的网络，包括 DPOE 系统、后台管理系统以及光网络单元(ONU)，其中，

所述 DPOE 系统采用如权利要求 6 或 7 所述的 DPOE 系统;

所述后台管理系统设置为：保存配置文件，并将所述配置文件下载到 DPOE 系统中， 所述配置文件包括 ONU 的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息。

9、 如权利要求 8 所述的网络，其中，

所述后台管理系统包括简单文件传送协议（TFTP）服务器，设置为：接收 DPOE 系统发起的 TFTP 请求，并响应该 TFTP 请求，将所述配置文件下载到 DPOE 系统中。

10、 如权利要求 8 或 9 所述的网络，其中，

所述 OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

11、 如权利要求 10 所述的网络，其中，

所述 ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种；

所述OLT的配置信息包括与所述ONU开通的业务相关的OLT的VLAN、用户端口和用户 MAC 地址中的一种或多种。

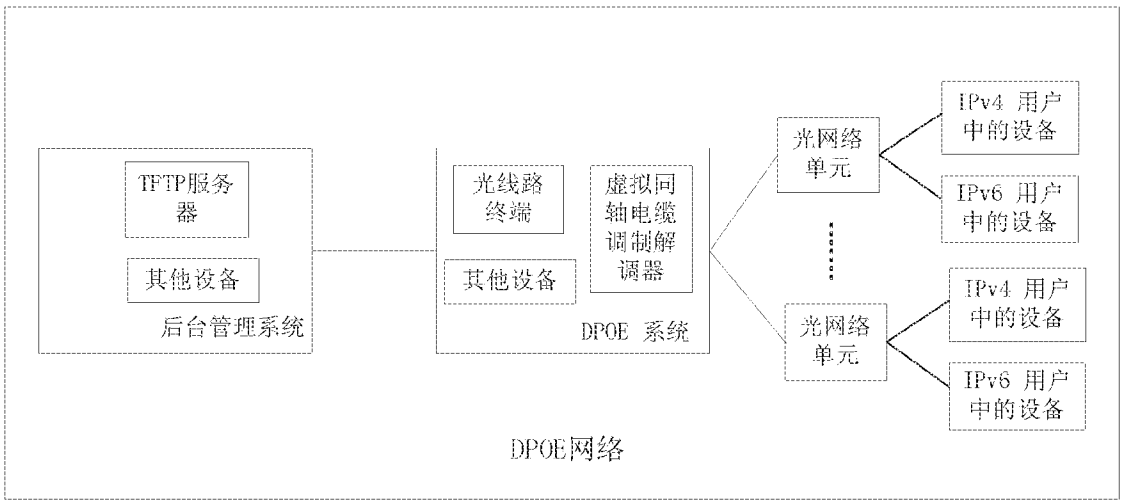

TFTP服务器
其他设备
后台管理系统
光线路终端
其他设备
虚拟同轴电缆调制解调器
DPOE 系统
光网络单元
光网络单元
IPv4 用户中的设备
IPv6 用户中的设备
IPv4 用户中的设备
IPv6 用户中的设备
DPOE网络

图 1

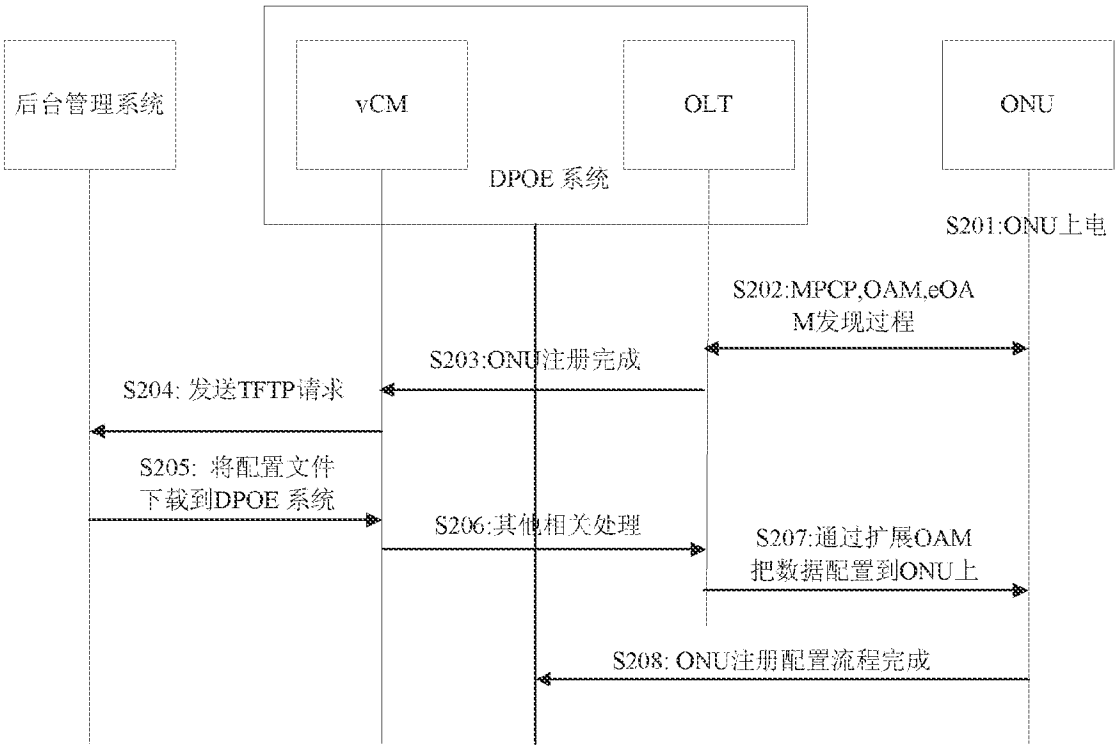

后台管理系统
vCM
OLT
ONU
DPOE 系统
S201:ONU上电
S202:MPCP,OAM,eOAM发现过程
S203:ONU注册完成
S204: 发送TFTP请求
S205: 将配置文件下载到DPOE 系统
S206:其他相关处理
S207:通过扩展OAM把数据配置到ONU上
S208: ONU注册配置流程完成

图 2

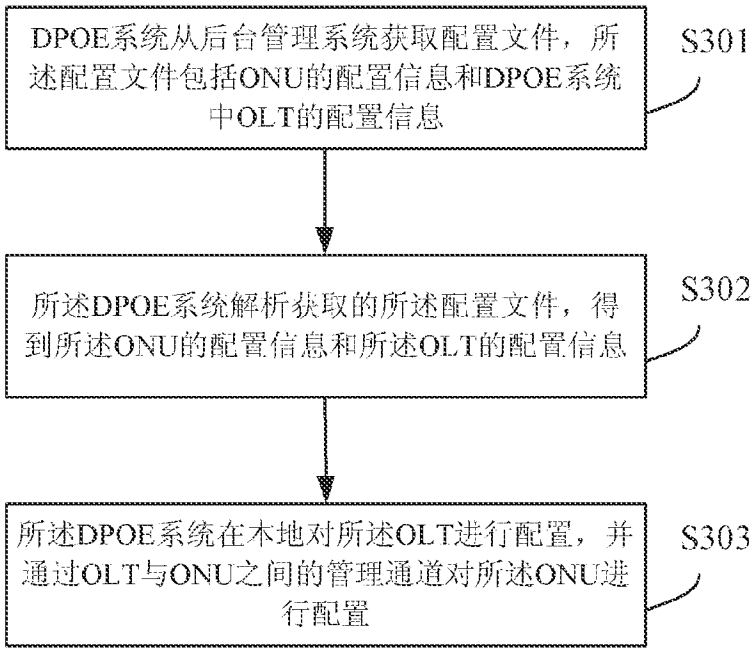

DPOE系统从后台管理系统获取配置文件，所述配置文件包括ONU的配置信息和DPOE系统中OLT的配置信息
S301
所述DPOE系统解析获取的所述配置文件，得到所述ONU的配置信息和所述OLT的配置信息
S302
所述DPOE系统在本地对所述OLT进行配置，并通过OLT与ONU之间的管理通道对所述ONU进行配置
S303

图 3

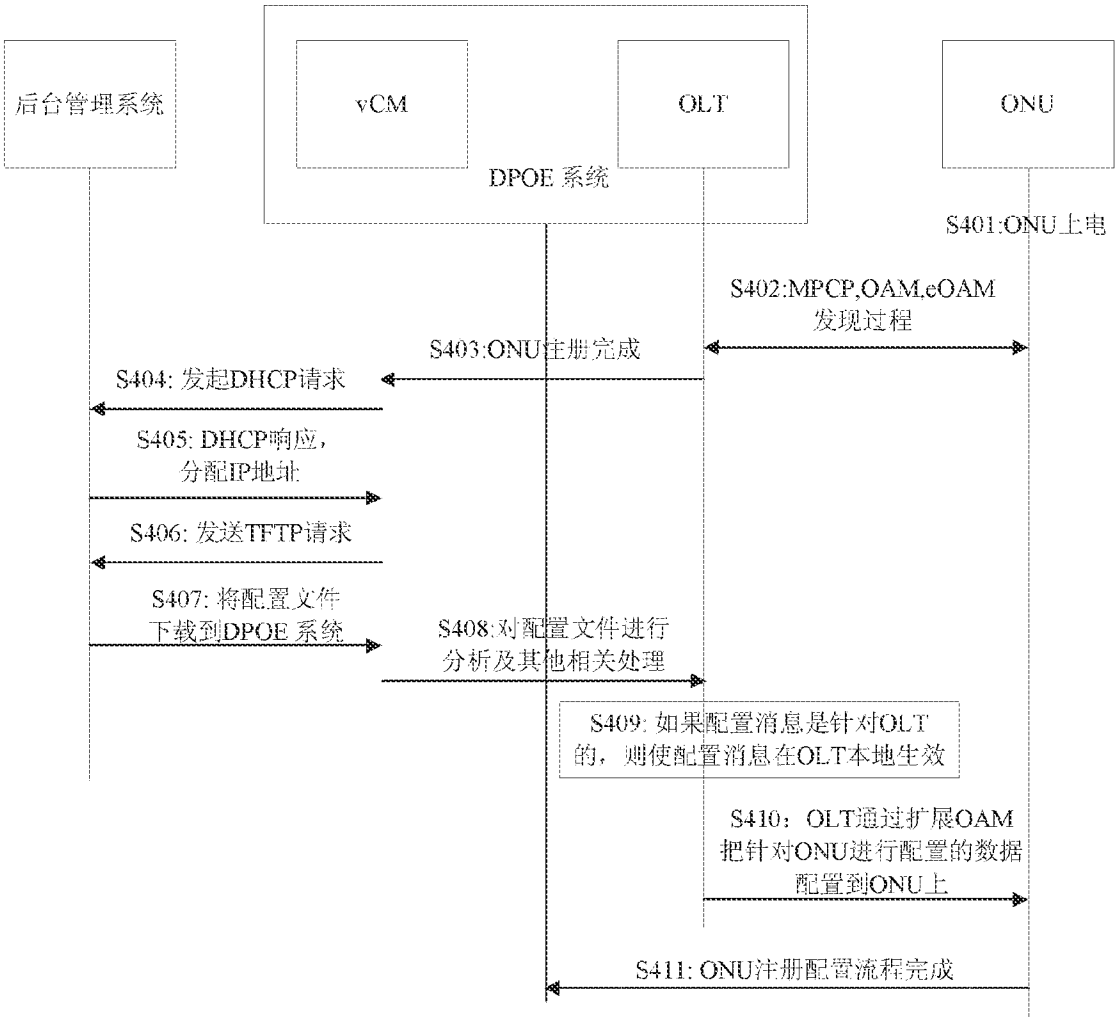

后台管理系统
vCM
OLT
ONU
DPOE 系统
S401:ONU上电
S402:MPCP,OAM,eOAM
发现过程
S403:ONU注册完成
S404: 发起DHCP请求
S405: DHCP响应，
分配IP地址
S406: 发送TFTP请求
S407: 将配置文件
下载到DPOE 系统
S408:对配置文件进行
分析及其他相关处理
S409: 如果配置消息是针对OLT
的，则使配置消息在OLT本地生效
S410：OLT通过扩展OAM
把针对ONU进行配置的数据
配置到ONU上
S411: ONU注册配置流程完成

图 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/072633

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/24 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H04L, H04Q, H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CPRSABS, CNTXT, CNKI: DOCSIS, backstage, passive, optical network, DPOE, configuration, ONU, OLT, analysis, channel, address, management

VEN: DOCSIS, BACKSTAGE, PASSIVE, OPTICAL W NETWORK?, CONFIGUR+, DOPE, ONU, OLT, ANALYTIC+, CHANNEL?, ADDRESS??, MANAGEMENT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 101997725 A (ZTE CORP.), 30 March 2011 (30.03.2011), abstract, description, paragraphs 16-21, paragraphs 40-42, and paragraphs 56-57, and figure 2	1-11
A	CN 101888575 A (ZTE CORP.), 17 November 2010 (17.11.2010), the whole document	1-11
A	CN 101741712 A (HUAWEI TECHNOLOGIES CO., LTD.), 16 June 2010 (16.06.2010), the whole document	1-11

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 June 2012 (10.06.2012)	**28 June 2012 (28.06.2012)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **FU, Lingxiao** Telephone No.: (86-10) **62411235**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/072633

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 101997725 A	30.03.2011	None	
CN 101888575 A	17.11.2010	WO 2012013042 A1	02.02.2012
CN 101741712 A	16.06.2010	WO 2010057414 A1	27.05.2010

Form PCT/ISA/210 (patent family annex) (July 2009)

国际检索报告

国际申请号
PCT/CN2012/072633

A. 主题的分类

H04L 12/24 (2006.01) i

按照国际专利分类(IPC)或者同时按照国家分类和 IPC 两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

IPC: H04L, H04Q, H04W

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用）)

CPRSABS, CNTXT, CNKI: DOCSIS，后台，无源，光网络，DPOE，配置，ONU，OLT，解析，通道，地址，管理

VEN: DOCSIS, BACKSTAGE, PASSIVE, OPTICAL W NETWORK?, CONFIGUR+, DOPE. ONU, OLT, ANALYTIC+, CHANNEL?, ADDRESS??, MANAGEMENT

C. 相关文件

类　型*	引用文件，必要时，指明相关段落	相关的权利要求
X	CN101997725A（中兴通讯股份有限公司）30.3 月 2011（30.03.2011） 摘要，说明书第 16-21 段，第 40-42 段，第 56-57 段，附图 2	1-11
A	CN101888575A（中兴通讯股份有限公司）17.11 月 2010（17.11.2010） 全文	1-11
A	CN101741712A（华为技术有限公司）16.6 月 2010（16.06.2010） 全文	1-11

☐ 其余文件在 C 栏的续页中列出。　　☒ 见同族专利附件。

* 引用文件的具体类型：

"A" 认为不特别相关的表示了现有技术一般状态的文件

"E" 在国际申请日的当天或之后公布的在先申请或专利

"L" 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件（如具体说明的）

"O" 涉及口头公开、使用、展览或其他方式公开的文件

"P" 公布日先于国际申请日但迟于所要求的优先权日的文件

"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件

"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性

"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性

"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
10.6 月 2012 (10.06.2012)	**28.6 月 2012 (28.06.2012)**
ISA/CN 的名称和邮寄地址： 中华人民共和国国家知识产权局 中国北京市海淀区蓟门桥西土城路 6 号 100088 传真号：　(86-10)62019451	受权官员 付凌霄 电话号码：(86-10) **62411235**

PCT/ISA/210 表(第 2 页) (2009 年 7 月)

国际检索报告

关于同族专利的信息

国际申请号
PCT/CN2012/072633

检索报告中引用的专利文件	公布日期	同族专利	公布日期
CN101997725A	30.03.2011	无	
CN101888575A	17.11.2010	WO2012013042A1	02.02.2012
CN101741712A	16.06.2010	WO2010057414A1	27.05.2010

DPOE System and Service Auto-Configuration Method and Network Based Thereon

Technical Field

The present invention relates to the field of communication, and in particular, to a passive optical network (PON), especially to a service auto-configuration method of an Ethernet passive optical network system based on a data over cable service interface system (DOCSIS) back-office management system.

Background of the Related Art

Regarding a PON system based on a DOCSIS back-office management, taking a DPOE (DOCSIS Provisioning Of EPON) network as an example, FIG. 1 is a topological structure diagram of the DPOE network, and that network is composed of a back-office management system including a Trivial File Transfer Protocol (TFTP) server, a DPOE system including equipments of a virtual coaxial cable modem (vCM), an optical line terminal (OLT) and other equipments, a DPOE optical network unit (ONU) and a customer premise equipment (CPE) terminal connected on the ONU. The process of the ONU initiating a registration simulates an initialization process of the coaxial cable modem, which is initiated by the vCM, and it acquires a configuration file from the TFTP server, and then the DPOE system configures to send configuration information of the acquired configuration file to the ONU through a management channel.

As shown in FIG. 2, a data configuration process of an ONU at present is mainly achieved through the following process:

S201: the ONU is powered up and starts an initialization process;

S202: the ONU and the DPOE system complete the initialization process of a PON layer;

S203: the DPOE system performs an authentication on the ONU, and completes a registration after the authorization is passed;

S204~S205: the vCM in the DPOE system initiates an initialization process specified according to a DOCSIS 3.0 specification, sends a TFTP request to the back-office management

system, and downloads the configuration file from the TFTP server of the back-office management system;

S206~S207: after relevant processing, then the configuration file is configured on the related ONU through the corresponding configuration management channel, wherein the configuration file includes service attributes and parameters which are provided by the operator to users connected to the ONU;

S208: after the data configuration is completed for the ONU, the ONU notifies the DPOE system, and the whole registration process of the ONU ends.

However, after completing the configuration of the ONU, in order to make the service on the ONU operate normally, it will need to perform the corresponding configuration on the OLT. Generally speaking, the configuration on the OLT needs to be performed by hand individually, or performed through a command line, or performed through a simple network management protocol (SNMP) interface between an Element Management System (EMS) and the OLT.

Opening services corresponding to enterprise users generally needs a large number of configurations to the OLT of the DPOE system in order to open the services, so it needs to configure the relevant parameters of the OLT at the same time for the ONU opening these services,.

For example, in general, regarding the normal opening of Ethernet Virtual Private LAN (EVP-LAN) services, the relevant configurations of the Virtual Local Area Network (VLAN) need to be performed at the OLT and the ONU, showing as follows.

The configurations required to be performed at the ONU are:

1, the VLAN identifier of the specific service operated on an UNI port on the ONU; and

2, a Logical Link Identifier (LLID)/Generic Encapsulation Method (GEM) port identifier (PORT ID) corresponding to the relevant service of the UNI port on the ONU.

The configurations on the OLT of the DPOE system are:

1, the LLID/GEM PORT ID used on the OLT (PON line card) of the DPOE system which is associated with the specific service operated on the UNI port;

2, the VLAN used on the OLT PON line card of the DPOE system which is used for the

specific service operated on the port UNI of the ONU;

3, the VLAN used to identified the specific service operated on the UNI port of the ONU which is configured on an OLT service processing board of the DPOE system;

4, a Multi-Protocol Label Switching (MPLS) entity on the OLT service processing board of the DPOE system , which is associated with the specific service operated on the ONU UNI port;

5, an MPLS pseudo line identifier on the OLT of the DPOE system, which is associated with the specific service operated on the ONU UNI port;

6, the OLT of the DPOE system initiating an MPLS protocol;

7, the VLAN identifier of a corresponding uplink port on the OLT of the DPOE system, which corresponds to the specific service operated on the UNI port on the ONU.

Therefore, in order to operate the service, the corresponding numerous configurations which are required to be performed on the OLT of the DPOE system are relative complex, and this way of configuring the ONU and the OLT respectively has low configuration efficiency. Especially, the configuration efficiency of the whole system is affected even more when more complex configurations need to be performed on the OLT correspondingly for the key service operation on the ONU.

Content of the Invention

The technical problem required to be solved by the present invention is to provide a DOCSIS Provisioning Of EPON (DPOE) system and a service auto-configuration method and network based on that system, to make the service be opened without performing further configuration to the OLT individually after the process of the ONU initialization is completed, so as to improve the configuration efficiency of the whole system.

In order to solve the above-mentioned technical problem, the present invention provides a service auto-configuration method of an DOCSIS Provisioning Of EPON (DPOE) system, and the method comprises:

the DPOE system acquiring a configuration file from a back-office management system,

wherein the configuration file comprises configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPOE system;

the DPOE system analyzing the acquired configuration file, and obtaining the configuration information of the ONU and the configuration information of the OLT; and

the DPOE system configuring the OLT locally and configuring the ONU via a management channel between the OLT and the ONU.

Preferably, the configuration information of the OLT is configuration information related to services opened by the ONU.

Preferably, the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and

the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to the services opened by the ONU.

Preferably, when analyzing the acquired configuration file, the DPOE system further converts the configuration information of the ONU into a message format which can be identified by the ONU, and converts the configuration information of the OLT into a message format which can be identified by the OLT.

Preferably, the method is performed in an process of ONU initialization.

In addition, in order to solve the above-mentioned technical problem, the present invention further provides an Ethernet passive optical network based on a DOCSIS Provisioning Of EPON (DPOE) system, and the system comprises an acquisition unit, an analyzing unit and a configuration unit; wherein,

the acquisition unit is configured to acquire a configuration file from a back-office management system, wherein the configuration file comprises configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPOE system;

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

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

Preferably, the analyzing unit is further configured to, when analyzing the acquired configuration file, convert the configuration information of the ONU into a message format which can be identified by the ONU and convert the configuration information of the OLT into a message format which can be identified by the OLT.

In addition, in order to solve the above-mentioned technical problem, the present invention further provides a service auto-configuration network of a DOCSIS Provisioning Of EPON (DPOE) system, and the network comprises a DPOE system, a back-office management system and an optical network unit (ONU); wherein,

the DPOE system adopts the above-mentioned DPOE system; and

the back-office management system is configured to: save the configuration file, and download the configuration file to the DPOE system, wherein the configuration file comprises the configuration information of the ONU and the configuration information of the OLT in the DPOE system.

Preferably, the back-office management system comprises a trivial file transfer protocol (TFTP) server configured to: receive a TFTP request initiated by the DPOE system, respond to that TFTP request, and download the configuration file to the DPOE system.

Preferably, the configuration information of the OLT is configuration information related to services opened by the ONU.

Preferably, the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and

the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT

related to the services opened by the ONU.

The DPOE system and the service auto-configuration method and network based on that system provided by the embodiments of the present invention complete the automatic configuration of the OLT and the ONU at the same time through a configuration file including the configuration information of the ONU and the configuration information of the OLT in the DPOE system; after the process of the ONU initialization is completed, the service can be opened without performing further configuration to the OLT individually. Especially, when more complex configurations are needed to be performed on the OLT correspondingly for the key service operation on the ONU, it can improve the configuration efficiency of the whole system very well.

Brief Description of Drawings

FIG. 1 is a topology structure diagram of a DPOE network;

FIG. 2 is a flow chart of a conventional ONU data configuration;

FIG. 3 is a flow chart of a service auto-configuration method of a DPOE system according to an embodiment of the present invention;

FIG. 4 is a flow chart of auto-configuration of an OLT and an ONU according to an embodiment of the present invention.

Preferred Embodiments of the Present Invention

In order to make the objective, the technical scheme and the advantage of the present invention more clear and understandable, embodiments of the present invention are described in detail in combination with accompanying drawings hereinafter. It should be illustrated that, in the case of not conflicting, the embodiments in the present application and features in these embodiments can be combined with each other at random.

As shown in FIG. 3, an embodiment of the present invention provides a service auto-configuration method of a DPOE system, including the following steps.

S301, the DPOE system acquires a configuration file from a back-office management system, wherein the configuration file includes configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPOE system.

In the process of ONU initialization, a virtual coaxial cable modem (vCM) in the DPOE system initiates a TFTP request to the back-office management system, and the DPOE system acquires the configuration file from that back-office management system, wherein the configuration file includes the added configuration information about the OLT of the DPOE system and the configuration information of the OLT is the configuration information related to services opened by the ONU, in this way, the configuration file acquired by the DPOE system includes the configuration information for configuring the ONU and the OLT.

S302, the DPOE system analyzes the acquired configuration file and obtains the configuration information of the ONU and the configuration information of the OLT.

When analyzing the acquired configuration file, the DPOE system further converts the configuration information of the ONU into a message format which can be identified by the ONU, and converts the configuration information of the OLT into a message format which can be identified by the OLT.

S303: the DPOE system configures the OLT locally and configures the ONU via a management channel between the OLT and the ONU.

After acquiring the configuration file, the DPOE system analyzes the configuration file and distinguishes the configuration information for configuring the ONU and the OLT, configures the OLT locally, transfers the information for configuring the ONU through the management channel between the DPOE system and the ONU, and configures the relevant parameters of the ONU. The management channel can include an OMCI channel of a GPON or an extended OAM of an EPON system.

Opening services corresponding to the enterprise users, the opened services generally include, but not limited to, Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services. A lot of configurations to the OLT of the DPOE system is needed during completing the opening of the services, so at the same time the

ONU opening these services needs to be configured with the relevant parameters of the OLT, such as, the information of a VLAN, a user port and a user media access control (MAC) address, etc.

Correspondingly, an embodiment of the present invention further provides a DPOE system, including an acquisition unit, an analyzing unit and a configuration unit; wherein,

the acquisition unit is used to acquire a configuration file from a back-office management system, wherein the configuration file includes configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPOE system;

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

when analyzing the acquired configuration file, the analyzing unit further converts the configuration information of the ONU into a message format which can be identified by the ONU, and converts the configuration information of the OLT into a message format which can be identified by the OLT;

the configuration unit is used to configure the OLT locally and configure the ONU via a management channel between the OLT and the ONU.

In an application example, the vCM of the DPOE system can realize the corresponding functions of the above-mentioned acquisition unit, the analyzing unit and the configuration unit.

When implementing specifically, the vCM can be a single function entity and also can be integrated on the OLT to be a part of the OLT.

Correspondingly, an embodiment of the present invention further provides a service auto-configuration network of a DPOE system, including a DPOE system, a back-office management system and an optical network unit (ONU); wherein,

the DPOE system can adopt the above-provided DPOE system; and

the back-office management system is used to save the configuration file and download the configuration file to the DPOE system, wherein the configuration file includes the

configuration information of the ONU and the configuration information of the OLT in the DPOE system.

The back-office management system includes a TFTP server, wherein, the TFTP server is used to receive a TFTP request initiated by the DPOE system and respond to that TFTP request, and download the configuration file into the DPOE system.

Wherein, the configuration information of the OLT is the configuration information related to services opened by the ONU.

The services opened by the ONU include one or more of the E-LINE services, the E-TREE services and the E-LAN services; and

the configuration information of the OLT includes one or more of a VLAN, a user port and a MAC address of the OLT related to the services opened by the ONU.

In an application example, as shown in FIG. 4, in the process of the ONU powering up and registering, the process of configuration to the ONU and the OLT of the DPOE system is completed at the same time, which includes the following steps.

S401: the ONU is powered up, and the initialization process is started;

S402: the ONU and the DPOE system complete the initialization process of a PON layer;

S403: the DPOE system performs authentication on the ONU, and the authentication is passed;

S404: the vCM initiates a Dynamic Host Configuration Protocol (DHCP) request to a DHCP server of the back-office management system;

S405: the DHCP server of the back-office management system responds to the DHCP request, and assigns an IP address for the vCM;

S406: the vCM initiates a TFTP request to a TFTP server of the back-office management system, to request to acquire the configuration data file of the ONU corresponding to that vCM;

S407: the TFTP server of the back-office management system responds to the TFTP request initiated by the vCM, and downloads the configuration file of the ONU corresponding

to that vCM into the DPOE system;

S408: the above-mentioned configuration file is analyzed and processed, wherein, regarding auto-operation of the EVP-LAN service, the configuration file includes a TLV required to be configured for the OLT of the DPOE system, for example: adding on the OLT the VLAN which is identified as V2 for a service V1 operated on a port UNI1 on the ONU; that TLV is a TLV which is newly added in the existing DOCSIS3.0 standard, and the format of that TLV is shown in Table 1 as follows.

Table 1: Format of the newly added TLV in the DOCSIS3.0 standard

Length (octets)	Field (name)		Value (hex)	Notes
1	Type		0x02	Corresponding VLAN identifier for identifying a certain service on the OLT of the DPOE system
1	Length		varies	11+N
6	Value	ONU identifier	varies	MAC address identifier of the ONU
1		ONU port number	varies	
2		VLAN identifier corresponding to the service operated on the ONU	varies	
2		VLAN identifier of a certain service operated on a certain UNI port of the ONU on the OLT	varies	
N		Vendor-specific field	varies	

Another example, an MPLS pseudo line identifier PW1, which is associated to the service V1 operated on the port UNI1 of the ONU, on the OLT is configured, and the TLV can be shown in Table 2 as follows.

Table 2: Format of the newly added TLV in the DOCSIS3.0 standard

Length (octets)	Field (name)	Value (hex)	Notes

1	Type		0x05	Corresponding identifier of PW of MPLS for identifying a certain service on the OLT
1	Length		varies	13+N
6	Value	ONU identifier	varies	MAC address identifier of the ONU
1		ONU port number	varies	
2		VLAN identifier corresponding to the service operated on the ONU	varies	
4		PW identifier of a certain service operated on a certain UNI port of the ONU on the OLT	varies	
N		Vendor-specific field	varies	

S409: through the analyzing and processing at step S408, the TLV based on the DOCSIS in the configuration file is converted into the message format which can be identified by the ONU and the OLT respectively. The DPOE system will identify which configuration message is for the OLT and which configuration message is for the ONU. For example, the DPOE system can identify the configuration data of the OLT and the configuration data of the ONU automatically according to the content of the type field; if it is configured for the OLT, then the configuration message is enabled to be effective in the OLT locally; if the data is configured for the ONU, then step S410 is executed.

S410: the OLT configures the data configured for the ONU onto the ONU via the management channel between the OLT and the ONU, such as the extended OAM or the OMCI.

S411: after completing the data configuration to the ONU, the ONU notifies the DPOE system, and the whole registration process of the ONU ends.

At this moment, the EVP-LAN service of the user connected to the UNI1 on the ONU can be opened, and other extra configurations are no longer needed.

It can be seen from the above-mentioned embodiments that, compared with the related art, the present invention adds the configuration information about the OLT of the DPOE system in the configuration file, and completes the automatic configuration on the OLT and the ONU at the same time; after the process of the ONU initialization is completed, the service can be opened without performing further configuration to the OLT individually. Especially, when more complex configurations are needed to be performed on the OLT correspondingly for the key service operation on the ONU, it can improve the configuration efficiency of the whole system very well.

The above description is only the preferable embodiments of the present invention and is not intended to limit the protection scope of the present invention. All of modifications without departing from the spirit and essence of the present invention should be embodied in the protection scope of the present invention.

Industrial Applicability

The DPOE system and the service auto-configuration method and network based on that system provided by the embodiments of the present invention complete the automatic configuration of the OLT and the ONU at the same time through a configuration file including the configuration information of the ONU and the configuration information of the OLT in the DPOE system; after the process of the ONU initialization is completed, the service can be opened without performing further configuration to the OLT individually. Especially, when more complex configurations are needed to be performed on the OLT correspondingly for the key service operation on the ONU, it can improve the configuration efficiency of the whole system very well.

What we claim is:

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

the DPOE system acquiring a configuration file from a back-office management system, wherein the configuration file comprises configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPOE system;

the DPOE system analyzing the acquired configuration file, and obtaining the configuration information of the ONU and the configuration information of the OLT; and

the DPOE system configuring the OLT locally and configuring the ONU via a management channel between the OLT and the ONU.

2. The method according to claim 1, wherein,

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

3. The method according to claim 2, wherein,

the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and

the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to the services opened by the ONU.

4. The method according to claim 1, wherein,

when analyzing the acquired configuration file, the DPOE system further converts the configuration information of the ONU into a message format which can be identified by the ONU, and converts the configuration information of the OLT into a message format which can be identified by the OLT.

5. The method according to claim 1, wherein,

the method is performed in an process of ONU initialization.

6. A data over cable service interface system (DOCSIS) management back-office Provisioning Of EPON (DPOE) system, comprising an acquisition unit, an analyzing unit and a configuration unit; wherein,

the acquisition unit is configured to acquire a configuration file from a back-office management system, wherein the configuration file comprises configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPOE system;

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

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

7. The system according to claim 6, wherein,

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

8. A service auto-configuration network of a DOCSIS Provisioning Of EPON (DPOE) system, comprising a DPOE system, a back-office management system and an optical network unit (ONU); wherein,

the DPOE system adopts the DPOE system of claim 6 or 7; and

the back-office management system is configured to: save the configuration file, and download the configuration file to the DPOE system, wherein the configuration file comprises the configuration information of the ONU and the configuration information of the OLT in the DPOE system.

9. The network according to claim 8, wherein,

the back-office management system comprises a trivial file transfer protocol (TFTP) server configured to: receive a TFTP request initiated by the DPOE system, respond to that TFTP request, and download the configuration file to the DPOE system.

10. The network according to claim 8 or 9, wherein,

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

11. The network according to claim 10, wherein,

the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and

the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to the services opened by the ONU.

ABSTRACT

A DPOE system and a service auto-configuration method and network based on that system are provided, wherein, the DPOE system includes an acquisition unit, an analyzing unit and a configuration unit; the service auto-configuration network based on that system includes a DPOE system, a back-office management system and an optical network unit (ONU); and the service auto-configuration method based on that system includes: the DPOE system acquiring a configuration file from the back-office management system, wherein the configuration file includes configuration information of the ONU and configuration information of an OLT in the DPOE system; the DPOE system analyzing the configuration file and obtaining the configuration information of the ONU and the configuration information of the OLT; configuring the OLT locally and configuring the ONU via a management channel between the OLT and the ONU. Thus the service can be opened without performing further configuration to the OLT individually after the process of the ONU initialization is completed.

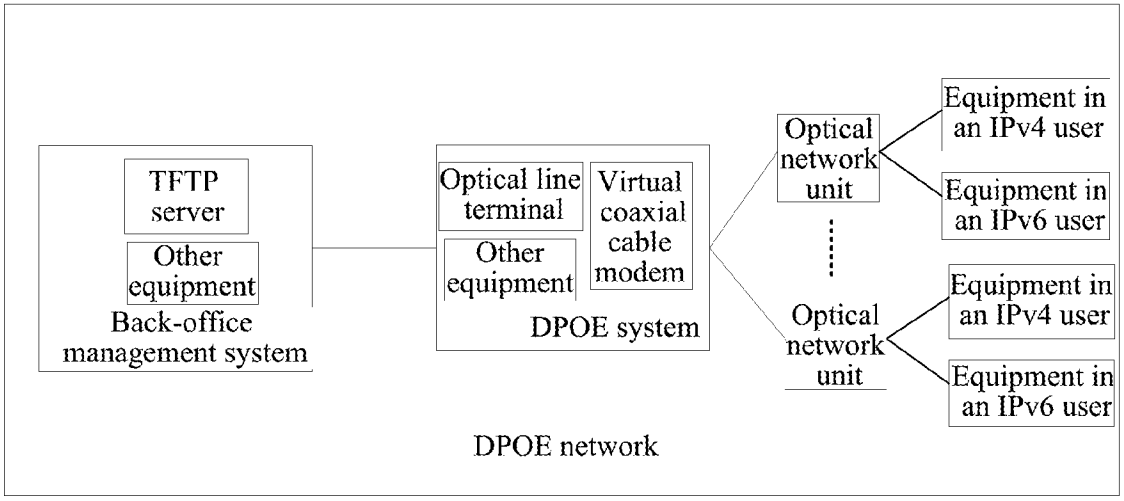

TFTP server
Other equipment
Back-office management system
Optical line terminal
Virtual coaxial cable modem
Other equipment
DPOE system
Optical network unit
Optical network unit
Equipment in an IPv4 user
Equipment in an IPv6 user
Equipment in an IPv4 user
Equipment in an IPv6 user
DPOE network

FIG. 1

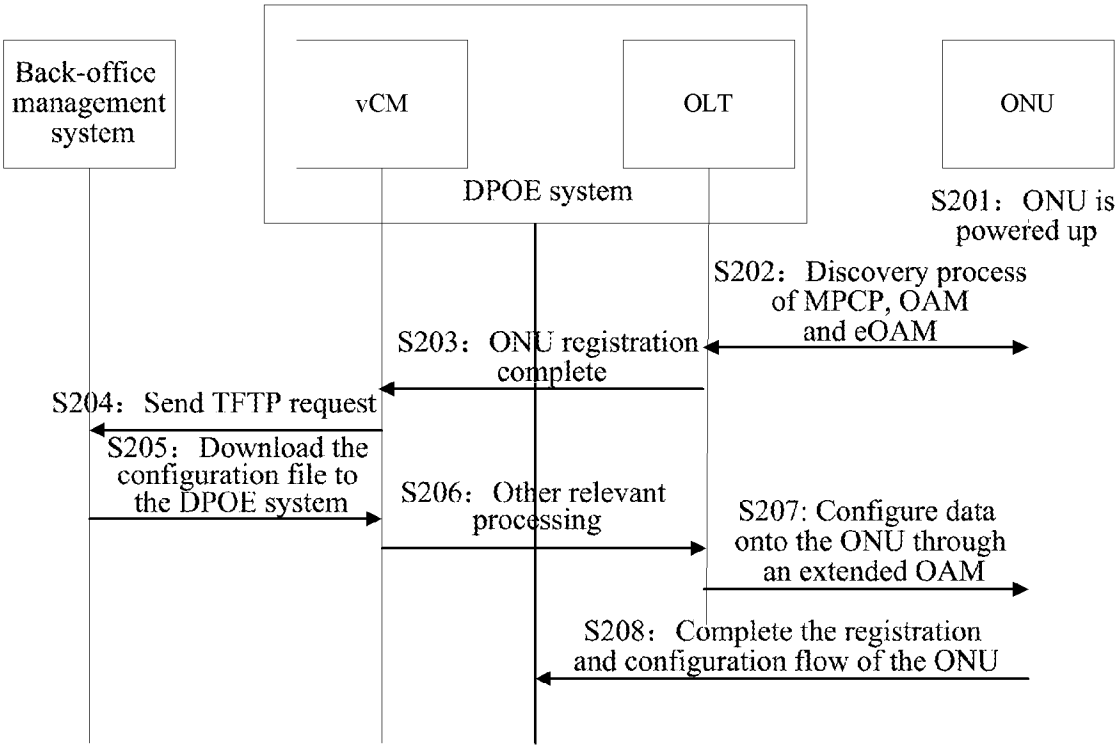

Back-office management system
vCM
OLT
DPOE system
ONU
S201: ONU is powered up
S202: Discovery process of MPCP, OAM and eOAM
S203: ONU registration complete
S204: Send TFTP request
S205: Download the configuration file to the DPOE system
S206: Other relevant processing
S207: Configure data onto the ONU through an extended OAM
S208: Complete the registration and configuration flow of the ONU

FIG. 2

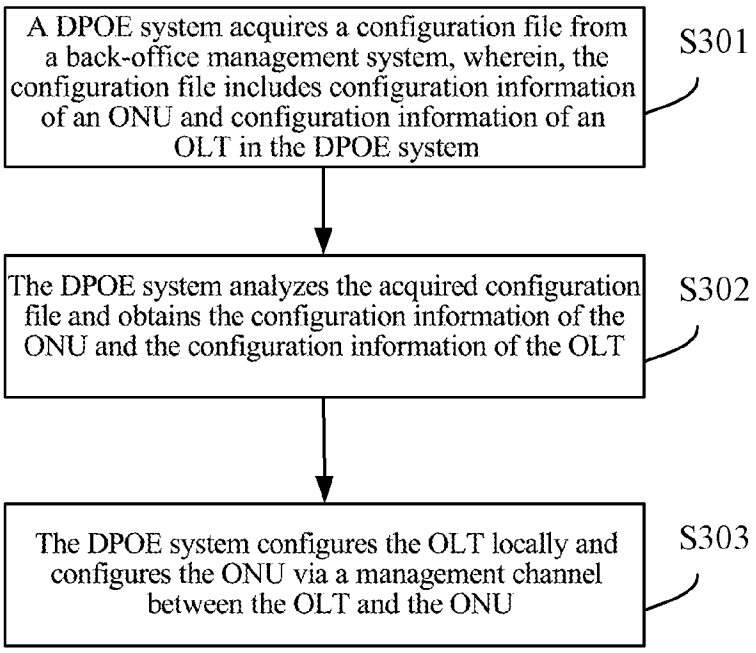

A DPOE system acquires a configuration file from a back-office management system, wherein, the configuration file includes configuration information of an ONU and configuration information of an OLT in the DPOE system
S301
The DPOE system analyzes the acquired configuration file and obtains the configuration information of the ONU and the configuration information of the OLT
S302
The DPOE system configures the OLT locally and configures the ONU via a management channel between the OLT and the ONU
S303

FIG. 3

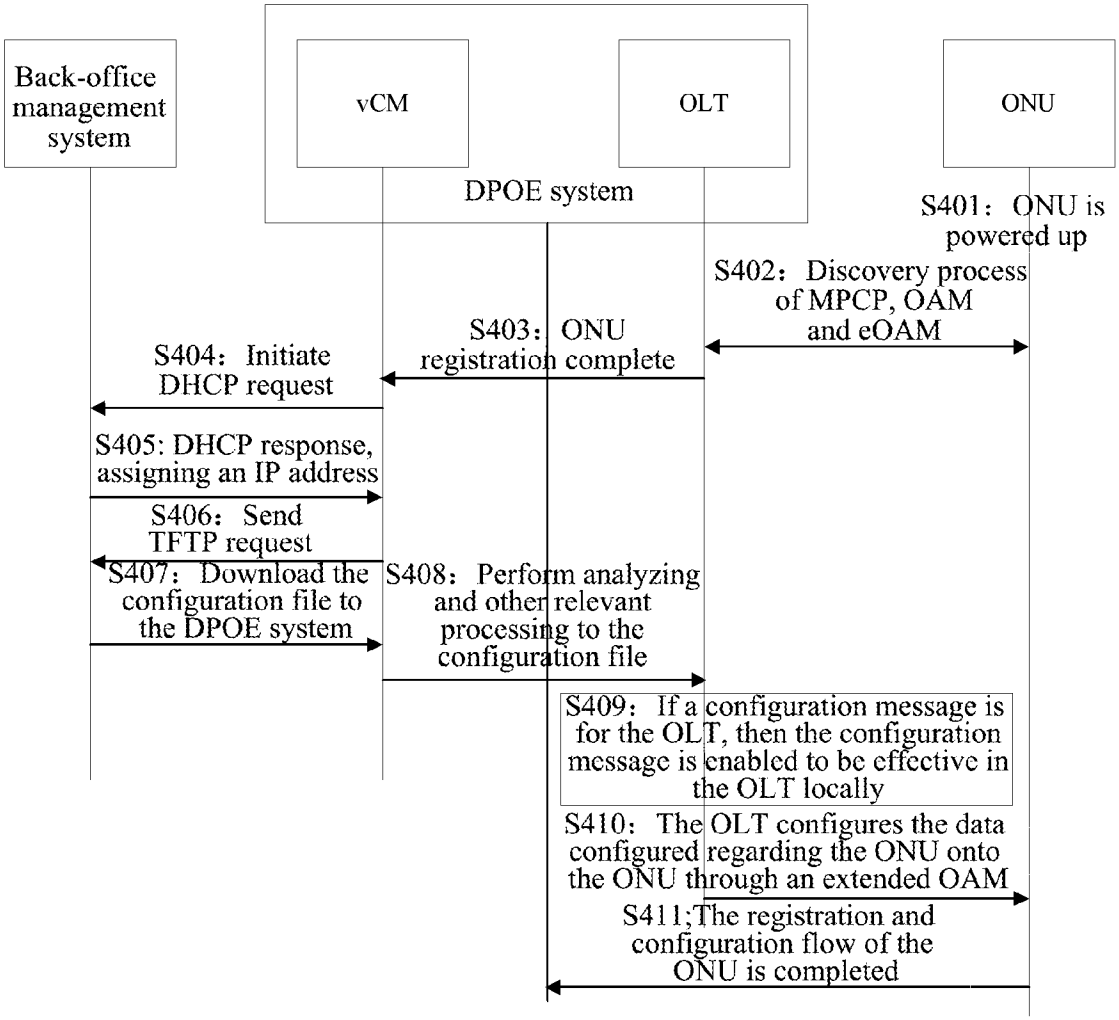

Back-office management system
vCM
OLT
ONU
DPOE system
S401: ONU is powered up
S402: Discovery process of MPCP, OAM and eOAM
S403: ONU registration complete
S404: Initiate DHCP request
S405: DHCP response, assigning an IP address
S406: Send TFTP request
S407: Download the configuration file to the DPOE system
S408: Perform analyzing and other relevant processing to the configuration file
S409: If a configuration message is for the OLT, then the configuration message is enabled to be effective in the OLT locally
S410: The OLT configures the data configured regarding the ONU onto the ONU through an extended OAM
S411;The registration and configuration flow of the ONU is completed

FIG. 4

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	95-1008
	Application Number	
Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Meiyan		ZANG	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Shenzhen City, Guangdong Province	Country of Residence i	CN

Mailing Address of Inventor:

Address 1	c/o ZTE CORPORATION, ZTE Plaza, Keji Road South,		
Address 2	Hi-Tech Industrial Park, Nanshan District		
City	Shenzhen City, Guangdong Province	**State/Province**	
Postal Code	518057	**Country** i	CN

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Liquan		YUAN	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Shenzhen City, Guangdong Province	Country of Residence i	CN

Mailing Address of Inventor:

Address 1	c/o ZTE CORPORATION, ZTE Plaza, Keji Road South,		
Address 2	Hi-Tech Industrial Park, Nanshan District		
City	Shenzhen City, Guangdong Province	**State/Province**	
Postal Code	518057	**Country** i	CN

Inventor 3 Remove

Legal Name

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	95-1008
	Application Number	
Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon	

Prefix	Given Name	Middle Name	Family Name	Suffix
	Chaoqin		ZHANG	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Shenzhen City, Guangdong Province	Country of Residence i	cn

Mailing Address of Inventor:

Address 1	c/o ZTE CORPORATION, ZTE Plaza, Keji Road South,		
Address 2	Hi-Tech Industrial Park, Nanshan District		
City	Shenzhen City, Guangdong Province	**State/Province**	
Postal Code	518057	**Country** i	CN

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	36163		
Email Address	mail@plumsea.com	Add Email	Remove Email

Application Information:

Title of the Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon		
Attorney Docket Number	95-1008	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	3	**Suggested Figure for Publication (if any)**	XX

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	95-1008
	Application Number	
Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon	

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	36163		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	a 371 of international	PCT/CN2012/072633	2012-03-20

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) [i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
201110092130.9	CN	2011-04-13	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	95-1008
	Application Number	
Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	95-1008
	Application Number	
Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	ZTE CORPORATION		
Mailing Address Information:			
Address 1	ZTE Plaza, Keji Road South,		
Address 2	Hi-Tech Industrial Park, Nanshan District		
City	Shenzhen City, Guangdong Province	**State/Province**	
Country i	CN	Postal Code	518057
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section only if non-applicant assignee information is desired to be included on the patent application publication in accordance with 37 CFR 1.215(b). Do not include in this section an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest), as the patent application publication will include the name of the applicant(s).

Remove

If the Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	95-1008
	Application Number	
Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon	

Mailing Address Information:			
Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	/ Patricia E. Hong /			Date (YYYY-MM-DD)	2013-10-03
First Name	Patricia E.	Last Name	Hong	Registration Number	34373

Additional Signature may be generated within this form by selecting the Add button. Add

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/01A (10-05)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon

As the below named inventor(s), I/we declare that:

This declaration is directed to:

☐ The attached application, or

☑ Application No. PCT/CN2012/072633 filed on 2012-03-20

☐ As amended on _____ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

I/we have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above;

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

All statements made herein of my/own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR(S)

Inventor one: Zang Meiyan

Signature: Zang Mei Yan Citizen of: CN

Inventor two: Yuan Liquan

Signature: Yuan Liquan Citizen of: CN

☑ Additional inventors or a legal representative are being named on 1 additional form(s) attached hereto.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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PTO/SB/01A (10-05)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon

As the below named inventor(s), I/we declare that:

This declaration is directed to:

☐ The attached application, or

☑ Application No. PCT/CN2012/072633 filed on 2012-03-20

☐ As amended on _____ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

I/we have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above;

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

WARNING:

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All statements made herein of my/own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR(S)

Inventor one: Zhang Chaoqin

Signature: Zhang Chaoqin Citizen of: CN

Inventor two: _____

Signature: _____ Citizen of: _____

☑ Additional inventors or a legal representative are being named on 1 additional form(s) attached hereto.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Appln. No.	:	TBD	Confirmation No.: TBD
Applicant	:	Meiyan ZANG	
Filed	:	October 3, 2013	
Title	:	DPOE System And Service Auto-Configuration Method And Network Based Thereon	
TC/A.U.	:	TBA	
Examiner	:	TBA	
Attorney Docket No.:		95-1008	
Customer No.	:	36163	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Sir:

Please amend the above-identified application prior to examination as follows:

Amendments to the Abstract begin on page 2 of this paper.

Amendments to the Specification begin on page 3 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 7 of this paper.

Remarks/Arguments begin on page 12 of this paper.

Amendments to the Abstract: Please amend the abstract as follows:

A DPOE system and a service auto-configuration method and network based on that system are provided, wherein, the DPOE system includes an acquisition unit, an analyzing unit and a configuration unit; the service auto-configuration network ~~based on that system~~ includes a DPOE system, a back-office management system and an ~~optical network unit (~~ONU~~)~~; ~~and~~ the service auto-configuration method based on that system includes: the DPOE system acquiring a configuration file from the back-office management system, wherein the configuration file includes configuration information of the ONU and configuration information of an OLT in the DPOE system; the DPOE system analyzing the configuration file and obtaining the configuration information of the ONU and the configuration information of the OLT; configuring the OLT locally and configuring the ONU via a management channel between the OLT and the ONU. Thus the service can be opened without performing further configuration to the OLT individually after the process of the ONU initialization is completed.

Amendments to the Specification: Please amend the specification as follows:

On page 1, first paragraph, please amend as follows:

Technical Field

The present ~~invention~~ document relates to the field of communication, and in particular, to a passive optical network (PON), especially to a service auto-configuration method of an Ethernet passive optical network system based on a data over cable service interface system (DOCSIS) back-office management system.

On page 3, paragraphs 7 and 8, please amend as follows:

Content of the Invention

The technical problem required to be solved by the present ~~invention~~ document is to provide a DOCSIS Provisioning Of EPON (DPOE) system and a service auto-configuration method and network based on that system, to make the service be opened without performing further configuration to the OLT individually after the process of the ONU initialization is completed, so as to improve the configuration efficiency of the whole system.

In order to solve the above-mentioned technical problem, the present ~~invention~~ document provides a service auto-configuration method of an DOCSIS Provisioning Of EPON (DPOE) system, and the method comprises:

On page 4, paragraph 8, please amend as follows:

In addition, in order to solve the above-mentioned technical problem, the present ~~invention~~ document further provides an Ethernet passive optical network based on a DOCSIS Provisioning Of EPON (DPOE) system, and the system comprises an acquisition unit, an analyzing unit and a configuration unit; wherein,

On page 5, please amend paragraph 5 as follows:

In addition, in order to solve the above-mentioned technical problem, the present ~~invention~~ document further provides a service auto-configuration network of a DOCSIS Provisioning Of EPON (DPOE) system, and the network comprises a DPOE system, a back-office management system and an optical network unit (ONU); wherein,

On page 6, please amend the first full paragraph as follows:

The DPOE system and the service auto-configuration method and network based on that system provided by the embodiments of the present ~~invention~~ document complete the automatic configuration of the OLT and the ONU at the same time through a configuration file including the configuration information of the ONU and the configuration information of the OLT in the DPOE system; after the process of the ONU initialization is completed, the service can be opened without performing further configuration to the OLT individually. Especially, when more complex configurations are needed to be performed on the OLT correspondingly for the key service operation on the ONU, it can improve the configuration efficiency of the whole system very well.

On page 6, paragraphs 4 and 5, please amend as follows:

FIG. 3 is a flow chart of a service auto-configuration method of a DPOE system according to an embodiment of the present ~~invention~~ document;

FIG. 4 is a flow chart of auto-configuration of an OLT and an ONU according to an embodiment of the present ~~invention~~ document.

On page 5, paragraphs 6 and 7, please amend as follows:

Preferred Embodiments of the Present Invention

In order to make the objective, the technical scheme and the advantage of the present ~~invention~~ document more clear and understandable, embodiments of the present ~~invention~~ document are described in detail in combination with accompanying drawings hereinafter. It should be illustrated that, in the case of not conflicting, the embodiments in the present application and features in these embodiments can be combined with each other at random.

As shown in FIG. 3, an embodiment of the present invention document provides a service auto-configuration method of a DPOE system, including the following steps.

On page 12, paragraphs 1, 2 and 3 please amend as follows:

It can be seen from the above-mentioned embodiments that, compared with the related art, the present ~~invention~~ document adds the configuration information about the OLT of the DPOE system in the configuration file, and completes the automatic configuration on the OLT and the ONU at the same time; after the process of the ONU initialization is completed, the service can be opened without performing further configuration to the OLT individually. Especially, when more complex configurations are needed to be performed on

the OLT correspondingly for the key service operation on the ONU, it can improve the configuration efficiency of the whole system very well.

The above description is only the preferable embodiments of the present ~~invention~~ document and is not intended to limit the protection scope of the present ~~invention~~ document. All of modifications without departing from the spirit and essence of the present ~~invention~~ document should be embodied in the protection scope of the present ~~invention~~ document.

Industrial Applicability

The DPOE system and the service auto-configuration method and network based on that system provided by the embodiments of the present ~~invention~~ document complete the automatic configuration of the OLT and the ONU at the same time through a configuration file including the configuration information of the ONU and the configuration information of the OLT in the DPOE system; after the process of the ONU initialization is completed, the service can be opened without performing further configuration to the OLT individually. Especially, when more complex configurations are needed to be performed on the OLT correspondingly for the key service operation on the ONU, it can improve the configuration efficiency of the whole system very well.

Please amend the claims as follows:

This listing of claims will replace all prior versions of claims in the application:

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

the DPOE system acquiring a configuration file from a back-office management system, wherein the configuration file comprises configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPOE system;

the DPOE system analyzing the acquired configuration file, and obtaining the configuration information of the ONU and the configuration information of the OLT; and

the DPOE system configuring the OLT locally and configuring the ONU via a management channel between the OLT and the ONU.

2. (Original) The method according to claim 1, wherein,

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

3. (Original) The method according to claim 2, wherein,

the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and

the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to the services opened by the ONU.

4. (Original) The method according to claim 1, wherein,

when analyzing the acquired configuration file, the DPOE system further converts the configuration information of the ONU into a message format which can be identified by the ONU, and converts the configuration information of the OLT into a message format which can be identified by the OLT.

5. (Original) The method according to claim 1, wherein,

the method is performed in an process of ONU initialization.

6. (Original) A data over cable service interface system (DOCSIS) management back-office Provisioning Of EPON (DPOE) system, comprising an acquisition unit, an analyzing unit and a configuration unit; wherein,

the acquisition unit is configured to acquire a configuration file from a back-office management system, wherein the configuration file comprises configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPOE system;

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

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

7. (Original) The system according to claim 6, wherein,

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

8. (Currently Amended) A service auto-configuration network of a DOCSIS Provisioning Of EPON (DPOE) system, comprising a DPOE system, a back-office management system and an optical network unit (ONU); wherein,

the DPOE system ~~adopts the DPOE system of claim 6 or 7~~ comprises an acquisition unit, an analyzing unit and a configuration unit; wherein,

the acquisition unit is configured to acquire a configuration file from a background management system, wherein the configuration file comprises configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPOE system;

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

the configuration unit is configured to configure the OLT locally and configure the ONU via a management channel between the OLT and the ONU; and

the back-office management system is configured to: save the configuration file, and download the configuration file to the DPOE system, wherein the configuration file comprises the configuration information of the ONU and the configuration information of the OLT in the DPOE system.

9. (Original) The network according to claim 8, wherein,

the back-office management system comprises a trivial file transfer protocol (TFTP) server configured to: receive a TFTP request initiated by the DPOE system, respond to that TFTP request, and download the configuration file to the DPOE system.

10. (Currently Amended) The network according to claim 8 ~~or 9~~, wherein,

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

11. (Original) The network according to claim 10, wherein,

the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and

the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to the services opened by the ONU.

12. (New) The network according to claim 9, wherein,

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

13. (New) The network according to claim 8, wherein,

the analyzing unit is further configured to, when analyzing the acquired configuration file, convert the configuration information of the ONU into a message format which can be identified by the ONU and convert the

configuration information of the OLT into a message format which can be identified by the OLT.

REMARKS

In the preliminary amendment, as set forth above, the Abstract is amended to be within 150 words. The specification has been amended to replace the term "the present invention" with "the present document." Amendments to the specification also replace the term "Vcm" with the term "vCM". The claims have been amended to eliminate multiple dependency, and new claims 12 and 13 have been added. No new matter has been added.

Support for the preliminary amendment set forth above can be found in the claims and the specification including drawings as originally filed. Applicant asserts that no new matter is added.

It is believed that the application is in condition for allowance and such allowance is respectfully requested. No fee is believed due and should any fee be necessary for consideration of this response it is hereby authorized to be charged to Deposit Account Number 502846.

Should the Examiner have any questions or determine that any further action is desirable to place this application in even better condition for allowance, the Examiner is encouraged to contact the Applicant's representative at the number listed below.

Respectfully submitted,

PLUMSEA LAW GROUP, LLC

Date: October 3, 2013

By: / Patricia E. Hong /
Patricia E. Hong (Reg. No. 34,373)
Telephone Number: 301-365-9040

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	DPOE System And Service Auto-Configuration Method And Network Based Thereon
First Named Inventor/Applicant Name:	Meiyan ZANG
Filer:	Patricia E. Hong/Carolyn Lewis
Attorney Docket Number:	97-1008

Filed as Large Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
National Stage Fee	1631	1	280	280
Natl Stage Search Fee - Report provided	1642	1	480	480
National Stage Exam - all other cases	1633	1	720	720
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1480**

Electronic Acknowledgement Receipt

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First Named Inventor/Applicant Name:	Meiyan ZANG
Customer Number:	36163
Filer:	Patricia E. Hong/Carolyn Lewis
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Transmittal of New Application	2013_10_03_95-1008_National_Phase_Trs.pdf	46715 3597bdfd45d5ad9993a57387bbd46677077a41c4	no	3
Warnings:					
Information:					
2	Documents submitted with 371 Applications	2013_10_03_95-1008_PCT_Publ_CN.pdf	18397222 edc8c5b7a209ec3de09207e545469345a3186302	no	22
Warnings:					
Information:					
3	Specification	2013_10_03_95-1008_English_Spec.pdf	128084 75442babe89a4a70ecbcb1a9e37179c88ed40002	no	12
Warnings:					
Information:					
4	Claims	2013_10_03_95-1008_Claims.pdf	86063 aaa7dc5bc5a7c2413b7d3e34638c9be5e55cfae7	no	3
Warnings:					
Information:					
5	Abstract	2013_10_03_95-1008_Abstract.pdf	93609 dfee718c9ec2ee942f3623a5366d56b4dc474323	no	1
Warnings:					
Information:					
6	Drawings-only black and white line drawings	2013_10_03_95-1008_Drawings.pdf	625328 fe7df7cccf58a0849f264fee900efb58c337b208	no	3
Warnings:					
Information:					
7	Application Data Sheet	2013_10_03_95-1008_ADS.pdf	1508481 5bedfd21b4daefcfdc4d59bdcb308bbeef20b8ff	no	7
Warnings:					
Information:					
8	Oath or Declaration filed	2013_10_03_95-1008_Exec_Decl.pdf	263817 bbd02f5f03311e66d8ce03dbce4074088ddd6235	no	2
Warnings:					
Information:					
9	Preliminary Amendment	2013_10_03_95-1008_Prel_Amdt.pdf	98357 d9dc991fb078d20d1313ede2b8940bc9a03d9227	no	12
Warnings:					
Information:					

10	Fee Worksheet (SB06)	fee-info.pdf	33442 eb154041b40ef9adc406c14dad101c5920aa8862	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	21281118

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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VIII-2-1	**声明：有权申请和被授予专利** 当根据细则4.17(iv)的声明不适用时，关于申请人在国际申请日有权申请 和被授予专利的声明(4.17(ii)和51之二.1(a)(ii))： 姓名：	**关于 本国际申请** **中兴通讯股份有限公司 ZTE CORPORATION 基于下列事项有权申请和被授予专利：**
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VIII-4-1-1	在先申请：	201110092130.9, CN, 2011年 4月 13日 (13.04.2011)
		我在此承认自己有义务公开我知道的，根据美国联邦法规(CFR)第37篇第1.56条对确定专利性有实质意义的信息，包括对于部分继续申请，在该在先申请的申请日和该部分继续申请的PCT国际申请日之间可得到的实质性信息。 **我在此声明所有根据我自己的知识所作的声明是真实的，并且所有根据信息和相信所作的声明相信是真实的；而且在作这些声明时我知道根据美国法典第18篇第1001条故意作假声明以及有关类似行为将受到罚款或监禁或二者并罚的惩罚，并且这样的故意假声明将危害申请或根据该申请授予的任何专利的有效性。**

PCT

打印件(原件为电子形式)

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VIII-4-1-6	日期	2012年 3月 20日 (20.03.2012)
VIII-4-1-1	姓名: Name (LAST, First):	张 超钦 ZHANG, Chaoqin
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VIII-4-1-4	国籍:	CN
VIII-4-1-5	发明人签字: (该签字必须是发明人的签字, 而不是代理人的签字)	/张超钦/
VIII-4-1-6	日期	2012年 3月 20日 (20.03.2012)

证　明

本证明之附件是向本局提交的下列专利申请文件副本。

申　　请　　号：201110092130.9

申　请　类　型：发明专利

发明 创造 名称：一种DPOE系统及基于该系统业务自动配置方法和网络

申　　请　　日：2011.04.13

申　　请　　人：中兴通讯股份有限公司

发明人或设计人：臧美燕、袁立权、张超钦

中华人民共和国国家知识产权局局长

2012 年 07 月 19 日

2011100921309

权 利 要 求 书 011110215

1、 一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统业务自动配置的方法，包括:

所述 DPOE 系统从后台管理系统获取配置文件，所述配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息;

所述 DPOE 系统解析获取的所述配置文件，得到所述 ONU 的配置信息和所述 OLT 的配置信息;

所述 DPOE 系统在本地对所述 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对所述 ONU 进行配置。

2、 如权利要求 1 所述的方法，其特征在于，

所述 OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

3、 如权利要求 2 所述的方法，其特征在于，

所述 ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种;

所述OLT的配置信息包括与所述ONU开通的业务相关的OLT的VLAN、用户端口和用户 MAC 地址中的一种或多种。

4、 如权利要求 1 所述的方法，其特征在于:

所述 DPOE 系统解析获取的所述配置文件时，还将所述 ONU 的配置信息转换为 ONU 可以识别的消息格式，将所述 OLT 的配置信息转换为 OLT 可以识别的消息格式。

5、 如权利要求 1 所述的方法，其特征在于:

所述方法是在 ONU 初始化过程中执行的。

6、 一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统，其特征在于，包括获取单元、解析单元和配置单元;

所述获取单元，用于从后台管理系统获取配置文件，所述配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中 OLT 的配置信息；

所述解析单元，用于解析获取的所述配置文件，得到所述 ONU 的配置信息和所述 OLT 的配置信息；

所述配置单元，用于在本地对所述 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对所述 ONU 进行配置。

7、 如权利要求 6 所述的系统，其特征在于，

所述解析单元解析获取的所述配置文件时，还将所述 ONU 的配置信息转换为 ONU 可以识别的消息格式，将所述 OLT 的配置信息转换为 OLT 可以识别的消息格式。

8、 一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统业务自动配置的网络，包括 DPOE 系统、后台管理系统以及光网络单元(ONU)，其特征在于，

所述 DPOE 系统采用如权利要求 6 或 7 所述的 DPOE 系统；

所述后台管理系统，用于保存配置文件，并将所述配置文件下载到 DPOE 系统中， 所述配置文件包括 ONU 的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息。

9、 如权利要求 8 所述的网络，其特征在于，

所述后台管理系统包括简单文件传送协议（TFTP）服务器，用于接收 DPOE 系统发起的 TFTP 请求，并响应该 TFTP 请求，将所述配置文件下载到 DPOE 系统中。

10、 如权利要求 8 或 9 所述的网络，其特征在于，

所述 OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

11、 如权利要求 10 所述的网络，其特征在于，

所述 ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一

种或多种;

所述 OLT 的配置信息包括与所述 ONU 开通的业务相关的 OLT 的 VLAN、用户端口和用户 MAC 地址中的一种或多种。

2011100921309

说　明　书　011110215

一种 DPOE 系统及基于该系统业务自动配置方法和网络

技术领域

本发明涉及通信领域，具体涉及一种无源光网络（Passive Optical Network，简称 PON），特别是基于 DOCSIS 后台管理系统的以太网无源光网络系统的业务自动配置方法。

背景技术

基于 DOCSIS(Data over Cable Service Interface System)管理后台的 PON 系统，以 DPOE（基于 DOCSIS 管理后台的以太网无源光网络）网络为例，图 1 是 DPOE 网络的拓扑结构图，该网络由包含 TFTP（简单文件传送协议）服务器的后台管理系统，包含 vCM(虚拟同轴电缆调制解调器)、OLT(Optical Line Terminal，光线路终端)以及其他设备的 DPOE 系统，DPOE ONU(Optical Network Unit，光网络单元)以及连接在 ONU 上的 CPE(Customer Premise Equipment，用户终端设备)终端组成。ONU 发起注册的过程是模拟同轴调整解调器的初始化过程，由 vCM 发起，并从 TFTP 服务器获取配置文件，DPOE 系统再把获取的配置文件的配置信息配置通过管理通道发送给 ONU。

如图 2 所示，目前的 ONU 的数据配置过程主要是通过如下过程完成：

S201：ONU 上电，开始初始化过程；

S202：ONU 和 DPOE 系统完成 PON 层的初始化过程；

S203：DPOE 系统对 ONU 进行认证，认证通过，完成注册；

S204 ~S205：DPOE 系统中的 vCM 会发起根据 DOCSIS 3.0 规范中规定的初始化过程，向后台管理系统发送 TFTP 请求，从后台管理系统的 TFTP 服务器上下载配置文件；

S206 ~S207：经过相关处理后，然后再通过相应的配置管理通道，配置到相关的 ONU 上，配置文件中包含运营商为 ONU 上连接的用户提供的服务属性和参数；

S208：对 ONU 完成数据配置后，ONU 通知 DPOE 系统，整个 ONU 的注册过程结束。

但是完成对 ONU 的配置，要使 ONU 上的业务正常运行，还需要对 OLT 进行相应的配置。一般情况下，对 OLT 的配置需要单独通过手工进行配置，或者通过命令行，或者通过 EMS 和 OLT 之间的 SNMP 接口进行。

对应企业用户开通业务，一般需要大量的对 DPOE 系统的 OLT 的配置，完成业务的开通，所以对于开通这些业务的 ONU，需要同时配置 OLT 的相关参数。

例如，一般针对 EVP-LAN 业务的正常开通，需要在 OLT 和 ONU 进行如 VLAN 的相关配置，包括

在 ONU 上需要进行的配置为：

1、ONU 上标识端口 UNI 上运行的具体业务的 VLAN；

2、ONU 上标识 UNI 端口的相应业务对应的 LLID/GEM PORT ID。

DPOE 系统的 OLT：

1、DPOE 系统的 OLT 上（PON 线卡）与 UNI 端口上运行的具体业务关联的 LLID/GEM PORT ID；

2、DPOE 系统的 OLT PON 线卡上针对 ONU 上端口 UNI 上运行的具体业务使用的 VLAN；

3、DPOE 系统的 OLT 业务处理板上标识 ONU 上 UNI 端口上运行的具体业务对应的 VLAN；

4、DPOE 系统的 OLT 业务处理板上与 ONU UNI 端口上运行的具体业务关联的 MPLS 实例；

5、DPOE 系统的 OLT 上与 ONU UNI 端口上运行的具体业务关联的 MPLS 伪线标识；

6、DPOE 系统的 OLT 启动 MPLS 协议;

7、DPOE 系统的 OLT 上对应 ONU 上 UNI 端口上运行的具体业务，对应的上联口的 VLAN 标识。

由此可见，运行该业务，需要在 DPOE 系统的 OLT 上进行的相应多次配置，比较复杂，这种分别配置 ONU 和 OLT 的方式，在配置效率上不高。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，更会影响整个系统的配置效率。

发明内容

本发明需要解决的技术问题是提供一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统以及基于该系统业务自动配置的方法及网络，以使 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通，以提高整个系统的配置效率。

为了解决上述技术问题，本发明提供了一种基于 DOCSIS 管理后台的无源光网络（DPOE）系统业务自动配置的方法，包括:

DPOE 系统从后台管理系统获取配置文件，该配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息;

DPOE 系统解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息;

DPOE 系统在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

进一步地，OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

进一步地，ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种;

OLT 的配置信息包括与 ONU 开通的业务相关的 OLT 的 VLAN、用户端口和用户 MAC 地址中的一种或多种。

进一步地，DPOE 系统解析获取的配置文件时，还将 ONU 的配置信息

转换为 ONU 可以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

进一步地，方法是在 ONU 初始化过程中执行的。

此外，为了解决上述技术问题，本发明还提供了一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统，包括获取单元、解析单元和配置单元；其中，

获取单元，用于从后台管理系统获取配置文件，该配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中 OLT 的配置信息；

解析单元，用于解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息；

配置单元，用于在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

进一步地，解析单元解析获取的配置文件时，还将 ONU 的配置信息转换为 ONU 可以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

此外，为了解决上述技术问题，本发明还提供了一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统业务自动配置的网络，包括 DPOE 系统、后台管理系统以及光网络单元(ONU)，其中，

DPOE 系统采用如上面所述的 DPOE 系统；

后台管理系统，用于保存配置文件，并将配置文件下载到 DPOE 系统中，该配置文件包括ONU 的配置信息和DPOE 系统中光线路终端(OLT)的配置信息。

进一步地，后台管理系统包括简单文件传送协议（TFTP）服务器，用于接收 DPOE 系统发起的 TFTP 请求，并响应该 TFTP 请求，将配置文件下载到 DPOE 系统中。

进一步地，OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

进一步地，ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种；

OLT 的配置信息包括与 ONU 开通的业务相关的 OLT 的 VLAN、用户端口和用户 MAC 地址中的一种或多种。

与现有技术相比，本发明提供的 DPOE 系统以及基于该系统业务自动配置的方法及网络，通过一个包括有 ONU 配置信息和 DPOE 系统中 OLT 配置信息的配置文件，同时完成 OLT 和 ONU 的自动化配置，在 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，可以非常好地提高整个系统的配置效率。

附图说明

图 1　为 DPOE 网络的拓扑结构图；

图 2　为现有的常规 ONU 数据配置流程图；

图 3　为本发明 DPOE 系统业务自动配置的方法流程图；

图 4　为本发明实施例的 OLT 和 ONU 的自动配置的流程图。

具体实施方式

为使本发明的目的、技术方案和优点更加清楚明白，下文中将结合附图对本发明的实施例进行详细说明。需要说明的是，在不冲突的情况下，本申请中的实施例及实施例中的特征可以相互任意组合。

如图 3 所示，本发明实施例提供了一种 DPOE 系统业务自动配置的方法，包括以下步骤：

S301：DPOE 系统从后台管理系统获取配置文件，配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息；

在 ONU 初始化过程中，DPOE 系统中的 vCM(虚拟同轴电缆调制解调器)向后台管理系统发起 TFTP 请求，DPOE 系统从该后台管理系统获取配置文件，配置文件中包含了增加了的针对 DPOE 系统的 OLT 的配置信息，OLT 的配置信息是和 ONU 开通的业务相关的配置信息，这样 DPOE 系统获取的配置文件包括配置 ONU 和 OLT 的配置信息。

S302：DPOE 系统解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息；

DPOE 系统解析获取的配置文件时，还将 ONU 的配置信息转换为 ONU 可以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

S303：DPOE 系统在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

DPOE 系统获取配置文件后解析配置文件，并区分配置 ONU 和 OLT 的配置信息，在本地对 OLT 进行配置，配置 ONU 的信息通过 DPOE 系统和 ONU 之间的管理通道进行传递，并配置 ONU 的相关参数。管理通道可以包括 GPON 的 OMCI 通道或 EPON 系统的扩展 OAM。

对应企业用户开通业务，一般开通的业务包括但不限于基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务和基于以太网的局域网（E-LAN）业务。需要大量的对 DPOE 系统的 OLT 的配置，完成业务的开通，所以对于开通这些业务的 ONU，需要同时配置 OLT 的相关参数，比如 VLAN、用户端口和用户 MAC 地址等信息。

相应地，本发明实施例还提供了一种 DPOE 系统，包括获取单元、解析单元、配置单元，其中，

获取单元，用于从后台管理系统获取配置文件，该配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息；

解析单元，用于解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息；

解析单元解析获取的配置文件时，还将 ONU 的配置信息转换为 ONU 可以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

配置单元，用于在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

在一个应用示例中，DPOE 系统的 Vcm 可以实现上述获取单元、解析单元和配置单元的相应功能。

在具体实施时，Vcm 可以作为单独的功能实体，也可以集成在 OLT 上成为 OLT 的一部分。

相应地，本发明实施例还提供了一种 DPOE 系统业务自动配置的网络，包括 DPOE 系统、后台管理系统以及光网络单元 ONU，其中，

DPOE 系统可以采用上面提供的 DPOE 系统；

后台管理系统，用于保存配置文件，并将配置文件下载到 DPOE 系统中，该配置文件包括 ONU 的配置信息和 DPOE 系统中 OLT 的配置信息。

该后台管理系统包括 TFTP 服务器，TFTP 服务器用于接收 DPOE 系统发起的 TFTP 请求，并响应该 TFTP 请求，把配置文件下载到 DPOE 系统中。

其中 OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

ONU 开通的业务包括 E-LINE 业务、E-TREE 业务和 E-LAN 业务中的一种或多种；

OLT 的配置信息包括与 ONU 开通的业务相关的 OLT 的 VLAN、用户端口和用户 MAC 地址中的一种或多种。

在一个应用示例中，如图 4 所示，在 ONU 上电注册的过程中，同时完成对 ONU 和 DPOE 系统的 OLT 进行配置的过程为：

S401：ONU 上电，开始初始化过程；

S402：ONU 和 DPOE 系统完成 PON 层的初始化过程；

S403：DPOE 系统对 ONU 进行认证，认证通过；

S404：vCM 向后台管理系统的 DHCP 服务器起 DHCP 请求；

S405：后台管理系统的 DHCP 服务器针对 DHCP 请求进行响应，给 vCM 分配 IP 地址；

S406：vCM 向后台管理系统的 TFTP 服务器发起 TFTP 请求，请求获取该 vCM 对应的 ONU 的配置数据文件；

S407：后台管理系统的 TFTP 服务器响应 vCM 发起的 TFTP 请求，把该 vCM 对应的 ONU 的配置文件下载到 DPOE 系统中；

S408：对上述配置文件进行分析处理，该配置文件中包含有针对 EVP-LAN 业务自动运行需要针对 DPOE 系统的 OLT 进行配置的 TLV，比如：在 OLT 上增加针对 ONU 上端口 UNI1 运行的业务 V1 进行标识的 VLAN 为 V2，该 TLV 为现有 DOCSIS3.0 标准中新增加的 TLV，该 TLV 的格式如表 1 所示如下：

表 1：现有 DOCSIS3.0 标准中新增加的 TLV 的格式

长度 (octets)	字段(name)		取值 (hex)	备注（Notes）
1	Type(类型)		0x02	DPOE 系统的 OLT 上标识某业务对应的 VLAN 标识
1	长度（Length）		可变	11+N
6	取值（Value）	ONU 标识	可变（varies）	ONU 的 MAC 地址标识
1		ONU 端口号	可变（varies）	
2		ONU 上运行的业务对应的 VLAN 标识	可变（varies）	
2		OLT 上对 ONU 某 UNI 端口运行的某业务的 VLAN 标识	可变 (varies)	
N		自定义字段（Vendor-specific field）	可变（varies）	

再如：配置 OLT 上与 ONU 端口 UNI1 上运行的业务 V1 关联的 MPLS

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伪线标识 PW1，该 TLV 可如表 2 所示如下：

表 2：现有 DOCSIS3.0 标准中新增加的 TLV 的格式

长度 (octets)	字段(name)		取值 (hex)	备注（Notes）
1	Type(类型)		0x05	OLT 上标识某业务对应的 MPLS 的 PW 的标识
1	长度（Length）		可变	13+N
6	取值（Value）	ONU 标识	可变（varies）	ONU 的 MAC 地址标识
1		ONU 端口号	可变（varies）	
2		ONU 上运行的业务对应的 VLAN 标识	可变（varies）	
4		OLT 上对 ONU 某 UNI 端口运行的某业务的 PW 标识	可变(varies)	
N		自定义字段（Vendor-specific field）	可变（varies）	

S409: 经过步骤 S408 的分析处理，把配置文件中的基于 DOCSIS 的 TLV 分别转换为 ONU 和 OLT 可以识别的消息格式。DPOE 系统会识别哪些配置消息针对 OLT，哪些配置消息针对 ONU。比如，DPOE 系统可以根据 type 字段的内容自动识别 OLT 的配置数据以及 ONU 的配置数据，如果是针对 OLT 进行配置的，则使配置消息在 OLT 本地生效，如果是针对 ONU 进行配置的数据，则进行步骤 S410。

S410：OLT 把针对 ONU 进行配置的数据通过 OLT 和 ONU 之间的管理通道，比如扩展 OAM、OMCI，把相关数据配置到 ONU 上。

S411：对 ONU 完成数据配置后，ONU 通知 DPOE 系统，整个 ONU 的

注册过程结束

此时，即可开通 ONU 上 UNI1 连接的用户的 EVP-LAN 业务，而不再需要其他额外配置。

从上述实施例可以看出，相对于现有技术，本发明在配置文件中增加了针对 DPOE 系统的 OLT 的配置信息，同时完成对 OLT 和 ONU 进行自动化配置，在 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，可以非常好地提高整个系统的配置效率。

以上，仅是本发明的最佳实施例而已，并非用于本发明的保护范围。凡在本发明的精神和原则之内，所做的任何修改都应包含在本发明的保护范围之内。

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说 明 书 附 图

011110215

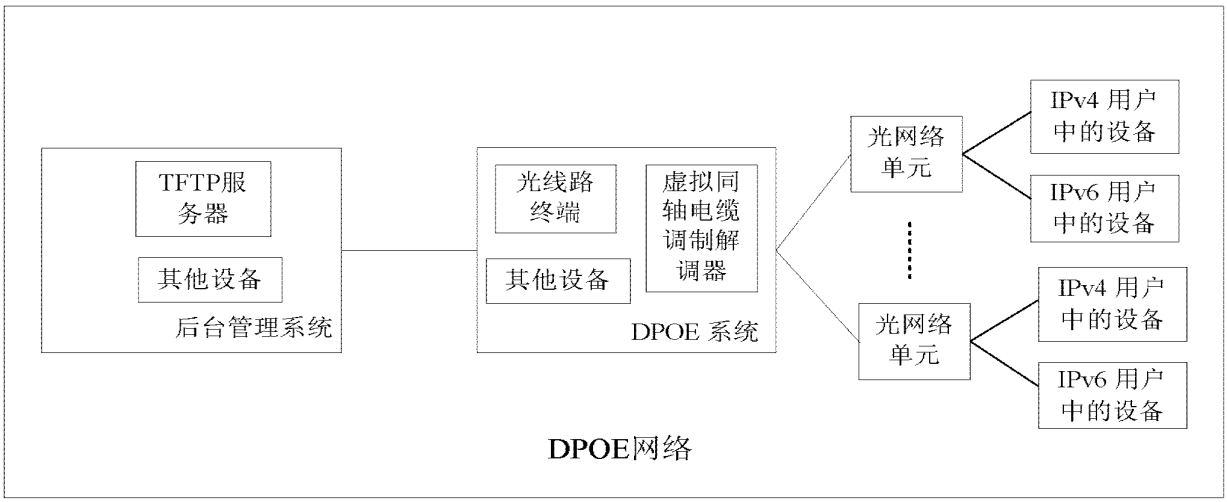


图 1

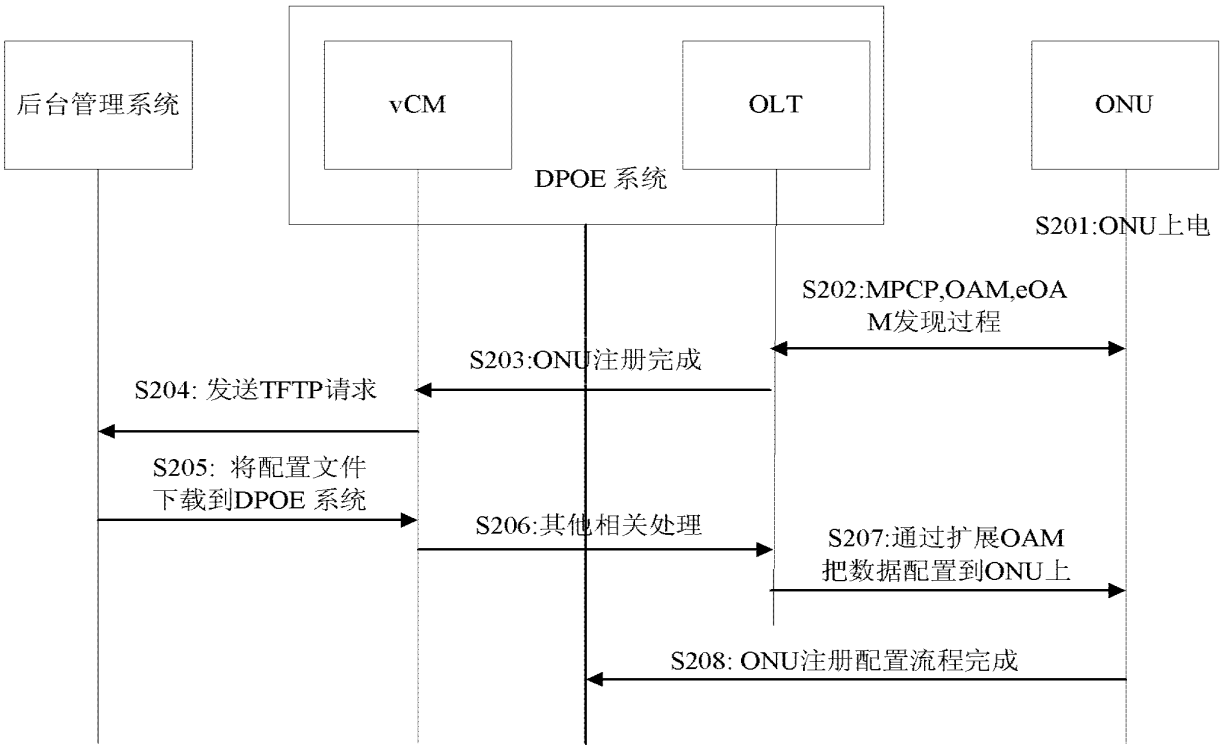


图 2

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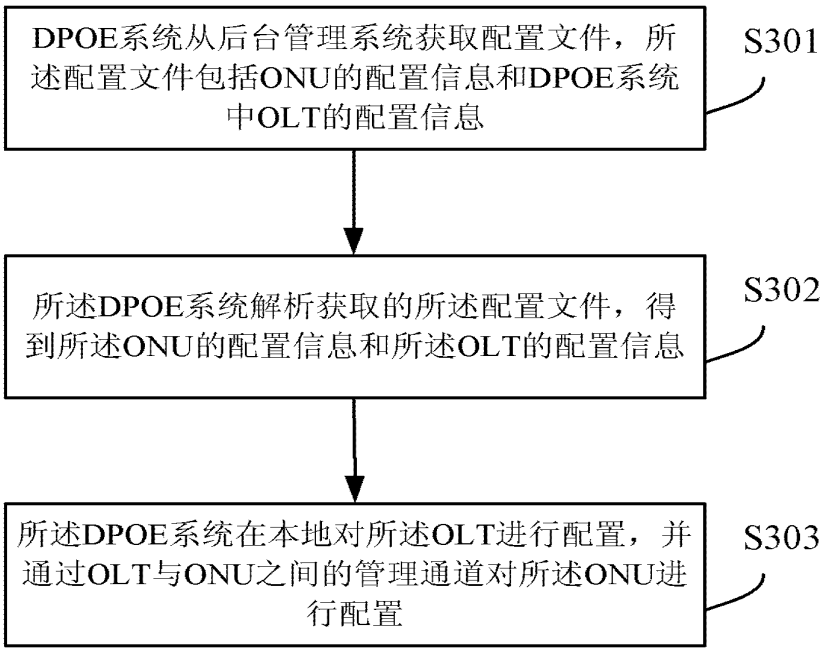


图 3

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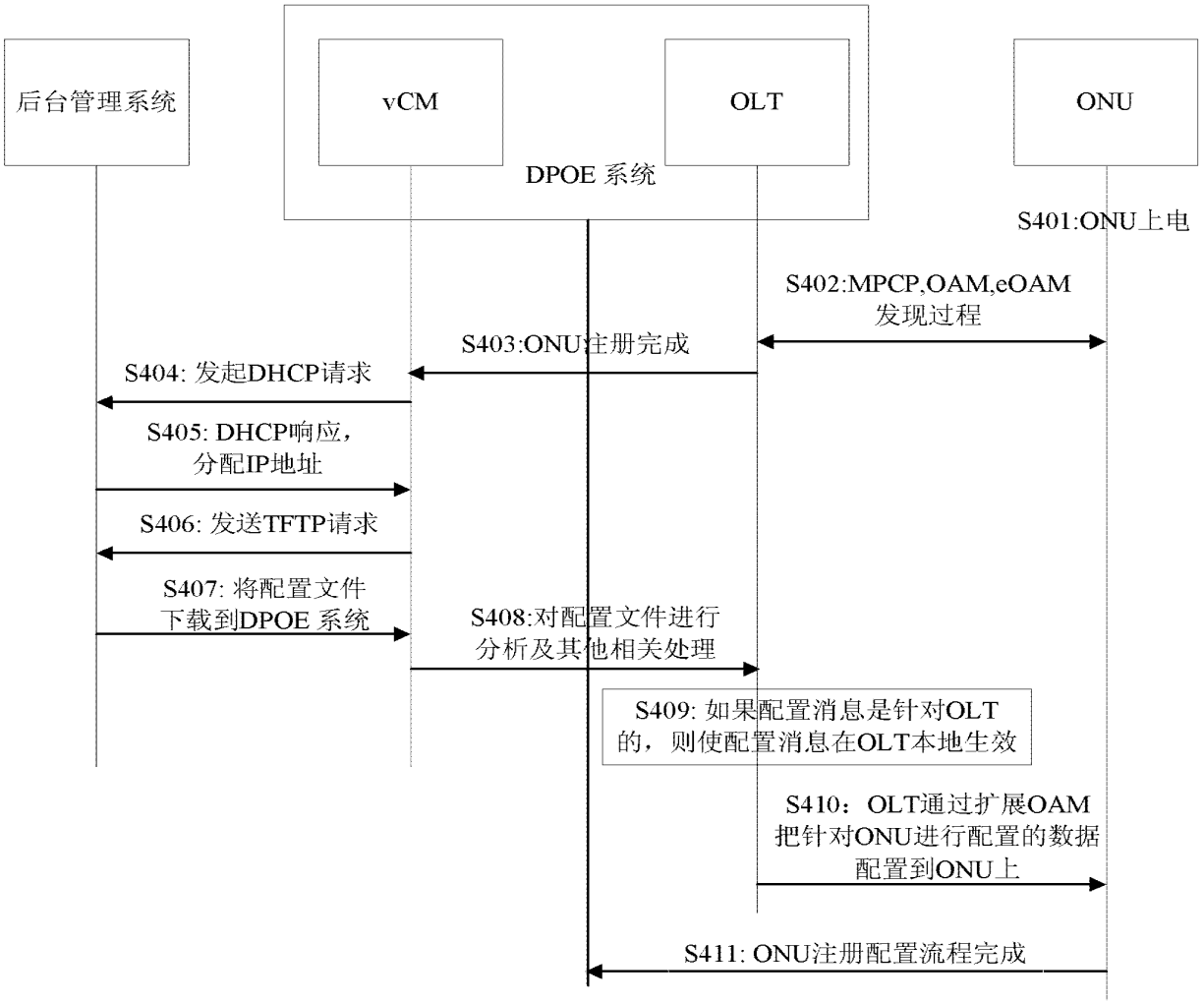


图 4

011110215

WIPO
WORLD
INTELLECTUAL PROPERTY
ORGANIZATION

DOCUMENT MADE AVAILABLE UNDER THE PATENT COOPERATION TREATY (PCT)

International application number:		**PCT/CN2012/072633**
International filing date:		**20 March 2012 (20.03.2012)**
Document type:		**Certified copy of priority document**
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1211 Geneva 20, Switzerland
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PCT请求书

打印件(原件为电子形式)

0	由受理局填写	
0-1	国际申请号	PCT/CN2012/072633
0-2	国际申请日	2012年 3月 20日 (20.03.2012)
0-3	受理局名称和“PCT国际申请”	RO/CN

0-4	PCT/RO/101表 PCT请求书	
0-4-1	软件版本	PCT-SAFE 版本 3.51.053.229 MT/FOP 20120101/0.20.5.19
0-5	请求 下列签字人请求按照专利合作条约的规定处理本国际申请	
0-6	申请人指定的受理局	中华人民共和国国家知识产权局 (RO/CN)
0-7	申请人或代理人的档案号	181203235
I	发明名称	一种DPOE系统及基于该系统业务自动配置方法和网络
II	申请人	
II-1	该人是	申请人 (applicant only)
II-2	是对下列国家的申请人	除美国以外的所有指定国 (all designated States except US)
II-4zh	名称	中兴通讯股份有限公司
II-4en	Name:	ZTE CORPORATION
II-5zh	地址	中国广东省深圳市 南山区高新技术产业园 科技南路中兴通讯大厦 518057
II-5en	Address	ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan Shenzhen, Guangdong 518057 China
II-6	国籍	中国 CN
II-7	居所	中国 CN

III-1	申请人和/或发明人	
III-1-1	该人是	申请人和发明人 (applicant and inventor)
III-1-2	是对下列国家的申请人	美国 (US only)
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III-1-7	居所	中国 CN
III-2	申请人和/或发明人	
III-2-1	该人是	申请人和发明人 (applicant and inventor)
III-2-2	是对下列国家的申请人	美国 (US only)
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III-2-5 en	Address	c/o ZTE CORPORATION ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan Shenzhen, Guangdong 518057 China
III-2-6	国籍	中国 CN
III-2-7	居所	中国 CN

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III-3	申请人和/或发明人	
III-3-1	该人是	申请人和发明人 (applicant and inventor)
III-3-2	是对下列国家的申请人	美国 (US only)
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III-3-6	国籍	中国 CN
III-3-7	居所	中国 CN
IV-1	代理人,共同代表或通信地址	
	下列人员被委托/已经被委托为代表申请人在主管国际单位办理事务的	代理人 (agent)
IV-1-1zh	名称	北京安信方达知识产权代理有限公司
IV-1-1en	Name:	AFD CHINA INTELLECTUAL PROPERTY LAW OFFICE
IV-1-2zh	地址	中国北京市 海淀区学清路8号 B座 1601A 100192
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IV-1-5	电子邮址	info@afdip.com
IV-1-5(a)	电子邮件授权 授权受理局、国际检索单位、国际局和国际初步审查单位，如果其愿意，使用本电子邮件地址发送有关本国际申请的通知书:	作为随后纸件通知书的预送本
IV-1-6	代理人登记号	11262
V	国家的指定	
V-1	根据细则4.9(a)，提交本请求书即为，指定在国际申请日受PCT约束的所有成员国，以要求获得可以获得的所有保护类型，适用情况下，要求获得地区专利和国家专利。	
VI-1	要求在先国家申请的优先权	
VI-1-1	申请日	2011年 4月 13日 (13.04.2011)
VI-1-2	号码	201110092130.9
VI-1-3	国家	中国 CN
VI-2	优先权文件请求	
	请受理局准备并向国际局送交上述在先申请中标号如下的在先申请的证明副本:	VI-1

PCT请求书

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VI-3	**援引加入 ：** 如果条约11（1）(iii)（d）或（e）规定的国际申请的某一项目，或者细则20.5(a)规定的说明书，权利要求书或附图的某一部分不包含在本国际申请中，但是全部包含在一个在先申请中，并且在受理局首次收到条约11（1）(iii)规定的一个或多个项目之日要求了该在先申请的优先权，则该项目或该部分可以依据细则20.6确认，为细则20.6的目的援引加入到该国际申请中。		
VII-1	**选定的国际检索单位**	**中华人民共和国国家知识产权局 (ISA/CN)**	
VIII	**声明**	声明数目	
VIII-1	关于发明人身份的声明	–	
VIII-2	关于申请人在国际申请日有权申请和被授予专利的声明	1	
VIII-3	关于申请人在国际申请日有权要求在先申请的优先权的说明	–	
VIII-4	发明人资格声明(仅为指定美国目的)	1	
VIII-5	关于不影响新颖性的公开或缺乏新颖性的例外的声明	–	

PCT请求书

打印件(原件为电子形式)

IX	清单	页数	附以电子文档
IX-1	请求书(包括声明页)	8	✓
IX-2	说明书	10	✓
IX-3	权利要求	3	✓
IX-4	摘要	1	✓
IX-5	附图	3	✓
IX-7	共计	25	
	附件	附以纸件	附以电子文档
IX-8	费用计算页	–	✓
IX-11	总委托书副本	–	文档号 ZW0011043126
IX-18	PCT-SAFE 物理载体	–	–
IX-20	应与摘要一起公布的附图图号	3	
IX-21	国际申请所用语言	中文	
X-1	申请人，代理人或共同代表的签字	(PKCS7数字签字)	
X-1-1	名称	北京安信方达知识产权代理有限公司	
X-1-2	签字人姓名	龙洪	
X-1-3	还要注明此人是以什么名义签字的	代理人	

由受理局填写

10-1	据称的国际申请文件的实际收到日期	2012年 3月 20日 (20.03.2012)
10-2	附图:	
10-2-1	收到	
10-2-2	未收到	
10-3	由于随后在期限内收到补充国际申请的文件或附图,更改的实际收到日期	
10-4	在期限内收到根据PCT第11(2)条所进行的改正的日期	
10-5	国际检索单位	ISA/CN
10-6	检索本的传送推迟到缴纳检索费后	

由国际局填写

11-1	国际局收到登记本的日期	

(12) 按照专利合作条约所公布的国际申请

(19) 世界知识产权组织
国 际 局

(43) 国际公布日
2012 年 10 月 18 日 (18.10.2012)

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(25) 申请语言: 中文

(26) 公布语言: 中文

(30) 优先权:
201110092130.9 2011 年 4 月 13 日 (13.04.2011) CN

(71) 申请人 (对除美国外的所有指定国): **中兴通讯股份有限公司 (ZTE CORPORATION)** [CN/CN]; 中国广东省深圳市南山区高新技术产业园科技南路中兴通讯大厦, Guangdong 518057 (CN)。

(72) 发明人; 及

(75) 发明人/申请人 (仅对美国): **臧美燕 (ZANG, Meiyan)** [CN/CN]; 中国广东省深圳市南山区高新技术产业园科技南路中兴通讯大厦中兴通讯股份有限公司转交, Guangdong 518057 (CN)。 **袁立权 (YUAN, Liquan)** [CN/CN]; 中国广东省深圳市南山区高新技术产业园科技南路中兴通讯大厦中兴通讯股份有限公司转交, Guangdong 518057 (CN)。 **张超钦 (ZHANG, Chaoqin)** [CN/CN]; 中国广东省深圳市南山区高新技术产业园科技南路中兴通讯大厦中兴通讯股份有限公司转交, Guangdong 518057 (CN)。

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(81) 指定国 (除另有指明，要求每一种可提供的国家保护): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW。

(84) 指定国 (除另有指明，要求每一种可提供的地区保护): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), 欧亚 (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), 欧洲 (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU,

[见续页]

(54) **Title**: DPOE SYSTEM AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON

(54) **发明名称** : 一种 DPOE 系统及基于该系统业务自动配置方法和网络

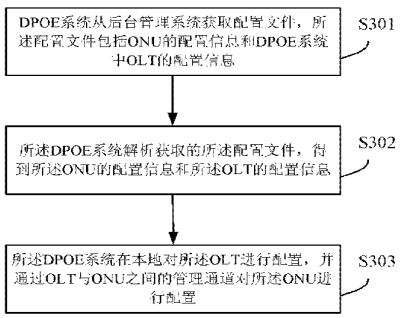


图 3 / Fig. 3

S301 A DPOE SYSTEM ACQUIRING A CONFIGURATION FILE FROM THE BACKGROUND MANAGEMENT SYSTEM, THE CONFIGURATION FILE COMPRISING THE CONFIGURATION INFORMATION OF THE ONU AND THE CONFIGURATION INFORMATION OF AN OLT IN THE DPOE SYSTEM
S302 THE DPOE SYSTEM PARSING THE ACQUIRED CONFIGURATION FILE, OBTAINING THE CONFIGURATION INFORMATION OF THE ONU AND THE CONFIGURATION INFORMATION OF THE OLT
S303 THE DPOE SYSTEM CONFIGURING THE OLT LOCALLY AND CONFIGURING THE ONU VIA A MANAGEMENT CHANNEL BETWEEN THE OLT AND THE ONU

(57) **Abstract**: A DPOE system and a service auto-configuration method and network based thereon, the DPOE system comprising an acquisition unit, an parsing unit and a configuration unit; the service auto-configuration network based on the system comprising a DPOE system, a background management system and an optical network unit (ONU); the service auto-configuration method based on the system comprising: the DPOE system acquiring a configuration file from the background management system, the configuration file comprising the configuration information of the ONU and the configuration information of an OLT in the DPOE system; the DPOE system parsing the configuration file, obtaining the configuration information of the ONU and the configuration information of the OLT; configuring the OLT locally and configuring the ONU via a management channel between the OLT and the ONU; thus the service can be activated without separately configuring the OLT after completing the initialization process of the ONU.

(57) **摘要**: DPOE 系统以及基于该系统业务自动配置的方法及网络，其中 DPOE 系统包括获取单元、解析单元和配置单元;基于该系统业务自动配置的网络包括 DPOE 系统、后台管理系统以及光网络单元(ONU)，基于该系统业务自动配置的方法包括：DPOE 系统从后台管理系统获取配置文件，所述配置文件包括 ONU 的配置信息和 DPOE 系统中 OLT 的配置信息；所述 DPOE 系统解析所述配置文件，得到 ONU 的配置信息和 OLT 的配置信息，在本地对所述 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。从而在 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通。

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IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)。

根据细则 4.17 的声明:

— 关于申请人有权申请并被授予专利(细则 4.17(ii))

— 发明人资格(细则 4.17(iv))

本国际公布:

— 包括国际检索报告(条约第 21 条(3))。

一种 DPOE 系统及基于该系统业务自动配置方法和网络

技术领域

本发明涉及通信领域，具体涉及一种无源光网络（Passive Optical Network，简称 PON），特别是基于有线传输数据业务接口规范（Data over Cable Service Interface System，DOCSIS）后台管理系统的以太网无源光网络系统的业务自动配置方法。

背景技术

基于 DOCSIS 管理后台的 PON 系统，以 DPOE（基于 DOCSIS 管理后台的以太网无源光网络）网络为例，图 1 是 DPOE 网络的拓扑结构图，该网络由包含 TFTP（Trivial File Transfer Protocol，简单文件传送协议）服务器的后台管理系统，包含 vCM(虚拟同轴电缆调制解调器)、OLT(Optical Line Terminal，光线路终端)以及其他设备的 DPOE 系统，DPOE ONU(Optical Network Unit，光网络单元)以及连接在 ONU 上的 CPE(Customer Premise Equipment，用户终端设备)终端组成。ONU 发起注册的过程是模拟同轴调整解调器的初始化过程，由 vCM 发起，并从 TFTP 服务器获取配置文件，DPOE 系统再把获取的配置文件的配置信息配置通过管理通道发送给 ONU。

如图 2 所示，目前的 ONU 的数据配置过程主要是通过如下过程完成：

S201：ONU 上电，开始初始化过程；

S202：ONU 和 DPOE 系统完成 PON 层的初始化过程；

S203：DPOE 系统对 ONU 进行认证，认证通过，完成注册；

S204 ~S205：DPOE 系统中的 vCM 会发起根据 DOCSIS 3.0 规范中规定的初始化过程，向后台管理系统发送 TFTP 请求，从后台管理系统的 TFTP 服务器上下载配置文件；

S206 ~S207：经过相关处理后，然后再通过相应的配置管理通道，配置到相关的 ONU 上，配置文件中包含运营商为 ONU 上连接的用户提供的服务属性和参数；

S208：对 ONU 完成数据配置后，ONU 通知 DPOE 系统，整个 ONU 的注册过程结束。

但是完成对 ONU 的配置，要使 ONU 上的业务正常运行，还需要对 OLT 进行相应的配置。一般情况下，对 OLT 的配置需要单独通过手工进行配置，或者通过命令行，或者通过网元管理系统（Element Management System，EMS）和 OLT 之间的简单网络管理协议（Simple Network Management Protocol，SNMP）接口进行。

对应企业用户开通业务，一般需要大量的对 DPOE 系统的 OLT 的配置，完成业务的开通，所以对于开通这些业务的 ONU，需要同时配置 OLT 的相关参数。

例如，一般针对以太网虚拟专网（Ethernet Virtual Private LAN，EVP-LAN）业务的正常开通，需要在 OLT 和 ONU 进行如虚拟局域网（Virtual Local Area Network，VLAN）的相关配置，包括

在 ONU 上需要进行的配置为：

1、ONU 上标识端口 UNI 上运行的具体业务的 VLAN;

2、ONU 上标识 UNI 端口的相应业务对应的逻辑链路标记（Logical Link Identifier，LLID）/通用封装方法（Generic Encapsulation Method，GEM ）端口标识 PORT ID。

DPOE 系统的 OLT:

1、DPOE 系统的 OLT 上（PON 线卡）与 UNI 端口上运行的具体业务关联的 LLID/GEM PORT ID;

2、DPOE 系统的 OLT PON 线卡上针对 ONU 上端口 UNI 上运行的具体业务使用的 VLAN;

3、DPOE 系统的 OLT 业务处理板上标识 ONU 上 UNI 端口上运行的具体业务对应的 VLAN;

4、DPOE 系统的 OLT 业务处理板上与 ONU UNI 端口上运行的具体业务关联的多协议标签交换（Multi-Protocol Label Switching，MPLS）实例;

5、DPOE 系统的 OLT 上与 ONU UNI 端口上运行的具体业务关联的 MPLS 伪线标识;

6、DPOE 系统的 OLT 启动 MPLS 协议;

7、DPOE 系统的 OLT 上对应 ONU 上 UNI 端口上运行的具体业务，对应的上联口的 VLAN 标识。

由此可见，运行该业务，需要在 DPOE 系统的 OLT 上进行的相应多次配置，比较复杂，这种分别配置 ONU 和 OLT 的方式，在配置效率上不高。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，更会影响整个系统的配置效率。

发明内容

本发明需要解决的技术问题是提供一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统以及基于该系统业务自动配置的方法及网络，以使 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通，以提高整个系统的配置效率。

为了解决上述技术问题，本发明提供了一种基于 DOCSIS 管理后台的无源光网络（DPOE）系统业务自动配置的方法，包括:

DPOE 系统从后台管理系统获取配置文件，该配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息;

DPOE 系统解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息;

DPOE 系统在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

优选地，OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

优选地，ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种;

OLT 的配置信息包括与 ONU 开通的业务相关的 OLT 的 VLAN、用户端

口和用户 MAC 地址中的一种或多种。

优选地，DPOE 系统解析获取的配置文件时，还将 ONU 的配置信息转换为 ONU 可以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

优选地，方法是在 ONU 初始化过程中执行的。

此外，为了解决上述技术问题，本发明还提供了一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统，包括获取单元、解析单元和配置单元；其中，

获取单元设置为：从后台管理系统获取配置文件，该配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中 OLT 的配置信息；

解析单元设置为：解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息；

配置单元设置为：在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

优选地，解析单元还设置为：解析获取的配置文件时，将 ONU 的配置信息转换为 ONU 可以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

此外，为了解决上述技术问题，本发明还提供了一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统业务自动配置的网络，包括 DPOE 系统、后台管理系统以及光网络单元(ONU)，其中，

DPOE 系统采用如上面所述的 DPOE 系统；

后台管理系统设置为：保存配置文件，并将配置文件下载到 DPOE 系统中， 该配置文件包括 ONU 的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息。

优选地，后台管理系统包括简单文件传送协议（TFTP）服务器，设置为：接收 DPOE 系统发起的 TFTP 请求，并响应该 TFTP 请求，将配置文件下载到 DPOE 系统中。

优选地，OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

优选地，ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种；

OLT 的配置信息包括与 ONU 开通的业务相关的 OLT 的 VLAN、用户端口和用户 MAC 地址中的一种或多种。

本发明实施例提供的 DPOE 系统以及基于该系统业务自动配置的方法及网络，通过一个包括有 ONU 配置信息和 DPOE 系统中 OLT 配置信息的配置文件，同时完成 OLT 和 ONU 的自动化配置，在 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，可以非常好地提高整个系统的配置效率。

附图概述

图 1 为 DPOE 网络的拓扑结构图；

图 2 为常规 ONU 数据配置流程图；

图 3 为本发明实施例 DPOE 系统业务自动配置的方法流程图；

图 4 为本发明实施例的 OLT 和 ONU 的自动配置的流程图。

本发明的较佳实施方式

为使本发明的目的、技术方案和优点更加清楚明白，下文中将结合附图对本发明的实施例进行详细说明。需要说明的是，在不冲突的情况下，本申请中的实施例及实施例中的特征可以相互任意组合。

如图 3 所示，本发明实施例提供了一种 DPOE 系统业务自动配置的方法，包括以下步骤：

S301：DPOE 系统从后台管理系统获取配置文件，配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息；

在 ONU 初始化过程中，DPOE 系统中的 vCM(虚拟同轴电缆调制解调器)向后台管理系统发起 TFTP 请求，DPOE 系统从该后台管理系统获取配置文件，配置文件中包含了增加了的针对 DPOE 系统的 OLT 的配置信息，OLT 的配置信息是和 ONU 开通的业务相关的配置信息，这样 DPOE 系统获取的配置文件包括配置 ONU 和 OLT 的配置信息。

S302：DPOE 系统解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息；

DPOE 系统解析获取的配置文件时，还将 ONU 的配置信息转换为 ONU 可以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

S303：DPOE 系统在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

DPOE 系统获取配置文件后解析配置文件，并区分配置 ONU 和 OLT 的配置信息，在本地对 OLT 进行配置，配置 ONU 的信息通过 DPOE 系统和 ONU 之间的管理通道进行传递，并配置 ONU 的相关参数。管理通道可以包括 GPON 的 OMCI 通道或 EPON 系统的扩展 OAM。

对应企业用户开通业务，一般开通的业务包括但不限于基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务和基于以太网的局域网（E-LAN）业务。需要大量的对 DPOE 系统的 OLT 的配置，完成业务的开通，所以对于开通这些业务的 ONU，需要同时配置 OLT 的相关参数，比如 VLAN、用户端口和用户媒体访问控制（Medium Access Control，MAC）地址等信息。

相应地，本发明实施例还提供了一种 DPOE 系统，包括获取单元、解析单元、配置单元，其中，

获取单元，用于从后台管理系统获取配置文件，该配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息；

解析单元，用于解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息；

解析单元解析获取的配置文件时，还将 ONU 的配置信息转换为 ONU 可

以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

配置单元，用于在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

在一个应用示例中，DPOE 系统的 Vcm 可以实现上述获取单元、解析单元和配置单元的相应功能。

在具体实施时，Vcm 可以作为单独的功能实体，也可以集成在 OLT 上成为 OLT 的一部分。

相应地，本发明实施例还提供了一种 DPOE 系统业务自动配置的网络，包括 DPOE 系统、后台管理系统以及光网络单元 ONU，其中，

DPOE 系统可以采用上面提供的 DPOE 系统；

后台管理系统，用于保存配置文件，并将配置文件下载到 DPOE 系统中，该配置文件包括 ONU 的配置信息和 DPOE 系统中 OLT 的配置信息。

该后台管理系统包括 TFTP 服务器，TFTP 服务器用于接收 DPOE 系统发起的 TFTP 请求，并响应该 TFTP 请求，把配置文件下载到 DPOE 系统中。

其中 OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

ONU 开通的业务包括 E-LINE 业务、E-TREE 业务和 E-LAN 业务中的一种或多种；

OLT 的配置信息包括与 ONU 开通的业务相关的 OLT 的 VLAN、用户端口和用户 MAC 地址中的一种或多种。

在一个应用示例中，如图 4 所示，在 ONU 上电注册的过程中，同时完成对 ONU 和 DPOE 系统的 OLT 进行配置的过程为：

S401：ONU 上电，开始初始化过程；

S402：ONU 和 DPOE 系统完成 PON 层的初始化过程；

S403：DPOE 系统对 ONU 进行认证，认证通过；

S404：vCM 向后台管理系统的动态主机配置协议（Dynamic Host Configuration Protocol，DHCP）服务器起 DHCP 请求；

S405：后台管理系统的 DHCP 服务器针对 DHCP 请求进行响应，给 vCM

分配 IP 地址;

S406: vCM 向后台管理系统的 TFTP 服务器发起 TFTP 请求，请求获取该 vCM 对应的 ONU 的配置数据文件;

S407: 后台管理系统的 TFTP 服务器响应 vCM 发起的 TFTP 请求，把该 vCM 对应的 ONU 的配置文件下载到 DPOE 系统中;

S408: 对上述配置文件进行分析处理，该配置文件中包含有针对 EVP-LAN 业务自动运行需要针对 DPOE 系统的 OLT 进行配置的 TLV，比如：在 OLT 上增加针对 ONU 上端口 UNI1 运行的业务 V1 进行标识的 VLAN 为 V2，该 TLV 为现有 DOCSIS3.0 标准中新增加的 TLV，该 TLV 的格式如表 1 所示如下:

表 1: DOCSIS3.0 标准中新增加的 TLV 的格式

长度 (octets)	字段(name)		取值 (hex)	备注（Notes）
1	Type(类型)		0x02	DPOE 系统的 OLT 上标识某业务对应的 VLAN 标识
1	长度（Length）		可变	11+N
6	取值（Value）	ONU 标识	可变（varies）	ONU 的 MAC 地址标识
1		ONU 端口号	可变（varies）	
2		ONU 上运行的业务对应的 VLAN 标识	可变（varies）	
2		OLT 上对 ONU 某 UNI 端口运行的某业务的 VLAN 标识	可变 (varies)	
N		自定义字段（Vendor-specific field）	可变（varies）	

再如：配置 OLT 上与 ONU 端口 UNI1 上运行的业务 V1 关联的 MPLS 伪线标识 PW1，该 TLV 可如表 2 所示如下：

表 2：DOCSIS3.0 标准中新增加的 TLV 的格式

长度 (octets)	字段(name)		取值 (hex)	备注（Notes）
1	Type(类型)		0x05	OLT 上标识某业务对应的 MPLS 的 PW 的标识
1	长度（Length）		可变	13+N
6	取值（Value）	ONU 标识	可变（varies）	ONU 的 MAC 地址标识
1		ONU 端口号	可变（varies）	
2		ONU 上运行的业务对应的 VLAN 标识	可变（varies）	
4		OLT 上对 ONU 某 UNI 端口运行的某业务的 PW 标识	可变 (varies)	
N		自定义字段（Vendor-specific field）	可变（varies）	

S409：经过步骤 S408 的分析处理，把配置文件中的基于 DOCSIS 的 TLV 分别转换为 ONU 和 OLT 可以识别的消息格式。DPOE 系统会识别哪些配置消息针对 OLT，哪些配置消息针对 ONU。比如，DPOE 系统可以根据 type 字段的内容自动识别 OLT 的配置数据以及 ONU 的配置数据，如果是针对 OLT 进行配置的，则使配置消息在 OLT 本地生效，如果是针对 ONU 进行配置的数据，则进行步骤 S410。

S410：OLT 把针对 ONU 进行配置的数据通过 OLT 和 ONU 之间的管理通道，比如扩展 OAM、OMCI，把相关数据配置到 ONU 上。

S411：对 ONU 完成数据配置后，ONU 通知 DPOE 系统，整个 ONU 的注册过程结束

此时，即可开通 ONU 上 UNI1 连接的用户的 EVP-LAN 业务，而不再需要其他额外配置。

从上述实施例可以看出，相对于现有技术，本发明在配置文件中增加了针对 DPOE 系统的 OLT 的配置信息，同时完成对 OLT 和 ONU 进行自动化配置，在 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，可以非常好地提高整个系统的配置效率。

以上，仅是本发明的最佳实施例而已，并非用于本发明的保护范围。凡在本发明的精神和原则之内，所做的任何修改都应包含在本发明的保护范围之内。

工业实用性

本发明实施例提供的 DPOE 系统以及基于该系统业务自动配置的方法及网络，通过一个包括有 ONU 配置信息和 DPOE 系统中 OLT 配置信息的配置文件，同时完成 OLT 和 ONU 的自动化配置，在 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，可以非常好地提高整个系统的配置效率。

权 利 要 求 书

1、 一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统业务自动配置的方法，包括:

所述 DPOE 系统从后台管理系统获取配置文件，所述配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息;

所述 DPOE 系统解析获取的所述配置文件，得到所述 ONU 的配置信息和所述 OLT 的配置信息;

所述 DPOE 系统在本地对所述 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对所述 ONU 进行配置。

2、 如权利要求 1 所述的方法，其中，

所述 OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

3、 如权利要求 2 所述的方法，其中，

所述 ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种;

所述 OLT 的配置信息包括与所述 ONU 开通的业务相关的 OLT 的虚拟局域网（VLAN）、用户端口和用户媒体访问控制（MAC）地址中的一种或多种。

4、 如权利要求 1 所述的方法，其中，

所述 DPOE 系统解析获取的所述配置文件时，还将所述 ONU 的配置信息转换为 ONU 可以识别的消息格式，将所述 OLT 的配置信息转换为 OLT 可以识别的消息格式。

5、 如权利要求 1 所述的方法，其中，

所述方法是在 ONU 初始化过程中执行的。

6、 一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统，包

括获取单元、解析单元和配置单元;

所述获取单元设置为：从后台管理系统获取配置文件，所述配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中 OLT 的配置信息;

所述解析单元设置为：解析获取的所述配置文件，得到所述 ONU 的配置信息和所述 OLT 的配置信息;

所述配置单元设置为：在本地对所述 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对所述 ONU 进行配置。

7、 如权利要求 6 所述的系统，其中，

所述解析单元还设置为：解析获取的所述配置文件时，将所述 ONU 的配置信息转换为 ONU 可识别的消息格式，将所述 OLT 的配置信息转换为 OLT 可识别的消息格式。

8、 一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统业务自动配置的网络，包括 DPOE 系统、后台管理系统以及光网络单元(ONU)，其中，

所述 DPOE 系统采用如权利要求 6 或 7 所述的 DPOE 系统;

所述后台管理系统设置为：保存配置文件，并将所述配置文件下载到 DPOE 系统中， 所述配置文件包括 ONU 的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息。

9、 如权利要求 8 所述的网络，其中，

所述后台管理系统包括简单文件传送协议（TFTP）服务器，设置为：接收 DPOE 系统发起的 TFTP 请求，并响应该 TFTP 请求，将所述配置文件下载到 DPOE 系统中。

10、 如权利要求 8 或 9 所述的网络，其中，

所述 OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

11、 如权利要求 10 所述的网络，其中，

所述 ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种;

所述OLT的配置信息包括与所述ONU开通的业务相关的OLT的VLAN、用户端口和用户 MAC 地址中的一种或多种。

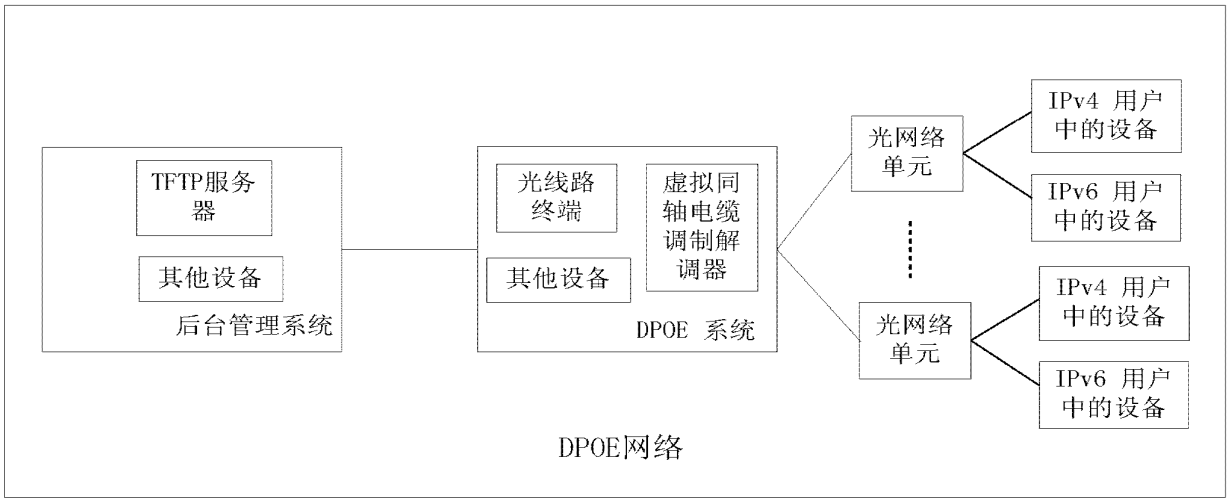

TFTP服务器
其他设备
后台管理系统
光线路终端
其他设备
虚拟同轴电缆调制解调器
DPOE 系统
光网络单元
光网络单元
IPv4 用户中的设备
IPv6 用户中的设备
IPv4 用户中的设备
IPv6 用户中的设备
DPOE网络

图 1

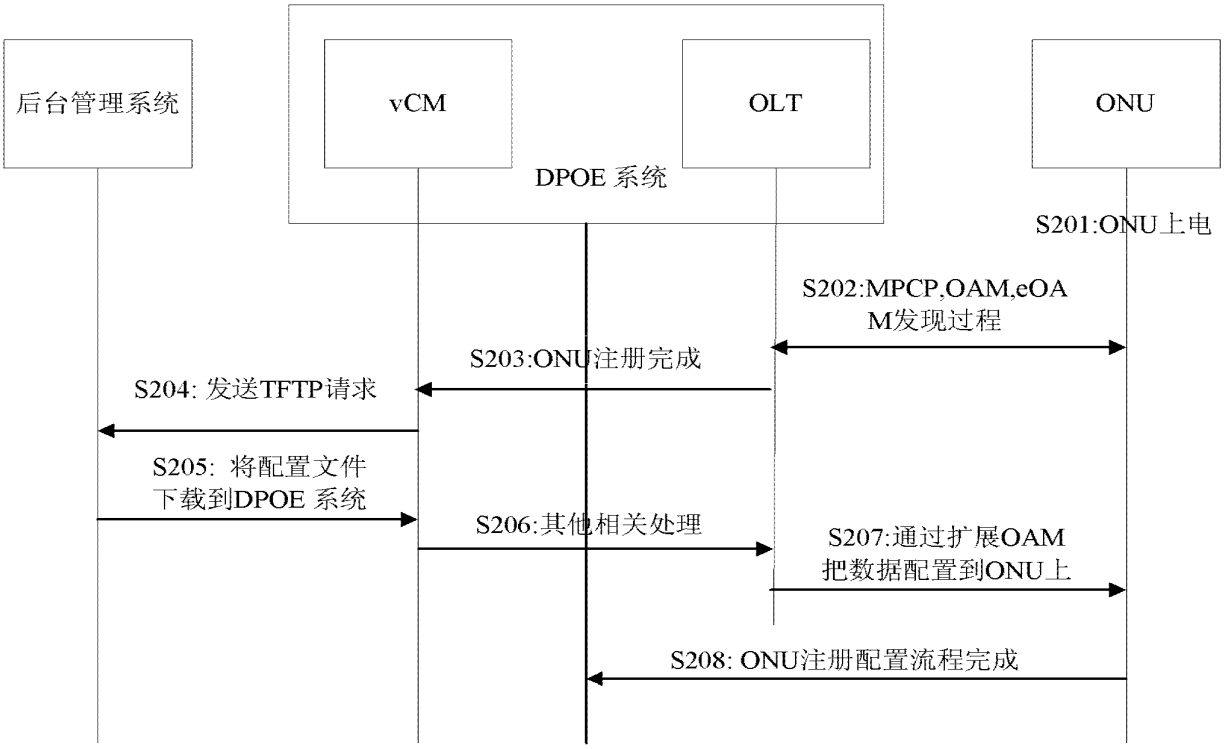

后台管理系统
vCM
OLT
ONU
DPOE 系统
S201:ONU上电
S202:MPCP,OAM,eOAM发现过程
S203:ONU注册完成
S204: 发送TFTP请求
S205: 将配置文件下载到DPOE 系统
S206:其他相关处理
S207:通过扩展OAM把数据配置到ONU上
S208: ONU注册配置流程完成

图 2

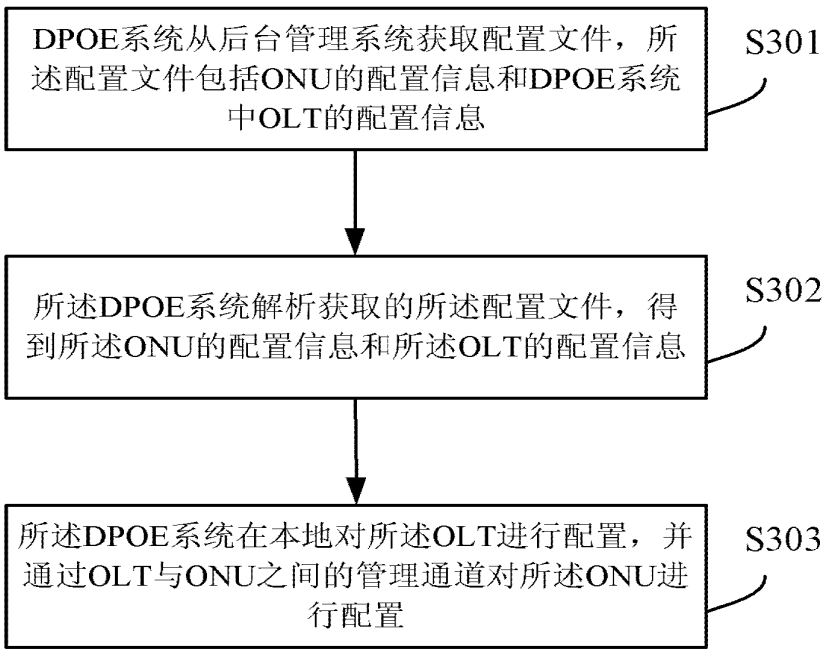

DPOE系统从后台管理系统获取配置文件，所述配置文件包括ONU的配置信息和DPOE系统中OLT的配置信息
S301
所述DPOE系统解析获取的所述配置文件，得到所述ONU的配置信息和所述OLT的配置信息
S302
所述DPOE系统在本地对所述OLT进行配置，并通过OLT与ONU之间的管理通道对所述ONU进行配置
S303

图 3

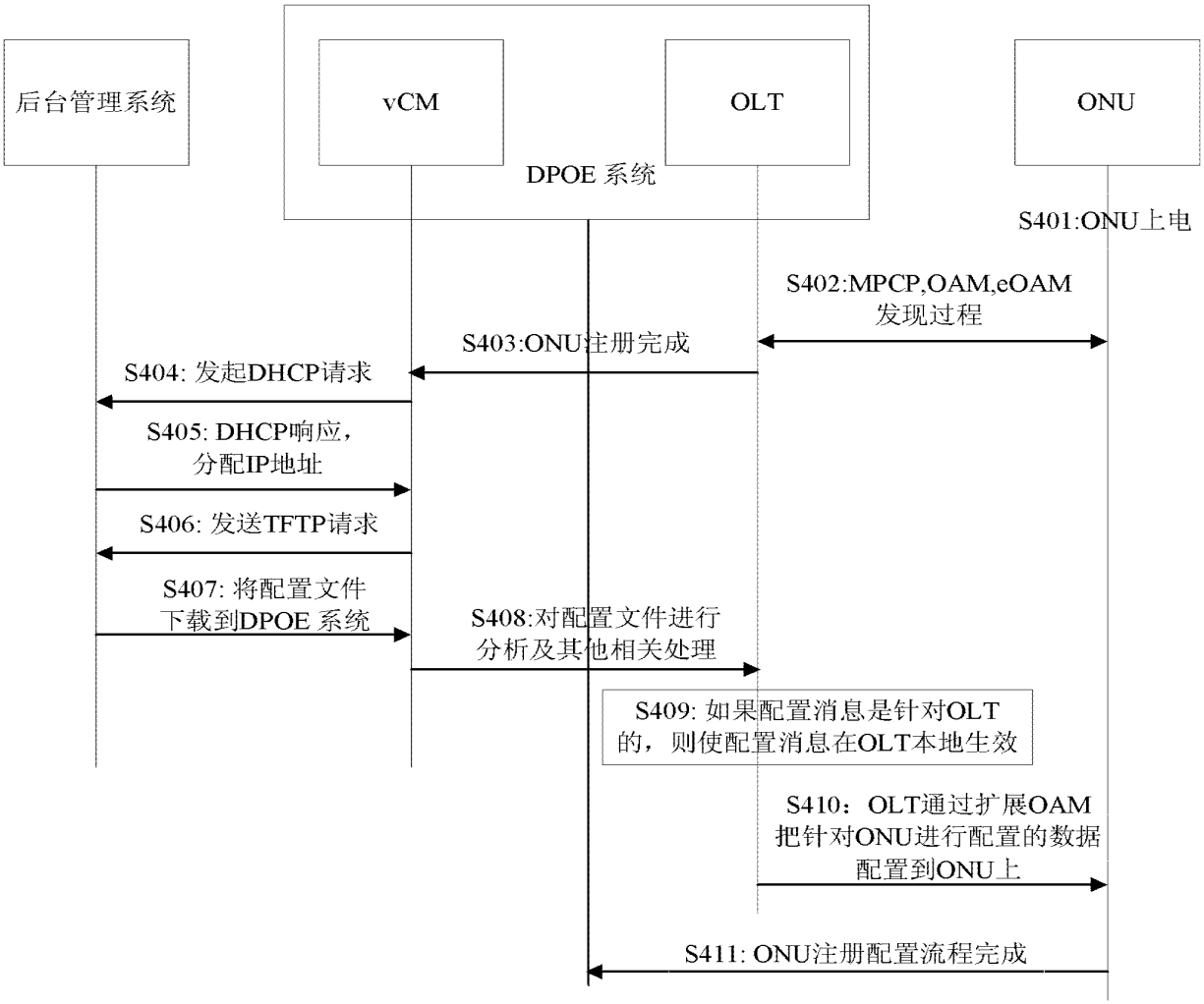

后台管理系统
vCM
OLT
ONU
DPOE 系统
S401:ONU上电
S402:MPCP,OAM,eOAM
发现过程
S403:ONU注册完成
S404: 发起DHCP请求
S405: DHCP响应，
分配IP地址
S406: 发送TFTP请求
S407: 将配置文件
下载到DPOE 系统
S408:对配置文件进行
分析及其他相关处理
S409: 如果配置消息是针对OLT
的，则使配置消息在OLT本地生效
S410：OLT通过扩展OAM
把针对ONU进行配置的数据
配置到ONU上
S411: ONU注册配置流程完成

图 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/072633

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/24 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H04L, H04Q, H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CPRSABS, CNTXT, CNKI: DOCSIS, backstage, passive, optical network, DPOE, configuration, ONU, OLT, analysis, channel, address, management

VEN: DOCSIS, BACKSTAGE, PASSIVE, OPTICAL W NETWORK?, CONFIGUR+, DOPE. ONU, OLT, ANALYTIC+, CHANNEL?, ADDRESS??, MANAGEMENT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 101997725 A (ZTE CORP.), 30 March 2011 (30.03.2011), abstract, description, paragraphs 16-21, paragraphs 40-42, and paragraphs 56-57, and figure 2	1-11
A	CN 101888575 A (ZTE CORP.), 17 November 2010 (17.11.2010), the whole document	1-11
A	CN 101741712 A (HUAWEI TECHNOLOGIES CO., LTD.), 16 June 2010 (16.06.2010), the whole document	1-11

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 June 2012 (10.06.2012)	**28 June 2012 (28.06.2012)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **FU, Lingxiao** Telephone No.: (86-10) **62411235**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/072633

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 101997725 A	30.03.2011	None	
CN 101888575 A	17.11.2010	WO 2012013042 A1	02.02.2012
CN 101741712 A	16.06.2010	WO 2010057414 A1	27.05.2010

Form PCT/ISA/210 (patent family annex) (July 2009)

国际检索报告

国际申请号 **PCT/CN2012/072633**

A. 主题的分类

H04L 12/24 (2006.01) i

按照国际专利分类(IPC)或者同时按照国家分类和 IPC 两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

IPC: H04L, H04Q, H04W

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用）)

CPRSABS, CNTXT, CNKI: DOCSIS，后台，无源，光网络，DPOE，配置，ONU，OLT，解析，通道，地址，管理

VEN: DOCSIS, BACKSTAGE, PASSIVE, OPTICAL W NETWORK?, CONFIGUR+, DOPE. ONU, OLT, ANALYTIC+, CHANNEL?, ADDRESS??, MANAGEMENT

C. 相关文件

类　型*	引用文件，必要时，指明相关段落	相关的权利要求
X	CN101997725A（中兴通讯股份有限公司）30.3 月 2011（30.03.2011） 摘要，说明书第 16-21 段，第 40-42 段，第 56-57 段，附图 2	1-11
A	CN101888575A（中兴通讯股份有限公司）17.11 月 2010（17.11.2010） 全文	1-11
A	CN101741712A（华为技术有限公司）16.6 月 2010（16.06.2010） 全文	1-11

☐ 其余文件在 C 栏的续页中列出。　　☒ 见同族专利附件。

* 引用文件的具体类型：

"A" 认为不特别相关的表示了现有技术一般状态的文件

"E" 在国际申请日的当天或之后公布的在先申请或专利

"L" 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件（如具体说明的）

"O" 涉及口头公开、使用、展览或其他方式公开的文件

"P" 公布日先于国际申请日但迟于所要求的优先权日的文件

"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件

"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性

"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性

"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
10.6 月 2012 (10.06.2012)	**28.6 月 2012 (28.06.2012)**
ISA/CN 的名称和邮寄地址： 中华人民共和国国家知识产权局 中国北京市海淀区蓟门桥西土城路 6 号 100088 传真号：　(86-10)62019451	受权官员 付凌霄 电话号码：(86-10) **62411235**

PCT/ISA/210 表(第 2 页) (2009 年 7 月)

国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2012/072633

检索报告中引用的专利文件	公布日期	同族专利	公布日期
CN101997725A	30.03.2011	无	
CN101888575A	17.11.2010	WO2012013042A1	02.02.2012
CN101741712A	16.06.2010	WO2010057414A1	27.05.2010

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/009,703	Filing Date 10/03/2013	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	10/03/2013	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 13	Minus	** 20	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/PAMELA v. THERATT/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
14/009,703	Meiyan Zang	95-1008

36163
PLUMSEA LAW GROUP, LLC
10411 MOTOR CITY DRIVE
SUITE 320
BETHESDA, MD 20817

INTERNATIONAL APPLICATION NO.	
PCT/CN2012/072633	
I.A. FILING DATE	PRIORITY DATE
03/20/2012	04/13/2011

CONFIRMATION NO. 1821
371 ACCEPTANCE LETTER

OC000000064379097

Date Mailed: 10/16/2013

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

10/03/2013	10/03/2013
DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS	DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Copy of the International Application filed on 10/03/2013
- English Translation of the IA filed on 10/03/2013
- Copy of the International Search Report filed on 10/03/2013
- Preliminary Amendments filed on 10/03/2013
- Oath or Declaration filed on 10/03/2013
- Request for Immediate Examination filed on 10/03/2013
- U.S. Basic National Fees filed on 10/03/2013
- Priority Documents filed on 10/03/2013

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

SHELBY J MILLER

Telephone: (571) 272-0384

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/009,703	10/03/2013		1480	95-1008	13	3

CONFIRMATION NO. 1821

36163
PLUMSEA LAW GROUP, LLC
10411 MOTOR CITY DRIVE
SUITE 320
BETHESDA, MD 20817

FILING RECEIPT

OC000000064379096

Date Mailed: 10/16/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Meiyan Zang, Shenzhen City, CHINA;
Liquan Yuan, Shenzhen City, CHINA;
Chaoqin Zhang, Shenzhen City, CHINA;

Applicant(s)

Meiyan Zang, Shenzhen City, CHINA;
Liquan Yuan, Shenzhen City, CHINA;
Chaoqin Zhang, Shenzhen City, CHINA;

Assignment For Published Patent Application

ZTE Corporation, Shenzhen City, Guangdong Province, CHINA

Power of Attorney: The patent practitioners associated with Customer Number 36163

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/CN2012/072633 03/20/2012

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
CHINA 2011100921130.9 04/13/2011 No Access Code Provided

If Required, Foreign Filing License Granted: 10/11/2013
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/009,703**
Projected Publication Date: 01/23/2014
Non-Publication Request: No
Early Publication Request: No

Title

DPOE System And Service Auto-Configuration Method And Network Based Thereon

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/009,703

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	480
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	13 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1480

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

Application Number	Filing Date
14009703	

Applicant(s) Meiyan ZANG

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT			*		*		*	
	Indep	Depend	Indep	Depend	Indep	Depend		Indep	Depend	Indep	Depend	Indep	Depend
1	1		1				51						
2		1		1			52						
3		1		1			53						
4		1		1			54						
5		1		1			55						
6	1		1				56						
7		1		1			57						
8		2	1				58						
9		2		1			59						
10		4		1			60						
11		4		1			61						
12				1			62						
13				1			63						
14							64						
15							65						
16							66						
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41							91						
42							92						
43							93						
44							94						
45							95						
46							96						
47							97						
48							98						
49							99						
50							100						
Total Indep	2		3		0								
Total Depend	17	↵	10	↵	0	↵							
Total Claims	19		13		0								

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14009703
Filing Date	2013-10-03
First Named Inventor	Meiyan Zang
Art Unit	2636
Examiner Name	Kenneth N. Vanderpuye
Attorney Docket Number	95-1008

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	101997725A	CN		2011-03-30	ZTE CORP		☐
	2	101888575A	CN		2010-11-17	ZTE CORP		☐
	3	101741712	CN		2010-06-16	HUAWEI TECHNOLOGIES CO LTD		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14009703
	Filing Date	2013-10-03
	First Named Inventor	Meiyan Zang
	Art Unit	2636
	Examiner Name	Kenneth N. Vanderpuye
	Attorney Docket Number	95-1008

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	International Search Report mailed June 28, 2012 in International Application Number PCT/CN2012/072633.	☐

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/ Patricia E. Hong /	Date (YYYY-MM-DD)	2013-11-21
Name/Print	Patricia E. Hong	Registration Number	34,373

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Espacenet

Bibliographic data: CN101997725 (A) — 2011-03-30

System and device for bearing data over cable service interface specification (DOCSIS) service based on passive optical network (PON)

No documents available for this priority number.

Inventor(s): HAIPENG WANG ± (WANG HAIPENG)

Applicant(s): ZTE CORP ± (ZTE CORP)

Classification: - international: ***H04L12/24; H04Q11/00***
- cooperative:

Application number: CN20101558866 20101125

Priority number(s): CN20101558866 20101125

Abstract of CN101997725 (A)

The invention discloses a system and a service for bearing a data over cable service interface specification (DOCSIS) service based on a passive optical network (PON). The system comprises a DOCSIS network management system, PON equipment, and intermediate layer equipment arranged between the DOCSIS network management system and the PON equipment, wherein the intermediate layer equipment is used for mapping a service event reported by the PON equipment to be a DOCSIS service event according to the preset mapping rule, and managing the PON equipment based on the management configuration information sent by the DOCSIS network management system. The system ensures that the PON access equipment and the DOCSIS network management system are in a transparent mode so that the existing resources of operators and equipment manufacturers are used fully. The system is in a smooth and steady evolution mode from the aspect of network evolution.

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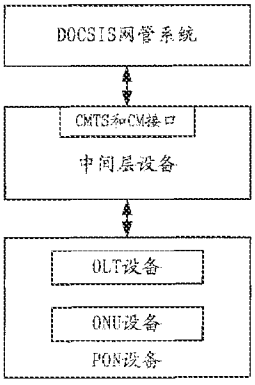
权利要求书 2 页 说明书 6 页 附图 4 页

(54)发明名称

一种基于PON承载DOCSIS业务的系统和装置

(57)摘要

本发明公开了一种基于PON承载DOCSIS业务的系统和装置，所述系统包括：DOCSIS网管系统、PON设备以及部署在二者间的中间层设备；所述中间层设备，用于根据预先配置的映射规则，将所述PON设备上报的业务事件映射为DOCSIS业务事件；并基于所述DOCSIS网管系统发送的管理配置信息实现对所述PON设备的管理。本发明所述系统可以使PON接入设备和DOCSIS网管系统相互透明，使运营商和设备商的现有资源得到了最大化的利用，从网络演进的角度上看，也为一种平滑稳定的演进方式。



CN 101997725 A

1. 一种基于无源光网络PON承载电缆数据业务接口规范DOCSIS业务的系统，其特征在于，包括：DOCSIS网管系统、PON设备以及部署在二者间的中间层设备；

所述中间层设备，用于根据预先配置的映射规则，将所述PON设备上报的业务事件映射为DOCSIS业务事件；并基于所述DOCSIS网管系统发送的管理配置信息实现对所述PON设备的管理。

2. 如权利要求1所述的系统，其特征在于，

所述中间层设备配置有电缆调制解调器终端系统CMTS和电缆调制解调器CM接口，用于与所述DOCSIS网管系统通信；

所述中间层设备与所述PON设备间建立有通信通道，该通道采用传输控制协议TCP连接。

3. 如权利要求1或2所述的系统，其特征在于，所述预先配置的映射规则包括：将所述PON设备中光网络单元ONU设备业务事件映射为DOCSIS业务中CM设备的业务事件；将所述PON设备中光线路终端OLT设备的业务事件映射为DOCSIS业务中CMTS设备的业务事件。

4. 如权利要求3所述的系统，其特征在于，所述ONU设备的业务事件包括ONU设备上电业务事件；所述OLT设备的业务事件包括OLT设备的加卡/删卡业务事件。

5. 如权利要求4所述的系统，其特征在于，

所述中间层设备接收到PON设备上报的ONU设备上电业务事件时，根据预先配置的映射关系，将所述ONU设备上电业务事件转化为DOCSIS业务中CM上电事件，模拟CM上电注册流程，并将上电获取的配置信息作为响应消息发送至所述PON设备。

6. 如权利要求1或5所述的系统，其特征在于，所述中间层设备与所述PON设备间交互消息的格式符合DOCSIS机架图接口协议的自定义类型·长度·值TLV格式。

7. 如权利要求1或2所述的系统，其特征在于，所述DOCSIS网管系统发送的管理配置信息包括：DOCSIS配置信息和非DOCSIS配置信息；其中，DOCSIS配置信息为DOCSIS标准中独有的管理信息；非DOCSIS配置信息为可与PON标准共用的管理信息。

8. 如权利要求7所述的系统，其特征在于，

所述DOCSIS网管系统将所述DOCSIS配置信息发送至所述中间层设备，所述中间层设备将所述DOCSIS配置信息映射为PON设备配置信息后发送至所述PON设备，并在接收到所述PON设备返回的执行结果后，进行本地DOCSIS配置，并将配置结果上报至所述DOCSIS网管系统；

所述DOCSIS网管系统将非DOCSIS配置信息直接发送至所述PON设备。

9. 如权利要求1所述的系统，其特征在于，所述中间层设备、DOCSIS网管系统和PON设备内分别配置有数据库，用于存储相应的业务数据；

所述DOCSIS网管系统定时检测各数据库，判断各数据库中的业务数据是否根据映射规则一一对应，若不是，则向上层发送告警消息。

10. 如权利要求1所述系统，其特征在于，所述PON设备包括以太网无源光网络EPON设备和GPON设备。

11. 一种中间层设备，其特征在于，包括：

映射处理模块，用于根据预先配置的映射规则，将PON设备上报的业务事件映射为DOCSIS业务事件；

管理配置模块，用于基于 DOCSIS 网管系统发送的管理配置信息实现对所述 PON 设备的管理。

12. 如权利要求 11 所述的中间层设备，其特征在于，所述中间层设备通过配置的 CMTS 和 CM 接口与所述 DOCSIS 网管系统通信；通过建立的通信通道与所述 PON 设备通信，所述通信通道采用传输控制协议 TCP 连接。

13. 如权利要求 11 或 12 所述的中间层设备，其特征在于，所述预先配置的映射规则包括：将所述 PON 设备中光网络单元 ONU 设备业务事件映射为 DOCSIS 业务中 CM 设备的业务事件；将所述 PON 设备中光线路终端 OLT 设备的业务事件映射为 DOCSIS 业务中 CMTS 设备的业务事件。

一种基于 PON 承载 DOCSIS 业务的系统和装置

技术领域

[0001] 本发明涉及通信技术领域，尤其涉及一种基于 PON(Optical Network，无源光网络）承载 DOCSIS(Data Over Cable Service Interface Specification，电缆数据业务接口规范）业务的系统和装置。

背景技术

[0002] 随着网络技术的日益发展，网络向客户提供的业务逐渐从分离的业务向 IP 为基础的综合业务过渡，形成综合的多媒体环境，可向用户提供从窄带到宽带的多种业务服务。有线电视业务和部分宽带业务通过同轴电缆网传播，特别是在北美，由于 DOCSIS 技术的成熟，有着众多的 Cable Modem 用户。

[0003] 随着 DWDM 技术及计算机技术的迅猛发展，主干网和用户网已经得到了如同雨后春笋般的发展。而建立一个新的与之相对应的网络“最后一公里”的网络，成为网络发展的迫切要求。EPON 就是这个热点领域的热点技术。EPON 是几个最佳的技术和网络结构的结合。EPON 采用点到多点结构，无源光纤传输方式，在以太网之上提供多种业务。目前，IP 以太网占到整个局域网通信的 95％以上，EPON 由于使用上述的经济和高效结构，是连接接入网最终用户的一种最有效的通信方法。10G 以太主干的出现也将使 EPON 成为未来全光网中最佳的“最后一公里”的解决方案。

[0004] 将 DOCSIS 网络升级成 EPON 系统是未来接入网的一个方向，如何保护运营商已有的资源，以及给运营商提供一个平稳的过渡方案非常重要。

发明内容

[0005] 本发明提供一种基于 PON 承载 DOCSIS 业务的系统和装置，用以为 DOCSIS 网络升级成 PON 系统提供平稳的过渡方案。

[0006] 具体的，本发明提供的基于 PON 承载 DOCSIS 业务的系统，包括 ：DOCSIS 网管系统、PON 设备以及部署在二者间的中间层设备 ；

[0007] 所述中间层设备，用于根据预先配置的映射规则，将所述 PON 设备上报的业务事件映射为 DOCSIS 业务事件 ；并基于所述 DOCSIS 网管系统发送的管理配置信息实现对所述 PON 设备的管理。

[0008] 其中，所述中间层设备配置有电缆调制解调器终端系统 CMTS 和电缆调制解调器 CM 接口，用于与所述 DOCSIS 网管系统通信 ；所述中间层设备与所述 PON 设备间建立有通信通道，该通道采用传输控制协议 TCP 连接。

[0009] 本发明所述系统进一步具有以下特点 ：

[0010] 所述预先配置的映射规则包括 ：将所述 PON 设备中光网络单元 ONU 设备业务事件映射为 DOCSIS 业务中 CM 设备的业务事件 ；将所述 PON 设备中光线路终端 OLT 设备的业务事件映射为 DOCSIS 业务中 CMTS 设备的业务事件。

[0011] 其中，所述 ONU 设备的业务事件包括 ONU 设备上电业务事件 ；所述 OLT 设备的业务

事件包括 OLT 设备的加卡 / 删卡业务事件。

[0012] 所述中间层设备接收到 PON 设备上报的 ONU 设备上电业务事件时，根据预先配置的映射关系，将所述 ONU 设备上电业务事件转化为 DOCSIS 业务中 CM 上电事件，模拟 CM 上电注册流程，并将上电获取的配置信息作为响应消息发送至所述 PON 设备。

[0013] 进一步的，所述中间层设备与所述 PON 设备间交互消息的格式符合 DOCSIS 机架图接口协议的自定义类型 • 长度 • 值 TLV 格式。

[0014] 所述 DOCSIS 网管系统发送的管理配置信息包括 :DOCSIS 配置信息和非 DOCSIS 配置信息 ;其中，DOCSIS 配置信息为 DOCSIS 标准中独有的管理信息 ;非 DOCSIS 配置信息为可与 PON 标准共用的管理信息。

[0015] 所述 DOCSIS 网管系统将所述 DOCSIS 配置信息发送至所述中间层设备，所述中间层设备将所述 DOCSIS 配置信息映射为 PON 设备配置信息后发送至所述 PON 设备，并在接收到所述 PON 设备返回的执行结果后，进行本地 DOCSIS 配置，并将配置结果上报至所述 DOCSIS 网管系统 ;所述 DOCSIS 网管系统将所述非 DOCSIS 配置信息直接发送至所述 PON 设备。

[0016] 进一步的，所述中间层设备、DOCSIS 网管系统和 PON 设备内分别配置有数据库，用于存储相应的业务数据 ;

[0017] 所述 DOCSIS 网管系统定时检测各数据库，判断各数据库中的业务数据是否根据映射规则一一对应，若不是，则向上层发送告警消息。

[0018] 本发明还提供一种中间层设备，包括 ;

[0019] 映射处理模块，用于根据预先配置的映射规则，将 PON 设备上报的业务事件映射为 DOCSIS 业务事件 ;

[0020] 管理配置模块，用于基于 DOCSIS 网管系统发送的管理配置信息实现对所述 PON 设备的管理。

[0021] 其中，所述中间层设备通过配置的 CMTS 和 CM 接口与所述 DOCSIS 网管系统通信 ;通过建立的通信通道与所述 PON 设备通信，所述通信通道采用传输控制协议 TCP 连接。

[0022] 所述预先配置的映射规则包括 :将所述 PON 设备中光网络单元 ONU 设备业务事件映射为 DOCSIS 业务中 CM 设备的业务事件 ;将所述 PON 设备中光线路终端 OLT 设备的业务事件映射为 DOCSIS 业务中 CMTS 设备的业务事件。

[0023] 本发明有益效果如下 :

[0024] 采用本发明所述的系统，可以使 PON 接入设备和 DOCSIS 网管系统相互透明，对于 PON 接入设备来说，它可以认为上层是 PON 网管系统 ;对于 DOCSIS 网管系统来说，它可以认为下层管理节点 DOCSIS 设备 (CMTS 和 CM)，使运营商和设备商的现有资源得到了最大化的利用，从网络演进的角度上看，也为一种平滑稳定的演进方式。

附图说明

[0025] 为了更清楚地说明本发明实施例或现有技术中的技术方案，下面将对实施例或现有技术描述中所需要使用的附图作一简单地介绍，显而易见地，下面描述中的附图仅仅是本发明的一些实施例，对于本领域普通技术人员来讲，在不付出创造性劳动性的前提下，还可以根据这些附图获得其他的附图。

[0026] 图 1 为本发明提供的一种基于 PON 承载 DOCSIS 业务的系统的结构示意图；

[0027] 图 2 为本发明实施例提供的一种基于 EPON 承载 DOCSIS 业务的系统的结构示意图；

[0028] 图 3 为本发明实施例所述的中间层设备模拟 CM 上电注册流程图；

[0029] 图 4 为本发明实施例中 DOCSIS 网管系统在系统架构中的配置框图；

[0030] 图 5 为本发明提供的一种中间层设备的结构示意图。

具体实施方式

[0031] 下面将结合本发明实施例中的附图，对本发明实施例中的技术方案进行清楚、完整地描述，显然，所描述的实施例仅仅是本发明一部分实施例，而不是全部的实施例。基于本发明中的实施例，本领域普通技术人员在没有做出创造性劳动前提下所获得的所有其他实施例，都属于本发明保护的范围。

[0032] 本发明提供一种基于 PON 承载 DOCSIS 业务的系统，其目的是提供一种 DOCSIS 协议如何在 PON 设备，例如 EPON 设备，上运行的方法，即如何利用 EPON 设备模拟 DOCSIS 业务，以及如何利用现有 DOCSIS 网管系统管理 EPON 设备。本发明所述系统采用在 EPON 设备外挂一个中间层设备，该中间层设备连接在 DOCSIS 网管系统与 EPON 设备之间，作用是将 DOCSIS 协议与 EPON 协议相互转化，同时将 EPON 设备模拟成 DOCSIS 设备。其中，EPON 设备和中间层设备采用自定义的协议通信。

[0033] 如图 1 所示，为本发明提供的基于 PON 承载 DOCSIS 业务的系统的结构示意图，该系统具体包括：

[0034] DOCSIS 网管系统、PON 设备以及部署在二者间起 DOCSIS 协议和 EPON 协议相互转化作用的中间层设备；

[0035] 具体的，所述中间层设备，用于根据预先配置的映射规则，将所述 PON 设备上报的业务事件映射为 DOCSIS 业务事件；并基于所述 DOCSIS 网管系统发送的管理配置信息实现对所述 PON 设备的管理。

[0036] 其中，中间层设备配置有 CMTS(Cable Modem Termination System，电缆调制解调器终端系统）和 CM(Cable Modem，电缆调制解调器）接口，用于与所述 DOCSIS 网管系统通信；

[0037] 中间层设备与 PON 设备间建立有一条通道，该通道采用 TCP 连接，并自定义符合 DOCSIS 机架图接口协议的 TLV（类型·长度·值）格式的消息，包括 PON 设备中 ONU 的上线、OLT 的加卡 / 删卡、特定配置等消息。

[0038] 基于上述系统架构和相关配置，本发明所述系统中中间层设备基于预先配置的映射规则进行映射处理主要表现在：将所述 PON 设备中光网络单元 ONU 设备业务事件映射为 DOCSIS 业务中 CM 设备的业务事件；将所述 PON 设备中光线路终端 OLT 设备的业务事件映射为 DOCSIS 业务中 CMTS 设备的业务事件。其中，ONU 设备业务事件包括 ONU 设备上电业务事件；OLT 设备的业务事件包括 OLT 设备的加卡 / 删卡业务事件。

[0039] 下面根据图 2 至图 4 给出本发明一个较佳的实施例，并结合对实施例的描述，进一步给出本发明的技术细节，使其能够更好地说明本发明的提供的方法的具体实现过程，为了方便描述，下述以 EPON 设备为例进行说明。

[0040] 如图 2 所示，为本实施例中基于 EPON 承载 DOCSIS 业务的系统的组网图，所述系统包括：DOCSIS 网管系统、中间层设备、EPON 设备和 DOCSIS 后台服务器。

[0041] 所述 DOCSIS 后台服务器和 DOCSIS 网管系统均与中间层设备相连。所述中间层设备中配置有 DOCSIS Agent，可以模拟 CMTS 和 CM 的所有功能；所述中间层设备接收到 DOCSIS 网管系统的管理配置信息和协议信息都转交由所述 DOCSIS Agent 处理，DOCSIS Agent 对 DOCSIS 操作解析，将 DOCSIS 操作映射成 EPON 相关操作，然后封装成自定义的通信数据包，通过接口转发到 EPON 设备中的 OLT 上。同理，DOCSIS Agent 对 OLT 响应和自动上报上来的业务事件信息根据自定义规范进行解析，然后将 EPON 设备操作映射成 DOCSIS 相关操作，通过标准的 CMTS/CM 接口给 DOCSIS 网管系统。

[0042] 其中，OLT 上报的业务事件包括 ONU 设备上电业务事件和 OLT 设备的加卡 / 删卡业务事件。

[0043] 下面通过两个具体示例对 DOCSIS Agent 将 EPON 设备操作映射成 DOCSIS 相关操作的过程进行详细说明，具体如下：

[0044] 示例一：中间设备模拟 CM 基本业务；

[0045] 如图 3 所示，为中间层设备模拟 Cable Modem 上电注册流程使 ONU 基本业务开通过程，该流程具体包括：

[0046] 步骤 S301、ONU 通过 OAM 将上电消息 discover 上报给 OLT 设备。

[0047] 步骤 S302、OLT 设备通过 OLT Agent 将接收到的 discover 消息封装成符合 DOCSIS 机架图接口协议的 TLV 格式给中间层设备的 DOCSIS Agent。

[0048] 步骤 S303、DOCSIS Agent 收到 discover 消息后解析，映射为 CM 上电流程，并开始模拟 CM 上电，获取 CM 上电配置参数。

[0049] 该步骤中 DOCSIS Agent 模拟 CM 上电流程具体如下：

[0050] (1) DOCSIS Agent 模拟 CM 向 DOCSIS 后台服务器中 DHCP（动态主机配置协议）服务器发送 discover 消息；

[0051] (2) DHCP 服务器向 DOCSIS Agent 响应 offer 消息；

[0052] (3) DOCSIS Agent 模拟 CM 向 DHCP 服务器发送 IP 地址请求消息；

[0053] (4) DHCP 服务器为 CM 分配 IP 地址后，向 CM 返回响应消息，该响应消息中包含有分配的 IP 地址、包含有 CM 配置参数的文件名、放置该配置文件的 TFTP 服务器的 IP 地址、Tod 服务器（时间服务器）IP 地址等信息。

[0054] (5) CM 向 Tod 服务器发送时间信息请求消息；

[0055] (6) Tod 服务器向 CM 返回当前的日期和时间信息；其中，CM 采用 IETF 定义的 RFC868 协议从时间服务器中获得当前的日期和时间；

[0056] (7) CM 根据 TFTP 服务器的 IP 地址信息向 TFTP 服务器发送配置参数请求消息；

[0057] (8) TFTP 服务器将 CM 配置参数发送给 CM；其中，CM 采用 TFTP 协议从 TFTP 服务器上下载配置参数文件，获得所需的各种参数；

[0058] (9) CM 获取配置参数后，使用该配置参数向中间层设备模拟的 CMTS 申请注册；

[0059] (10) CM 接收到 CMTS 发出的注册响应后，完成注册流程。

[0060] 步骤 S304、DOCSIS Agent 将 CM 上电配置参数映射为 ONU 上电配置参数并封装成符合 DOCSIS 机架图接口协议的 TLV 格式的消息后向 OLT Agent 发送。

[0061] 步骤 S305、OLT Agent 对接收到的消息进行解析，获取 ONU 上电配置参数并通过 OAM 下发给 ONU。

[0062] 当 CM 的配置都下发成功后，CM 就进入了正常的工作状态，然后可以对 ONU 进行正常管理

[0063] 示例二：中间层设备模拟 CMTS 基本业务，具体为中间层设备模拟 OLT 加卡流程，包括：

[0064] (1)、OLT 上执行加卡操作，OLT 系统产生 card up 消息通知 OLT Agent；

[0065] (2)、OLT Agent 根据加卡消息产生四个 OLT 标识（查询 OLT 的 PONMAC），将 OLT 标识以符合 DOCSIS 机架图接口协议的 TLV 格式封装，上报给中间层设备；

[0066] (3)、中间层设备收到此消息，模拟产生四个 CMTS 的数据，并同样以符合 DOCSIS 机架图接口协议的 TLV 格式对 OLT 下发初始化配置；例如，使 PONMAC 初始化、使能等；

[0067] (4) 配置完成后，OLT agent 上报确认消息给中间层设备，中间层设备模拟完成 CMTS 初始化。

[0068] 另一方面，本发明所述的基于 EPON 承载 DOCSIS 业务的系统还可以通过 DOCSIS 网管系统实现 EPON 设备的管理，具体表现为：

[0069] DOCSIS 网管系统在 EPON 设备模拟 DOCSIS 系统正常运行后，根据具体需要会对 EPON 设备进行管理操作。本发明所述系统为了方便灵活管理和减少重复开发，可以将 DOCSIS 网管系统中的配置信息进行分类，一类为 DOCSIS 标准独有的管理信息，定义为 DOCSIS 配置信息（例如：重启 cable modem，qos 配置等）；另一类为能与 EPON 标准共用的管理信息，定义为非 DOCSIS 配置信息（例如系统的名字、系统上电时间等）。

[0070] 对于非 DOCSIS 配置，可以通过 DOCSIS 网管系统直接对 EPON 设备管理，即 DOCSIS 网管系统直接将非 DOCSIS 配置信息 Telnet（远程登陆）到 EPON 设备进行 CLI（Command Line Interface，命令行界面）配置；或者直接通过 SNMP 管理方式，不经过中间层设备；对于 DOCSIS 配置，DOCSIS 网管系统将管理中间层设备，中间层设备将 DOCSIS 配置信息转化为 EPON 配置信息，并下发给 EPON 设备；

[0071] EPON 设备中的 OLT 收到配置信息后根据自定义的分类进行判断，如果是 OLT 的配置，转交 OLT 配置模块处理，如果是 ONU 的配置，通过 OAM 下发到 ONU 的配置模块处理。EPON 设备执行完毕后将结果返回给中间层设备，中间层设备根据返回结果做 DOCSIS 配置，再将结果返回给 DOCSIS 网管系统。

[0072] 当然，上述实现方式只是一种优选方案，本发明也可以不对配置信息进行分类，均由中间层设备完成配置消息的下发。

[0073] 进一步的，DOCSIS 网管系统、中间层设备、EPON 设备均配置有数据库，用于存储相关的业务数据，如图 4 所示；基于所述数据库的配置，所述 DOCSIS 网管系统在进行业务管理时，可以定时检测各数据库，判断各数据库中的业务数据是否根据映射规则一一对应（例如：实际当中 ONU 的某个接口加入某个 VLAN，那么在中间层设备和 DOCSIS 网管系统应该是 CM 的某个接口加入 VLAN），若不是，则向上层发送告警消息。

[0074] 采用本发明所述的系统，可以使 PON 接入设备和 DOCSIS 网管系统相互透明，对于 PON 接入设备来说，它可以认为上层是 PON 网管系统；对于 DOCSIS 网管系统来说，它可以认为下层管理节点 DOCSIS 设备（CMTS 和 CM），使运营商和设备商的现有资源得到了最大化的

利用，从网络演进的角度上看，也为一种平滑稳定的演进方式。

[0075] 如图 5 所示，本发明还提供一种中间层设备，包括：

[0076] 映射处理模块 510，用于根据预先配置的映射规则，将 PON 设备上报的业务事件映射为 DOCSIS 业务事件；

[0077] 管理配置模块 520，用于基于 DOCSIS 网管系统发送的管理配置信息实现对所述 PON 设备的管理。

[0078] 进一步的，所述中间层设备通过配置的 CMTS 和 CM 接口与所述 DOCSIS 网管系统通信；通过建立的通信通道与所述 PON 设备通信，所述通信通道采用传输控制协议 TCP 连接。

[0079] 映射处理模块 510 中预先配置的映射规则包括：将所述 PON 设备中光网络单元 ONU 设备业务事件映射为 DOCSIS 业务中 CM 设备的业务事件；将所述 PON 设备中光线路终端 OLT 设备的业务事件映射为 DOCSIS 业务中 CMTS 设备的业务事件。

[0080] 优选的，DOCSIS 网管系统发送的管理配置信息包括：所述 DOCSIS 网管系统发送的管理配置信息包括：DOCSIS 配置信息和非 DOCSIS 配置信息；其中，DOCSIS 配置信息为 DOCSIS 标准中独有的管理信息；非 DOCSIS 配置信息为可与 PON 标准共用的管理信息。

[0081] 基于上述特征，当 DOCSIS 网管系统将 DOCSIS 配置信息发送至所述中间层设备时，所述管理配置模块 520，将 DOCSIS 配置信息映射为 PON 设备配置信息后发送至所述 PON 设备，并在接收到所述 PON 设备返回的执行结果后，进行本地 DOCSIS 配置，并将配置结果上报至 DOCSIS 网管系统；

[0082] 当然，上述配置信息划分只是一种优选方案，在具体实现时也可以不进行划分，当不进行划分时，管理配置模块 520 对所有的配置信息均进行上述操作。

[0083] 采用本发明所述的装置，可以使 PON 接入设备和 DOCSIS 网管系统相互透明，对于 PON 接入设备来说，它可以认为上层是 PON 网管系统；对于 DOCSIS 网管系统来说，它可以认为下层管理节点 DOCSIS 设备 (CMTS 和 CM)，使运营商和设备商的现有资源得到了最大化的利用，从网络演进的角度上看，也为一种平滑稳定的演进方式。

[0084] 显然，本领域的技术人员可以对本发明进行各种改动和变型而不脱离本发明的精神和范围。这样，倘若本发明的这些修改和变型属于本发明权利要求及其等同技术的范围之内，则本发明也意图包含这些改动和变型在内。

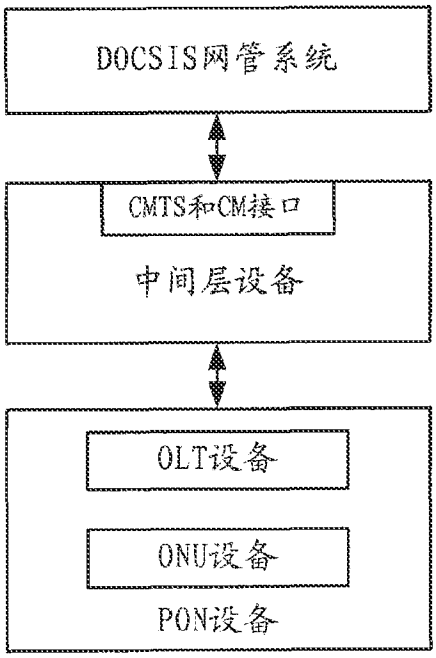


图 1

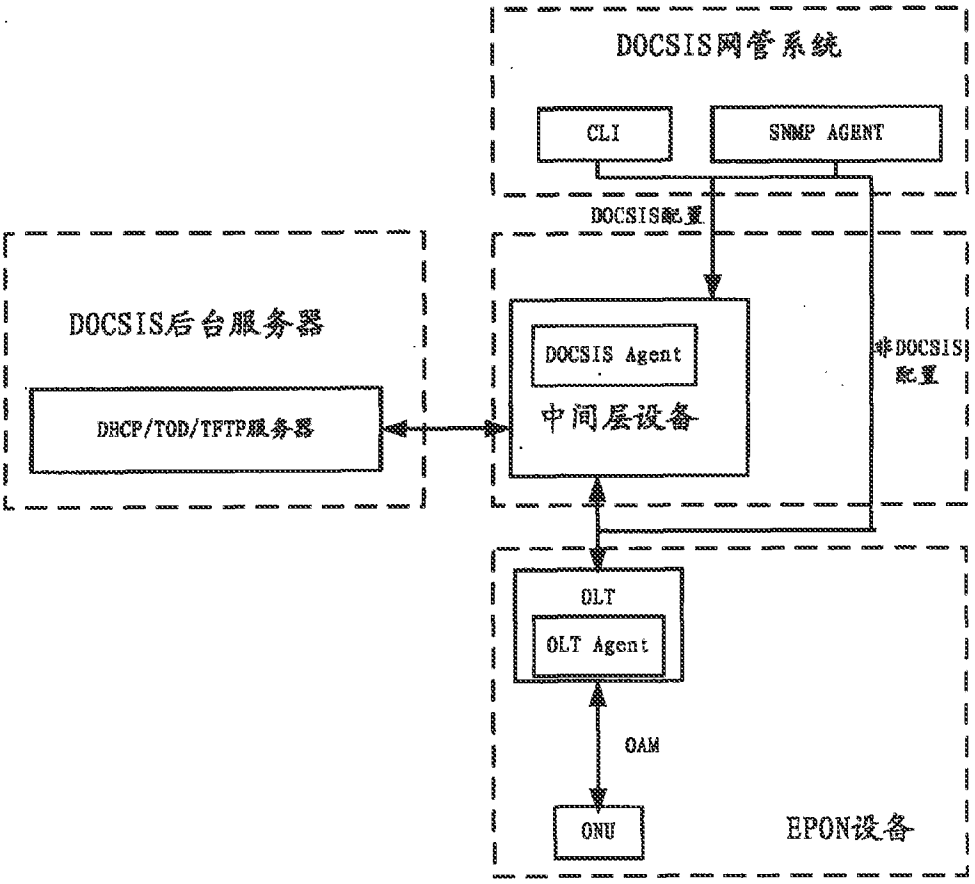

DOCSIS网管系统
CLI
SNMP AGENT
DOCSIS配置
DOCSIS后台服务器
DOCSIS Agent
非DOCSIS配置
DHCP/TOD/TFTP服务器
中间层设备
OLT
OLT Agent
OAM
ONU
EPON设备

图 2

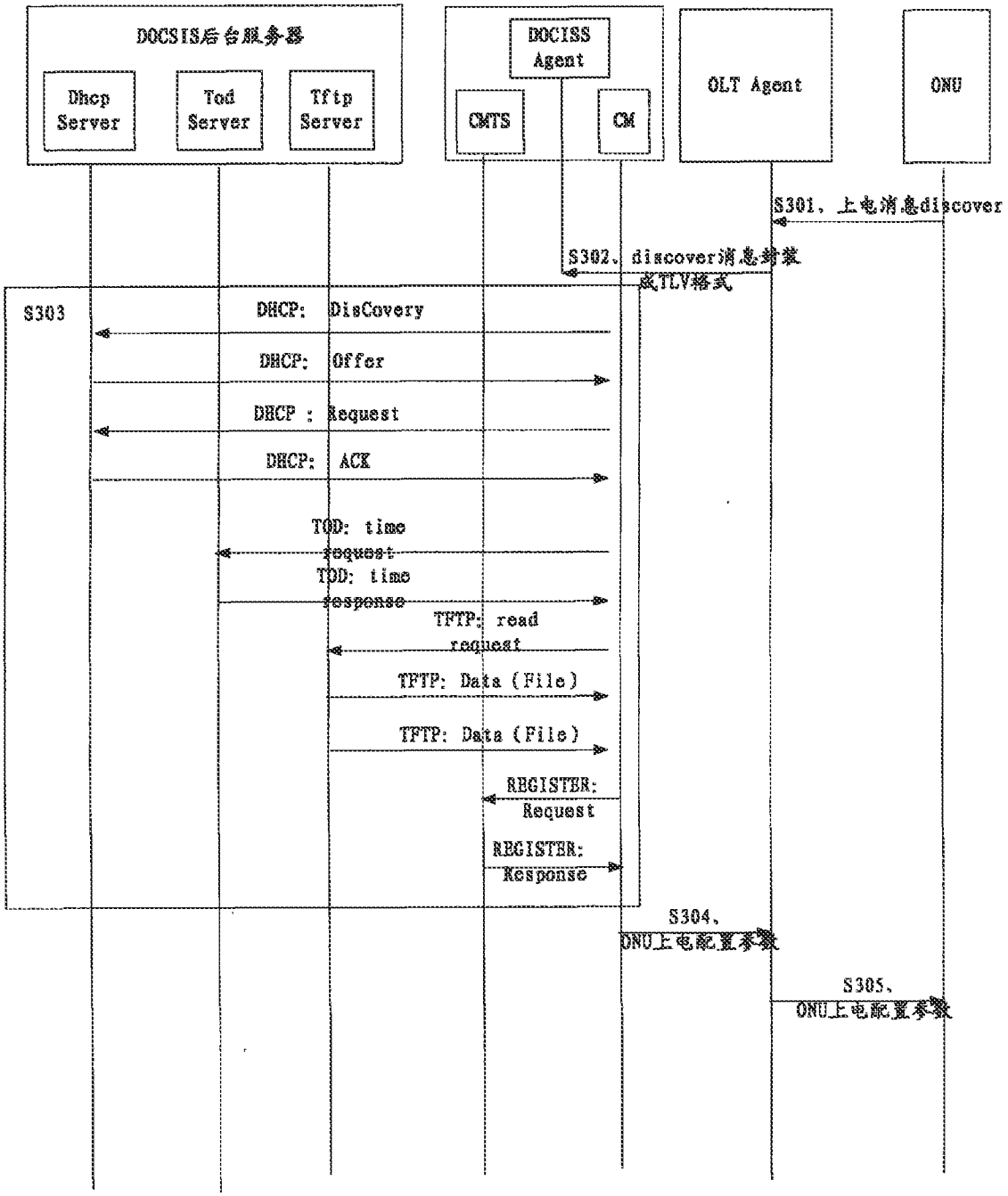

DOCSIS后台服务器
Dhcp Server
Tod Server
Tftp Server
DOCISS Agent
CMTS
CM
OLT Agent
ONU
S301、上电消息discover
S302、discover消息封装成TLV格式
S303
DHCP: DisCovery
DHCP: Offer
DHCP : Request
DHCP: ACK
TOD: time request
TOD: time response
TFTP: read request
TFTP: Data (File)
TFTP: Data (File)
REGISTER: Request
REGISTER: Response
S304、ONU上电配置参数
S305、ONU上电配置参数

图 3

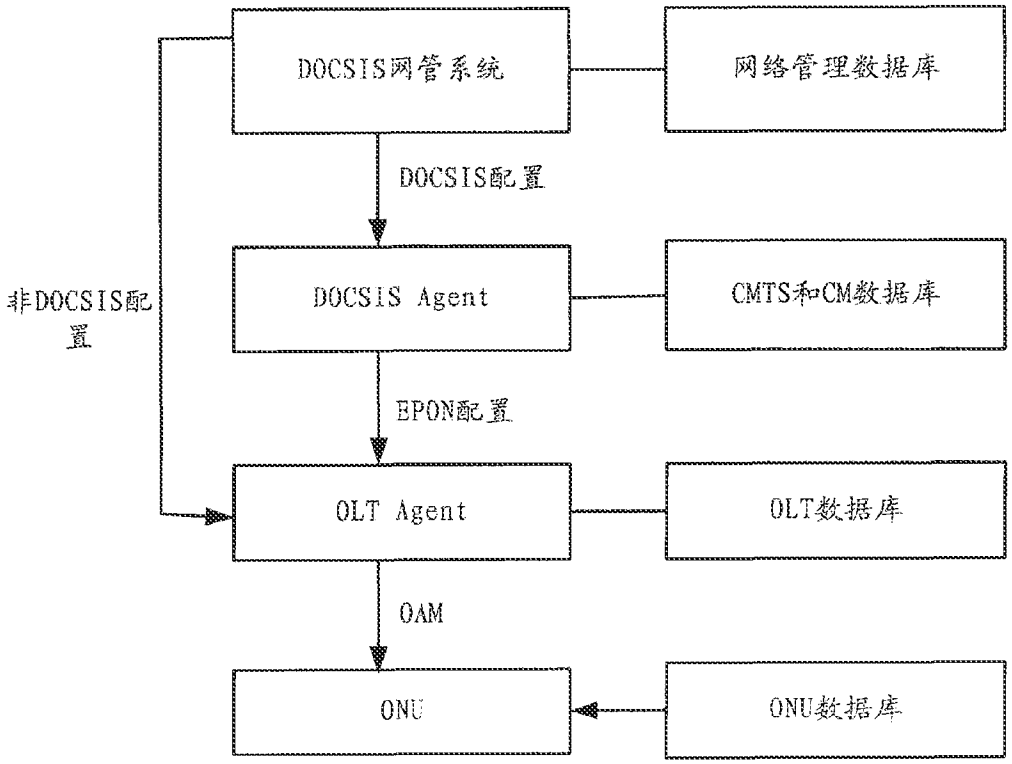

DOCSIS网管系统
网络管理数据库
DOCSIS配置
非DOCSIS配置
DOCSIS Agent
CMTS和CM数据库
EPON配置
OLT Agent
OLT数据库
OAM
ONU
ONU数据库

图 4

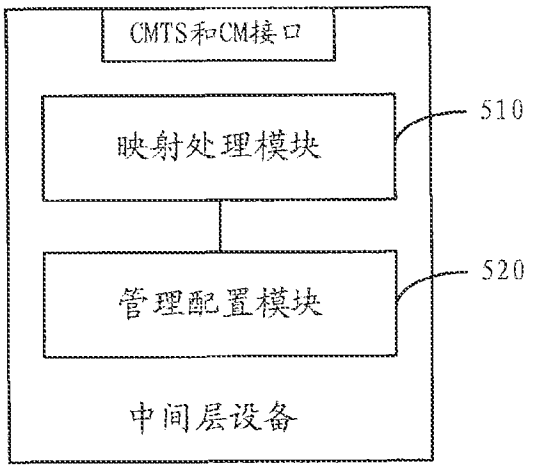

CMTS和CM接口
映射处理模块
510
管理配置模块
520
中间层设备

图 5

Espacenet

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Configuration method and system for realizing port address binding

No documents available for this priority number.

Inventor(s): XINJUN ZHI; QI CHEN ± (ZHI XINJUN, ; CHEN QI)

Applicant(s): ZTE CORP ± (ZTE CORPORATION)

Classification: - international: ***H04L29/06; H04L29/12; H04Q11/00***
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Abstract of CN101888575 (A)

The invention discloses a configuration method and a configuration system for realizing port address binding. The method comprises the following steps that: a management unit sets binding information comprising an IP address and an MAC address of a user host and an ethernet user port identifier and sends the binding information to an optical line terminal (OLT); the OLT generates a configuration message comprising the IP address, the MAC address and a management entity identifier according to the binding information and sends the configuration message to an optical network unit (ONU) or an optical network terminal (ONT), wherein the management entity identifier corresponds to the ethernet user port identifier; and according to the received configuration message, the ONU or ONT writes the IP address and the MAC address into a binding table appointed by the management entity identifier of an MAC bridge port binding table management entity. The configuration method and the configuration system have flexible configuration and can realize complete control over user rights and improve the safety of a user network.

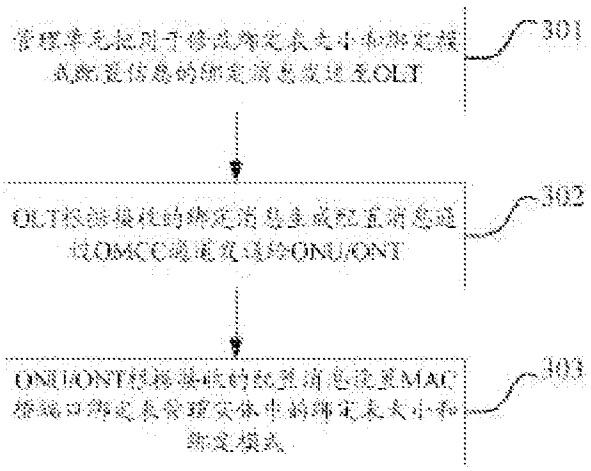


图 3 /Fig.3

301 THE MANAGEMENT UNIT TRANSMITS THE BINDING MESSAGE FOR MODIFYING THE SIZE OF THE BINDING TABLE AND THE BINDING MODE CONFIGURATION INFORMATION TO THE OLT

302 THE OLT GENERATES THE CONFIGURATION MESSAGE ACCORDING TO THE RECEIVED BINDING MESSAGE AND TRANSMITS THE CONFIGURATION MESSAGE TO THE ONU/ONT THROUGH THE OMCC CHANNEL

303 THE ONU/ONT SETS THE SIZE OF THE BINDING TABLE AND THE BINDING MODE OF THE MAC BRIDGE PORT BINDING TABLE MANAGEMENT ENTITY ACCORDING TO THE RECEIVED CONFIGURATION MESSAGE

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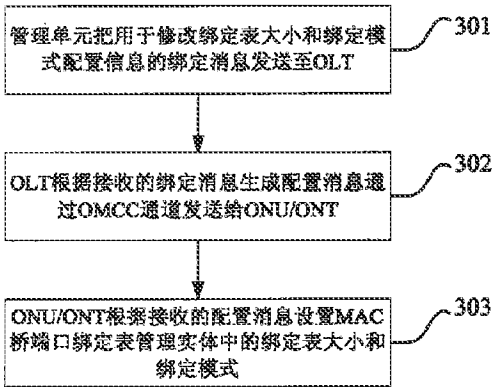
权利要求书 2 页 说明书 6 页 附图 3 页

(54)发明名称

一种实现端口地址绑定的配置方法和系统

(57)摘要

本发明公开一种端口地址绑定配置方法和系统，方法包括管理单元设置包含用户主机 IP 地址和 MAC 地址、以太网用户端口标识的绑定消息，并把绑定消息发送到光线路终端 OLT；OLT 根据绑定消息生成包含所述 IP 地址和所述 MAC 地址、管理实体标识的配置消息，并把配置消息发送至光网络单元 ONU 或光网络终端 ONT，其中，所述管理实体标识与所述以太网用户端口标识对应；ONU 或 ONT 根据收到的配置消息，把所述 IP 地址和 MAC 地址写入 MAC 桥端口绑定表管理实体的管理实体标识符指定的绑定表中。本发明配置灵活，能够实现对用户权限的完全控制，提高用户网络的安全性。



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1. 一种实现端口地址绑定的配置方法，其特征在于，包括：

管理单元设置包含用户主机 IP 地址和 MAC 地址、以太网用户端口标识的绑定消息，并把绑定消息发送到光线路终端 OLT；

OLT 根据绑定消息生成包含所述 IP 地址和所述 MAC 地址、管理实体标识的配置消息，并把配置消息发送至光网络单元 ONU 或光网络终端 ONT，其中，所述管理实体标识与所述以太网用户端口标识对应；

ONU 或 ONT 根据收到的配置消息，把所述 IP 地址和 MAC 地址写入 MAC 桥端口绑定表管理实体的管理实体标识符指定的绑定表中。

2. 根据权利要求 1 所述的配置方法，其特征在于，所述 MAC 桥端口绑定表管理实体中通过相同的管理实体标识符与指向以太网用户端口的 MAC 桥端口配置管理实体对应。

3. 根据权利要求 1 或 2 所述的配置方法，其特征在于，所述配置消息包括通过所述绑定消息得到的用于添加绑定条目的配置消息、用于删除绑定条目的配置消息和用于配置绑定模式和绑定表大小的配置消息。

4. 根据权利要求 3 所述的配置方法，其特征在于，配置完成后，若 ONU 或 ONT 通过以太网用户端口接收的数据帧的 IP 地址和 MAC 地址存在于 MAC 桥端口绑定表管理实体的绑定表中，则接收所述数据帧的以太网用户端口的绑定模式为正向绑定时转发数据帧，所述绑定模式为反向绑定时丢弃数据帧。

5. 根据权利要求 4 所述的配置方法，其特征在于，配置完成后，若 ONU 或 ONT 通过以太网用户端口接收的数据帧的 IP 地址和 MAC 地址不存在于 MAC 桥端口绑定表管理实体的绑定表中，则接收所述数据帧的以太网用户端口的绑定模式为反向绑定时转发数据帧，所述绑定模式为正向绑定时丢弃数据帧。

6. 根据权利要求 3 所述的配置方法，其特征在于，所述 ONU 或 ONT 根据收到的用于添加绑定条目的配置消息，在 MAC 桥端口绑定表管理实体中添加包括条目编号、表示添加的条目绑定性质、IP 地址、MAC 地址的绑定条目。

7. 根据权利要求 3 所述的配置方法，其特征在于，所述 ONU 或 ONT 根据收到的用于删除绑定条目的配置消息，在 MAC 桥端口绑定表管理实体中删除包括条目编号、表示删除的条目绑定性质、IP 地址、MAC 地址的绑定条目。

8. 根据权利要求 3 所述的配置方法，其特征在于，所述 ONU 或 ONT 根据收到的用于修改绑定模式和绑定表大小的配置消息，在 MAC 桥端口绑定表管理实体中修改绑定模式信息和绑定表大小信息。

9. 一种实现端口地址绑定的系统，其特征在于，包括

管理单元，用于设置包含用户主机 IP 地址和 MAC 地址、以太网用户端口标识的绑定消息，并把绑定消息发送到光线路终端 OLT；

OLT，用于根据绑定消息生成包含所述 IP 地址和所述 MAC 地址、管理实体标识的配置消息，并把配置消息发送至光网络单元 ONU 或光网络终端 ONT，其中，所述管理实体标识与所述以太网用户端口标识对应；

ONU 或 ONT，用于根据收到的配置消息，把 IP 地址和 MAC 地址写入 MAC 桥端口绑定表管理实体的管理实体标识符指定的绑定表中。

10. 根据权利要求 9 所述的系统，其特征在于，所述 MAC 桥端口绑定表管理实体通过相

同的管理实体标识符与指向以太网用户端口的 MAC 桥端口配置管理实体对应。

一种实现端口地址绑定的配置方法和系统

技术领域

[0001] 本发明涉及通信领域的GPON技术，尤其涉及一种GPON系统中端口地址绑定的技术。

背景技术

[0002] 吉比特无源光网络(Gigabit-Capable Passive Optical Network，GPON)是一种点到多点的光接入技术，图1显示了GPON接入网络架构图，如图1所示，GPON系统包括光线路终端(Optical Line Terminal，OLT)、由无源分光器件组成的光分布网络(Optical Distribution Network，ODN)，以及光网络单元(Optical Network Unit，ONU)或光网络终端(Optical Network Terminal，ONT)。其中，OLT是GPON系统中的局端设备，通常放在运营商的中心局；ONU或ONT是GPON系统的终端设备，ONU一般用于光纤到路边(Fiber To The Curb，FTTC)，ONT一般用于光纤到户(Fiber To The Home，FTTH)；OLT与ONU或ONT之间通过ODN连接；OLT通过管理控制通道(ONT Management and Control Channel，OMCC)对ONU/ONT进行配置管理。

[0003] GPON的标准为G.984系列，其中G.984.4具体定义了ONT管理控制接口(ONT Management and Control Interface，OMCI)，提供了标准的管理控制协议和相关的管理实体(Managed Entity，ME)，OLT通过OMCI对相关ME进行配置，从而实现ONU或ONT的远程配置和管理。

[0004] ONU或ONT作为GPON接入网的终端设备，需要为用户解决好安全问题。G.984.4定义的MAC桥端口过滤表管理实体可用于以太网用户端口的目的MAC地址过滤，该MAC桥端口过滤表管理实体中定义了数据关系、管理实体标识符、以及MAC过滤表，所述MAC过滤表中的每个过滤条目均包括条目编号、过滤字节（包含过滤/转发、添加/删除等位信息）、以及目的MAC地址，该管理实体通过对MAC桥端口目的MAC地址的过滤对用户接收业务的权限进行了控制。譬如对于组播业务，通过对用户桥端口组播MAC的过滤配置，可以防止非法用户获取组播业务。由于G.984.4中的MAC桥端口过滤表管理实体只针对MAC桥端口的出向业务，而不针对入向业务，因此为了进一步加强对用户权限的控制和增加安全性，现有技术中对G.984.4中的MAC桥端口过滤表管理实体的过滤字节进行了扩展，利用过滤字节中的保留比特位进一步定义了过滤方向，即实现了既可以对MAC桥端口出向数据的目的MAC地址进行过滤，也可以对入向数据的目的MAC地址进行过滤，从而进一步增强了对用户权限的控制，提高了安全性。

[0005] 现有技术中MAC桥端口过滤表管理实体定义从MAC桥端口出入的以太网业务的目的MAC地址过滤，对用户权限进行控制，但由于是对目的MAC地址的过滤，因此无法对用户网络内的主机进行控制，譬如对于用户网络内主机发起的MAC地址洪水攻击，无法防范，极易造成ONU/ONT中MAC地址表溢出导致网络安全问题，对IP地址盗用等安全问题也无法防范，极易造成用户网络内的合法用户的权限被盗用，合法用户的权益蒙受损失。因此，MAC桥端口过滤表管理实体实际上并没有完全控制用户权限，安全性较低。

发明内容

[0006] 本发明的目的在于提供一种实现端口地址绑定的配置方法和系统，能够更好的解决现有技术中 MAC 桥端口过滤表管理实体没有完全控制用户网络中的用户权限，安全性较低的问题。

[0007] 根据本发明的一个方面，提供的一种实现端口地址绑定的配置方法包括：

[0008] 管理单元设置包含用户主机 IP 地址和 MAC 地址、以太网用户端口标识的绑定消息，并把绑定消息发送到光线路终端 OLT；

[0009] OLT 根据绑定消息生成包含所述 IP 地址和所述 MAC 地址、管理实体标识的配置消息，并把配置消息发送至光网络单元 ONU 或光网络终端 ONT，其中，所述管理实体标识与所述以太网用户端口标识对应；

[0010] ONU 或 ONT 根据收到的配置消息，把所述 IP 地址和 MAC 地址写入 MAC 桥端口绑定表管理实体的管理实体标识符指定的绑定表中。

[0011] 根据本发明的另一个方面，提供的一种实现端口地址绑定的系统包括：

[0012] 管理单元，用于设置包含用户主机 IP 地址和 MAC 地址、以太网用户端口标识的绑定消息，并把绑定消息发送到光线路终端 OLT；

[0013] OLT，用于根据绑定消息生成包含所述 IP 地址和所述 MAC 地址、管理实体标识的配置消息，并把配置消息发送至光网络单元 ONU 或光网络终端 ONT，其中，所述管理实体标识与所述以太网用户端口标识对应；

[0014] ONU 或 ONT，用于根据收到的配置消息，把 IP 地址和 MAC 地址写入 MAC 桥端口绑定表管理实体的管理实体标识符指定的绑定表中。

[0015] 与现有技术相比，本发明定义并使用 MAC 桥端口绑定表管理实体，实现了用户网络中主机的 IP 地址和 MAC 地址与以太网用户端口三者的绑定，实现了对用户权限的完全控制，进一步提高用户网络的安全性。

附图说明

[0016] 图 1 是 GPON 接入网络架构示意图；

[0017] 图 2 是本发明定义的 MAC 桥端口绑定表管理实体与 MAC 桥端口配置管理实体、物理通道端点以太网用户网络接口管理实体的关系图；

[0018] 图 3 是本发明实施例提供设置绑定表大小和绑定模式的流程图；

[0019] 图 4 是本发明实施例提供的添加绑定表条目的流程图；

[0020] 图 5 是本发明实施例提供的删除绑定表条目的流程图；

[0021] 图 6 是本发明实施例提供的业务流的处理流程图；

[0022] 图 7 是本发明实施例提供的系统框图。

具体实施方式

[0023] 以下结合附图对本发明的优选实施例进行详细说明，应当理解，以下所说明的优选实施例仅用于说明和解释本发明，并不用于限制本发明。

[0024] 图 2 显示了本发明定义的 MAC 桥端口绑定表管理实体与 MAC 桥端口配置管理实

体、物理通道端点以太网用户网络接口管理实体的关系图，如图 2 所示，ONU 或 ONT 在创建 MAC 桥端口配置管理实体实例时会自动创建在本发明中定义的 MAC 桥端口绑定表管理实体的实例，MAC 桥端口绑定表管理实体通过与 MAC 桥端口配置管理实体相同的管理实体标识符与 MAC 桥端口配置管理实体相关联，MAC 桥端口配置管理实体通过一个指向物理通道端点以太网用户网络接口管理实体的指针与以太网用户端口相关联，从而实现 MAC 桥端口绑定表管理实体与以太网用户端口的对应。本发明所述 MAC 桥端口绑定表管理实体及其相关属性是使 IP 地址、MAC 地址与以太网用户端口三者进行绑定的新增加的管理实体，所述 MAC 桥端口绑定表管理实体各实例均包括管理实体标识符、绑定模式、绑定表大小、绑定表。

[0025] 所述管理实体标识符是 MAC 桥端口绑定表管理实体各实例的唯一标识，是只读的标识符，该标识符与 MAC 桥端口配置管理实体中的管理实体标识符相同，表示与 MAC 桥端口配置管理实体相关联。

[0026] 所述绑定模式是可读可写的端口地址绑定模式，包括设置为“1”的正向绑定和设置为“0”的反向绑定，其中，所述正向绑定表示端口只允许数据帧中的源 IP 地址和源 MAC 地址存在于绑定表中的数据帧通过，所述反向绑定表示端口只允许数据帧中的源 IP 地址和源 MAC 地址不存在于绑定表中的数据帧通过，此外，还可以设置保留位。

[0027] 所述绑定表大小用于定义绑定表可以存放 IP 地址和 MAC 地址的最大条目数，绑定表大小可读可写。

[0028] 所述绑定表用于保存与 MAC 桥端口相关的用户主机的 IP 地址和 MAC 地址，并配合绑定模式判断是否转发进入 MAC 桥端口的数据帧。在配置完成后，如果 ONU 或 ONT 通过以太网用户端口接收的数据帧的源 IP 地址和源 MAC 地址存在于绑定表中，则在绑定模式为正向绑定时转发数据帧，在绑定模式为反向绑定时丢弃数据帧；如果 ONU 或 ONT 通过以太网用户端口接收的数据帧的源 IP 和源 MAC 地址不存在于绑定表中，则在绑定模式为正向绑定的情况下丢弃数据帧，在绑定模式为反向绑定时转发数据帧。所述绑定表中的绑定条目包含用户主机的 IP 地址和 MAC 地址外，还包含条目编号、条目绑定性质。

[0029] 所述条目编号是 MAC 桥端口绑定表管理实体中绑定条目的索引标识。

[0030] 所述条目绑定性质包括设置为“1”的表示添加的条目绑定性质和设置为“0”的表示删除的条目绑定性质。

[0031] 当 MAC 桥端口绑定表管理实体初始化时，ONU 或 ONT 将所述绑定表设为空。

[0032] 图 3 显示了本发明实施例提供的设置绑定表大小和绑定模式的流程图，如图 3 所示，步骤包括：

[0033] 步骤 301：管理单元设置表示绑定表大小和绑定模式的绑定消息，该绑定消息中包含 ONT 或 ONU 标识信息、以太网用户端口标识信息、绑定表大小信息、绑定模式信息，并将所述绑定消息发送到 OLT 上。

[0034] 步骤 302：OLT 把接收的绑定消息生成配置消息，并将配置消息通过 OMCC 通道发送到 ONU 或 ONT。

[0035] 所述配置消息包括管理实体标识信息、绑定表大小信息和绑定模式信息。其中，所述管理实体标识源于管理单元设置的以太网用户端口标识信息，与指向以太网用户端口的 MAC 桥端口配置管理实体实例的标识符相同，用于与以太网用户端口对应。

[0036] 步骤 303：ONU 或 ONT 根据配置消息，在 MAC 桥端口绑定表管理实体中设置管理

实体标识信息指定的实例的绑定表大小信息和绑定模式信息，设置完成后返回配置响应消息。

[0037] 图 4 显示了本发明实施例提供的添加绑定表条目的流程图，如图 4 所示，步骤包括：

[0038] 步骤 401：管理单元设置用于添加绑定条目的绑定消息，并将所述绑定消息发送到 OLT。

[0039] 所述绑定消息包含 ONU 或 ONT 标识信息、以太网用户端口标识信息、绑定条目编号信息、表示添加的条目绑定性质信息、待绑定的 IP 地址和 MAC 地址信息。

[0040] 步骤 402：OLT 根据接收的绑定消息生成配置消息，并将配置消息通过 OMCC 通道发送到 ONU 或 ONT。

[0041] 所述绑定消息包含管理实体标识符信息、添加绑定条目信息。其中，所述管理实体标识源于管理单元设置的以太网用户端口标识信息，与指向以太网用户端口的 MAC 桥端口配置管理实体实例的标识符相同，用于与以太网用户端口对应；所述添加绑定条目信息包括条目编号、条目绑定性质、IP 地址和 MAC 地址。

[0042] 步骤 403：ONU 或 ONT 根据接收的配置消息在 MAC 桥端口绑定表管理实体中设置管理实体标识信息指定实例的绑定表，在绑定表中添加包括条目编号、表示添加的条目绑定性质、IP 地址和 MAC 地址的绑定条目信息，设置完成后返回配置响应消息。

[0043] 图 5 显示了本发明实施例提供的删除绑定表条目的流程图，如图 5 所示，步骤如下：

[0044] 步骤 501：管理单元设置用于删除绑定条目的绑定消息，并将所述绑定消息发送到 OLT。

[0045] 所述绑定消息包含 ONT 或 ONT 标识信息、以太网用户端口标识信息、绑定条目编号信息、表示删除的条目绑定性质信息，待删除的 IP 地址和 MAC 地址信息。

[0046] 步骤 502：OLT 根据接收的绑定消息生成配置消息，并将配置消息通过 OMCC 通道发送到 ONU 或 ONT。

[0047] 所述配置消息包括管理实体标识符信息、删除绑定条目信息。其中，所述管理实体标识源于管理单元设置的以太网用户端口标识信息，与指向以太网用户端口的 MAC 桥端口配置管理实体实例的标识符相同，用于与以太网用户端口对应；所述删除绑定条目信息包括条目编号、条目绑定性质、IP 地址和 MAC 地址。

[0048] 步骤 503：ONU 或 ONT 根据接收的配置消息在 MAC 桥端口绑定表管理实体中设置管理实体标识信息指定实例的绑定表，在绑定表中删除包括条目编号、表示删除的条目绑定性质、IP 地址和 MAC 地址的绑定条目信息，设置完成后返回配置响应消息。

[0049] 图 6 显示了本发明实施例提供的数据帧的处理流程图，如图 6 所示，步骤如下：

[0050] 步骤 601：ONU 或 ONT 接收数据帧；

[0051] 步骤 602：ONT 或 ONU 通过以太网用户端口收到数据帧并解析，得到数据帧的 IP 地址和 MAC 地址后，在 MAC 桥端口绑定表管理实体中的接收该数据帧的以太网用户端口对应的的绑定表中查找是否存在 IP 地址和 MAC 地址与所接收数据帧的 IP 地址和 MAC 地址相同的绑定条目，若存在则进行步骤 603，若不存在则进行步骤 606。

[0052] 步骤 603：ONT 或 ONU 判断接收数据帧的以太网用户端口的绑定模式是否为正向绑

定，如果是正向绑定则进行步骤 604，如果是反向绑定则进行步骤 605。

[0053] 步骤 604 ：ONT 或 ONU 转发所述数据帧。

[0054] 步骤 605 ：ONT 或 ONU 丢弃所述数据帧。

[0055] 步骤 606 ：ONT 或 ONU 判断接收数据帧的以太网用户端口的绑定模式是否为正向绑定，如果是正向绑定则进行步骤 607，如果是反向绑定则进行步骤 608。

[0056] 步骤 607 ：ONT 或 ONU 丢弃该数据帧 ；

[0057] 步骤 608 ：ONT 或 ONU 转发该数据帧。

[0058] 图 7 显示了本发明实施例提供的系统框图，如图 7 所示，系统包括管理单元 (701)、OLT(702) 和 ONU 或 ONT(703)。其中，

[0059] 管理单元 (701)，用于设置绑定端口地址的绑定消息，并将绑定消息发送到 OLT(702) ；

[0060] OLT(702)，用于接收管理单元下发的绑定消息，根据绑定消息生成配置消息，并将配置消息通过 OMCC 通道发送到 ONU 或 ONT ；

[0061] 所述配置消息包括通过所述绑定消息得到的用于添加绑定条目的配置消息、用于删除绑定条目的配置消息和用于配置绑定模式和绑定表大小的配置消息。

[0062] 用于添加绑定条目的配置消息包含源于管理单元设置的以太网用户端口标识信息的管理实体标识符信息、添加绑定条目信息 ；所述添加绑定条目信息包括条目编号、表示添加的条目绑定性质、IP 地址和 MAC 地址。

[0063] 用于删除绑定条目的配置消息包含源于管理单元设置的以太网用户端口标识信息的管理实体标识符信息、删除绑定条目信息 ；所述删除绑定条目信息包括条目编号、表示删除的条目绑定性质、IP 地址和 MAC 地址。

[0064] 用于配置绑定模式和绑定表大小的配置消息包含源于管理单元设置的以太网用户端口标识信息的管理实体标识符信息、绑定表大小信息和绑定模式信息。

[0065] ONU 或 ONT(703)，用于根据配置消息在 MAC 桥端口绑定表管理实体中设置管理实体标识信息指定实例的信息，并根据 MAC 桥端口绑定表管理实体中的地址绑定表和绑定模式转发或丢弃接收的数据帧。

[0066] 管理单元 (701) 将设置的用于端口地址绑定的绑定消息通过简单网络管理协议 SNMP 报文的方式发送到 OLT(702)，OLT(702) 接收管理单元 (701) 下发的绑定消息，并根据绑定消息生成配置消息后，将配置消息通过 OMCC 通道发送到 ONU 或 ONT(703)，ONU 或 ONT(703) 根据配置消息设置 MAC 桥端口绑定表管理实体。若配置消息为修改绑定模式和绑定表大小的配置消息，则在 MAC 桥端口绑定表管理实体中修改绑定模式信息和绑定表大小信息 ；若配置消息为添加绑定条目的配置消息，则在 MAC 桥端口绑定表管理实体实例中添加绑定条目编号信息、表示添加的条目绑定性质、待添加的 IP 地址和 MAC 地址信息 ；若配置消息为删除绑定条目的配置消息，则在 MAC 桥端口绑定表管理实体实例中删除相应绑定条目编号的绑定条目。

[0067] 综上所述，本发明通过使用 MAC 桥端口绑定表管理实体，把用户主机的 IP 地址和 MAC 地址与以太网用户端口二者绑定，实现了网络中用户权限的完全控制，解决了用户网络中的 MAC 地址洪水攻击以及 IP 地址盗用等问题，增强了用户网络的安全性 ；此外，MAC 桥端口绑定表管理实体与以太网用户端口绑定的用户主机 IP 地址和 MAC 地址条目数可以自由

配置，包括自由增加和删除绑定条目，并可选择绑定条目的绑定模式，十分方便灵活。

[0068] 尽管上文对本发明进行了详细说明，但是本发明不限于此，本技术领域技术人员可以根据本发明的原理进行各种修改。因此，凡按照本发明原理所做的修改，都应当理解为落入本发明的保护范围。

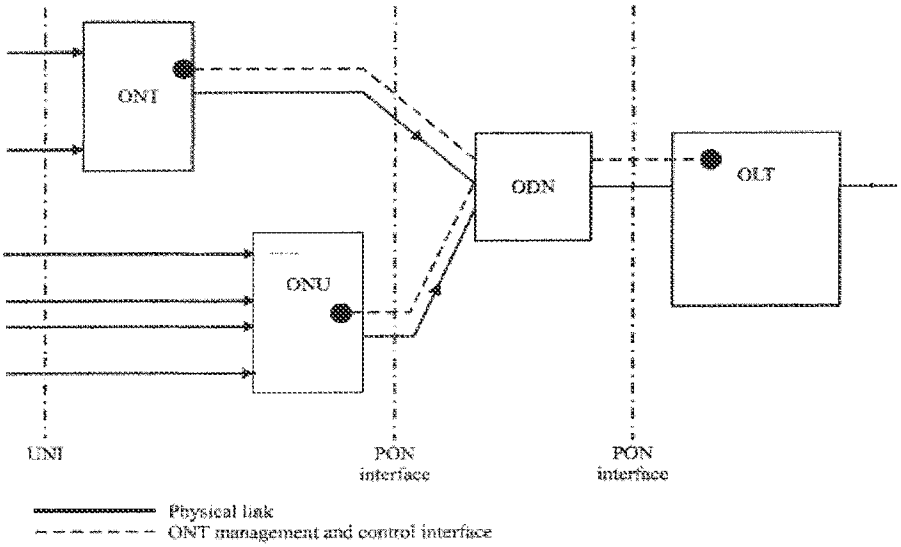

ONT
ONU
ODN
OUT
UNI
PON interface
PON interface
Physical link
ONT management and control interface

图 1

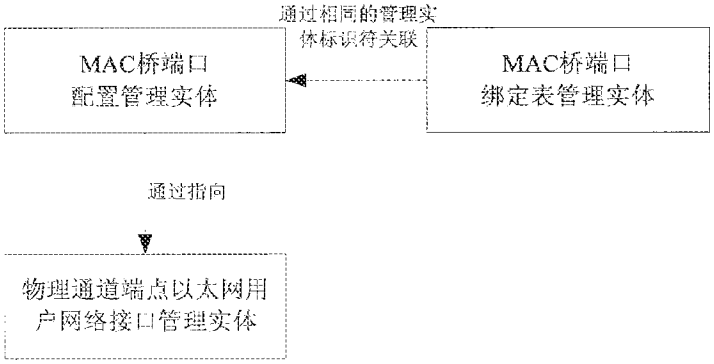

通过相同的管理实体标识符关联
MAC桥端口配置管理实体
MAC桥端口绑定表管理实体
通过指向
物理通道端点以太网用户网络接口管理实体

图 2

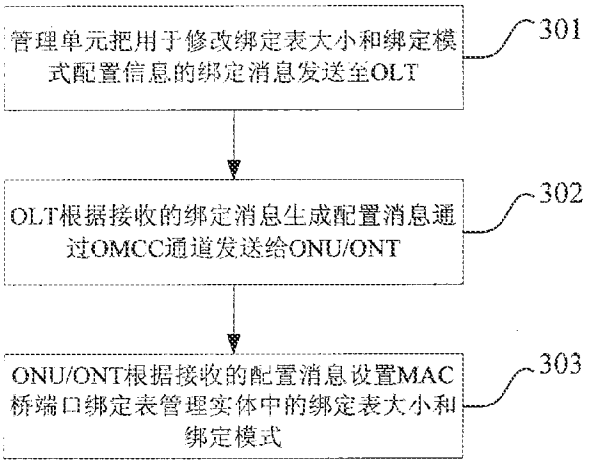

管理单元把用于修改绑定表大小和绑定模式配置信息的绑定消息发送至OLT
301
OLT根据接收的绑定消息生成配置消息通过OMCC通道发送给ONU/ONT
302
ONU/ONT根据接收的配置消息设置MAC桥端口绑定表管理实体中的绑定表大小和绑定模式
303

图 3

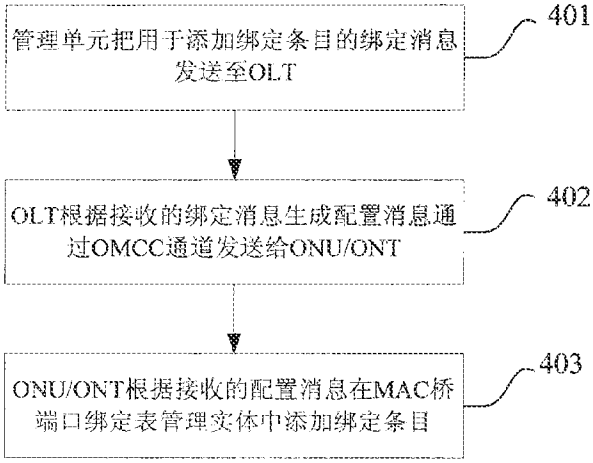

管理单元把用于添加绑定条目的绑定消息发送至OLT
401
OLT根据接收的绑定消息生成配置消息通过OMCC通道发送给ONU/ONT
402
ONU/ONT根据接收的配置消息在MAC桥端口绑定表管理实体中添加绑定条目
403

图 4

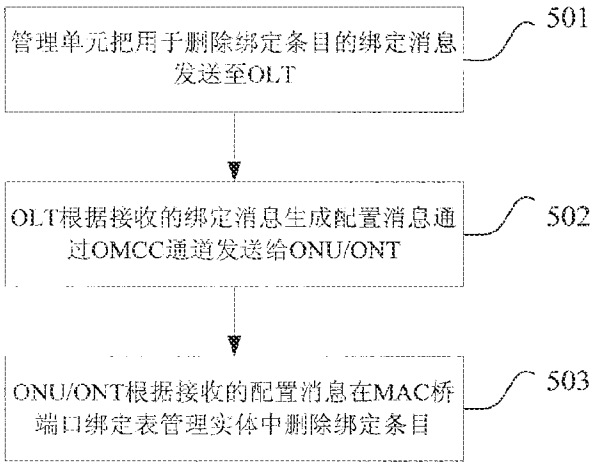

管理单元把用于删除绑定条目的绑定消息发送至OLT
501
OLT根据接收的绑定消息生成配置消息通过OMCC通道发送给ONU/ONT
502
ONU/ONT根据接收的配置消息在MAC桥端口绑定表管理实体中删除绑定条目
503

图 5

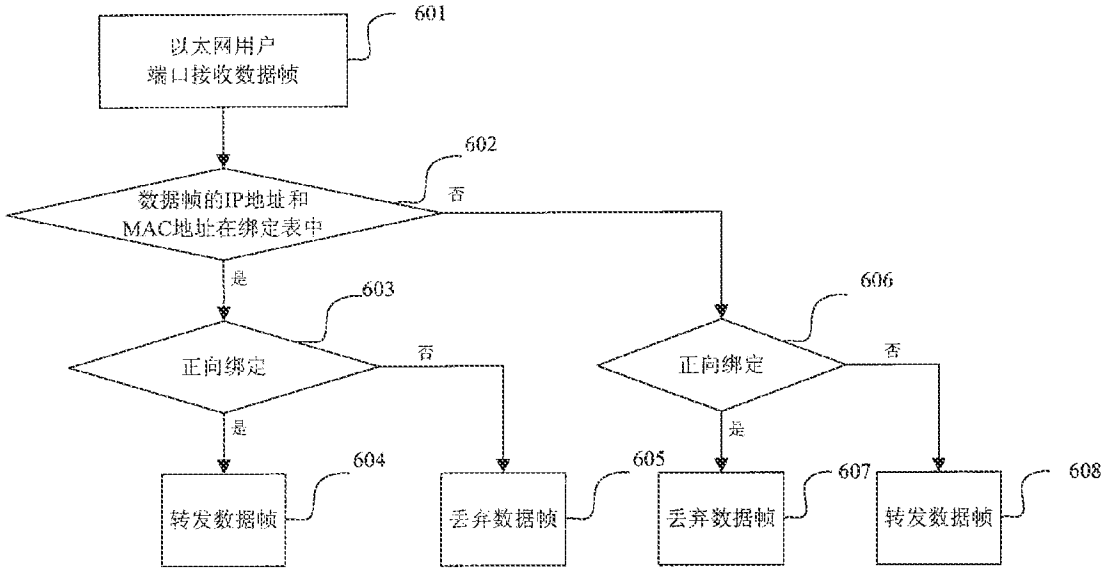

以太网用户端口接收数据帧
601
数据帧的IP地址和MAC地址在绑定表中
602
否
是
正向绑定
603
否
是
转发数据帧
604
丢弃数据帧
605
正向绑定
606
否
是
丢弃数据帧
607
转发数据帧
608

图 6

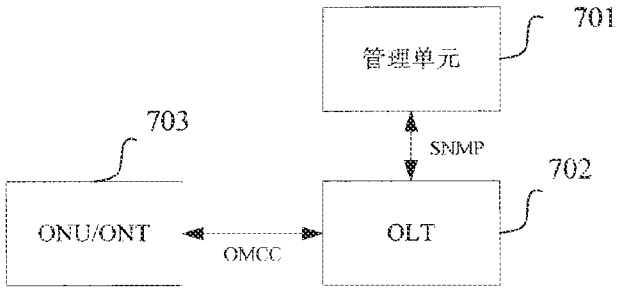

管理单元
701
SNMP
ONU/ONT
703
OMCC
OLT
702

图 7

Espacenet

Bibliographic data: CN101741712 (A) — 2010-06-16

Device, system and method supporting base station data exchange

No documents available for this priority number.

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Abstract of CN101741712 (A)

The invention provides a device, a system and a method supporting base station data exchange. The method mainly comprises the following steps of: pre-establishing an IP forwarding table, and receiving a data message sent by a source BS; querying the IP forwarding table according to a destination IP address, an entrance physical port or an entrance ONU port and an entrance PON service logical portof the data message so as to acquire an exit physical port and an exit PON service logical port of the data message; and forwarding the data message to a destination BS by using the exit physical port or an exit ONU port and the exit PON service logical port.; By using the device, the system and the method, a PON network as a transmission network supports an X2 interface, and the direct intercommunication in the true sense in stead of the intercommunication through a wireless gateway between the BSes is realized.

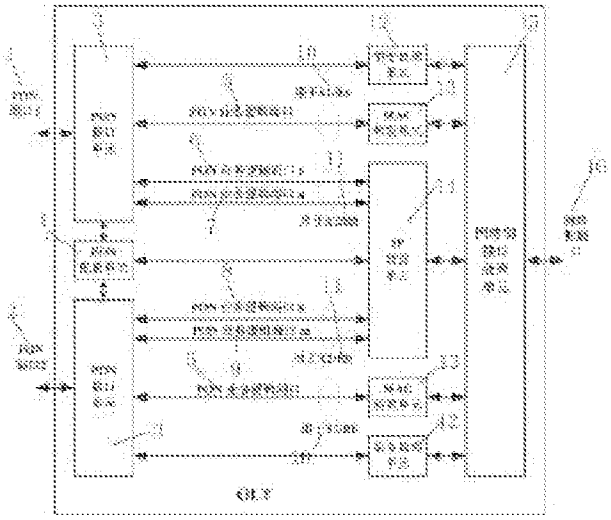


Fig. 2

1 PON PORT 1
2 PON PORT 2
3 PON INTERFACE UNIT
4 PON CONFIGURATION UNIT
5 PON SERVICE LOGIC PORT
6 PON SERVICE LOGIC PORT 2
7 PON SERVICE LOGIC PORT n
8 PON SERVICE LOGIC PORT 8
9 PON SERVICE LOGIC PORT m
10 PON SLIBS
11 PON xDSL
12 SIGNALING PROCESSING UNIT
13 MAC FORWARDING UNIT
14 IP FORWARDING UNIT
15 NETWORK SIDE INTERFACE PROCESSING UNIT
16 NETWORK SIDE PORT

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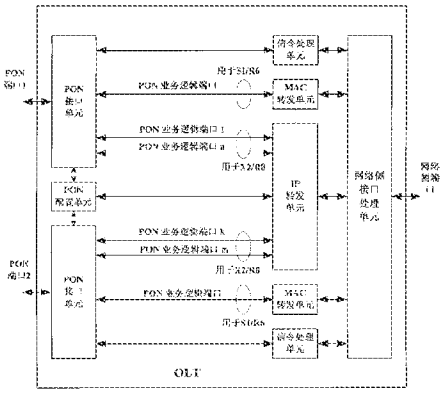
权利要求书 3 页 说明书 10 页 附图 6 页

(54)发明名称

支持基站数据交换的装置、系统及方法

(57)摘要

本发明提供了一种支持基站数据交换的装置、系统及方法。该方法主要包括：预先建立IP转发表，接收源BS发送的数据报文；根据所述数据报文的目的IP地址、入物理端口或入ONU端口、和入PON业务逻辑端口，查询所述IP转发表，获取所述数据报文的出物理端口、出PON业务逻辑端口，利用所述出物理端口或出ONU端口、出PON业务逻辑端口将所述数据报文转发给目的BS。利用本发明，实现了作为传输网络的PON网络支持X2接口，实现BS之间真正意义上的直接互通，而不是通过无线网关互通。



CN 101741712 A

1. 一种支持基站数据交换的光路终结点 OLT，其特征在于，包括：

PON 配置单元，用于给基站 BS 分配与 BS 的 IP 地址相对应的 PON 业务逻辑端口，所述 PON 业务逻辑端口包括入和出 PON 业务逻辑端口，用于与所述 BS 中的 BS 间通信接口交互数据报文；

IP 转发单元，用于通过所述 PON 业务逻辑端口接收源 BS 发送的数据报文，根据该数据报文的目的 IP 地址、入物理端口或入光网络单元 ONU 端口、和入 PON 业务逻辑端口，查询预先建立的 IP 转发表，获取所述数据报文的出物理端口或出 ONU 端口、出 PON 业务逻辑端口，利用所述出物理端口或出 ONU 端口、出 PON 业务逻辑端口将所述数据报文转发给目的 BS。

2. 根据权利要求 1 所述的支持基站数据交换的光路终结点 OLT，其特征在于，所述 OLT 还包括：

信令处理单元，用于实现动态主机配置协议 DHCP 监听功能，并根据监听得到的 BS 的 IP 地址和所述 PON 业务逻辑端口建立 IP 转发表，所述 IP 转发表中包括：入物理端口或入 ONU 端口、入 PON 业务逻辑端口、目的 IP 地址、出物理端口或出 ONU 端口、和出 PON 业务逻辑端口。

3. 根据权利要求 1 所述的支持基站数据交换的光路终结点 OLT，其特征在于，所述 OLT 还包括：

MAC 转发单元，用于通过自学习建立基于 BS 的 IP 地址、所述 PON 配置单元分配的用于与所述 BS 中的 BS 和无线网关间通信接口交互数据报文的 PON 业务逻辑端口的媒质接入控制层 MAC 转发表，所述 PON 业务逻辑端口包括入和出 PON 业务逻辑端口；

接收源 BS 发送的数据报文，根据该数据报文的目的 IP 地址、入物理端口或入 ONU 端口、和入 PON 业务逻辑端口，查询所述 MAC 转发表，获取所述数据报文的出物理端口或出 ONU 端口、出 PON 业务逻辑端口，利用所述出物理端口或出 ONU 端口、出 PON 业务逻辑端口将所述数据报文转发给无线网关。

4. 根据权利要求 1 或 2 或 3 所述的支持基站数据交换的光路终结点 OLT，其特征在于，所述 OLT 还包括：

PON 接口单元，用于实现 OLT 和 BS 之间的 PON 接口通信功能；

网络侧接口处理单元，用于实现 OLT 和无线网关之间的网络侧接口的通信功能。

5. 根据权利要求 4 所述的支持基站数据交换的光路终结点 OLT，其特征在于：

所述信令处理单元，还支持地址解析协议代理 ARP Proxy 功能，对于来自 BS 之间的通信接口的 ARP 请求，返回 OLT 的 MAC 地址作为应答；对于来自 BS 和无线网关之间的通信接口的 ARP 请求，返回无线网关的 MAC 地址作为应答。

6. 根据权利要求 4 所述的支持基站数据交换的光路终结点 OLT，其特征在于：

所述 IP 转发单元，采用三层转发方式支持 BS 之间的通信接口传输的数据报文，并且该数据报文采用特定的虚拟局域网 VLAN 标识；

所述 MAC 转发单元，采用二层转发方式支持 BS 和无线网关之间的通信接口传输的数据报文；

或者，

所述 IP 转发单元，采用 IP 承载于千兆位无源光网络封装方式 IP over GEM 方式支持 BS 之间的通信接口传输的数据报文；

所述 MAC 转发单元，采用以太网承载于千兆位无源光网络封装方式 ETHover GEM 方式支持 BS 和无线网关之间的通信接口传输的数据报文。

7. 一种 BS，其特征在于，包括：

切换处理单元，用于生成 BS 间传输的数据报文，将该数据报文传输给 IP 转发单元；

IP 转发单元，用于根据所述切换处理单元传输过来的数据报文的目的 IP 地址，查询预先建立的 IP 转发表，获取所述数据报文对应的出 PON 业务逻辑端口，并通过该出 PON 业务逻辑端口将所述数据报文发送给 OLT。

8. 根据权利要求 7 所述的 BS，其特征在于，所述 BS 还包括：

信令处理单元，用于通过 DHCP 过程得到的 DHCP 服务器分配给 BS 的 IP 地址，根据该 IP 地址、OLT 分配的用于与所述 BS 中的 BS 间通信接口交互数据报文的 PON 业务逻辑端口，建立 IP 转发表，所述 PON 业务逻辑端口包括入和出 PON 业务逻辑端口。

9. 根据权利要求 7 所述的 BS，其特征在于，所述 BS 还包括：

无线处理单元，用于实现 BS 和无线网关之间的无线接口通信功能，生成 BS 和无线网关间传输的数据报文，将该数据报文传输给 MAC 转发单元；

MAC 转发单元，用于通过自学习建立基于 BS 的 IP 地址、OLT 分配的用于与所述 BS 中的 BS 和无线网关间通信接口交互数据报文的 PON 业务逻辑端口的 MAC 转发表，所述 PON 业务逻辑端口包括入和出 PON 业务逻辑端口；

根据所述无线处理单元传输过来的数据报文的目的 IP 地址，查询所述 MAC 转发表获取所述数据报文对应的出 PON 业务逻辑端口，通过该出 PON 业务逻辑端口将所述数据报文发送给无线网关。

10. 根据权利要求 7 或 8 或 9 所述的 BS，其特征在于，所述 BS 还包括：

PON 接口单元，用于实现 OLT 和 BS 之间的 PON 接口通信功能；

PON 配置单元，用于配置 OLT 给 BS 分配的用于与所述 BS 中的 BS 间通信接口交互数据报文、与所述 BS 中的 BS 和无线网关间通信接口交互数据报文的 PON 业务逻辑端口，所述 PON 业务逻辑端口包括入和出 PON 业务逻辑端口。

11. 一种支持基站数据交换的系统，其特征在于，包括 OLT、源 BS 和目的 BS，其中，

所述源 BS 生成所述源 BS 和所述目的 BS 间传输的数据报文，根据该数据报文的目的 IP 地址，查询预先建立的 IP 转发表，获取所述数据报文对应的出 PON 业务逻辑端口，并通过该出 PON 业务逻辑端口将所述数据报文发送给 OLT；

所述 OLT 接收源 BS 发送的数据报文，根据该数据报文的目的 IP 地址、入物理端口或入光网络单元 ONU 端口、和入 PON 业务逻辑端口，查询预先建立的 IP 转发表，获取所述数据报文的出物理端口或出 ONU 端口、出 PON 业务逻辑端口，利用所述出物理端口或出 ONU 端口、出 PON 业务逻辑端口将所述数据报文转发给所述目的 BS。

12. 一种基站数据交换的方法，其特征在于，预先建立 IP 转发表，所述方法具体包括：

接收源 BS 发送的数据报文；

根据所述数据报文的目的 IP 地址、入物理端口或入 ONU 端口、和入 PON 业务逻辑端口，查询所述 IP 转发表，获取所述数据报文的出物理端口、出 PON 业务逻辑端口，利用所述出物理端口或出 ONU 端口、出 PON 业务逻辑端口将所述数据报文转发给目的 BS。

13. 根据权利要求 12 所述的基站数据交换的方法，其特征在于，所述预先建立 IP 转发

表，具体包括：

侦听源 BS 和 DHCP 服务器之间的 DHCP 报文，得到所述源 BS 的 IP 地址；

为所述源 BS 分配与所述源 BS 的 IP 地址相对应的 PON 业务逻辑端口，所述 PON 业务逻辑端口包括入和出 PON 业务逻辑端口，用于与所述 BS 中的 BS 间通信接口交互数据报文；

根据所述 BS 的 IP 地址、所述 PON 业务逻辑端口建立所述 IP 转发表，所述 IP 转发表中包括：入物理端口或入 ONU 端口、入 PON 业务逻辑端口、目的地址、出物理端口或出 ONU 端口、和出 PON 业务逻辑端口。

14. 根据权利要求 12 或 13 所述的基站数据交换的方法，其特征在于，所述接收源 BS 发送的数据报文，具体包括：

接收源 BS 发送的 ARP 请求消息，向所述源 BS 发送携带 OLT 的 MAC 地址的 ARP 应答消息；

所述 OLT 通过所述 PON 业务逻辑端口，接收所述源 BS 根据所述 OLT 的 MAC 地址发送过来的数据报文，所述数据报文的目的接收方为目的 BS。

支持基站数据交换的装置、系统及方法

技术领域

[0001] 本发明涉及无线通信技术领域，尤其涉及一种支持基站数据交换的装置、系统及方法。

背景技术

[0002] 长期演进 (Long Term Evolution，LTE) 网络的架构图如图 1 所示，LTE 网络采用两层扁平网络结构，其中移动管理实体 (Mobility ManagementEntity，MME) 管理控制面的协议，如用户终端标识的分配、安全性、鉴权和漫游控制等；服务网关 (Serving Gateway，S-GW) 管理用户面的协议，如储存用户终端上下文、加密上下文等。

[0003] 在通用地面无线接入网路 (Universal Terrestrial Radio AccessNetwork，E-UTRAN) 的结构中，增强节点 B(enhanced NodeB，eNB) 之间采用 X2 接口，用于传输切换数据包；在 eNodeB 和 A-GW 之间采用 S1 接口。LTE 网络对移动承载网络的时延要求非常高，要求端到端时延小于 10 毫秒。

[0004] 微波接入全球互联 (World Interoperability for Microwave Access，WiMAX) 的网络架构类似 LTE 网络，WiMAX 的接入网采用两级结构，由基站 (Base Station，BS) 和接入网网关 (Access Service Network Gateway，ASN GW) 构成；其中，BS 对应于 eNB，接入服务网络网关 (AccessService Network Gateway，A-GW) 对应于 A-GW；BS 采用 R8 接口，用于传输切换数据包；在 BS 和 ASN GW 之间采用 R6 接口。

[0005] 对于千兆位无源光网络 (Gigabit Passive Optical Network，GPON) 及下一代 GPON，PON 业务逻辑传输管道为 GEM port，采用 GPON 封装方式 (GPON Encapsulation Method，GEM)port-ID 进行标识。对于以太无源光网络 (Ethernet Passive Optical Network，EPON) 及下一代 EPON，PON 业务逻辑传输管道为逻辑链路标识 (Logical Link Identifier，LLID) 管道，采用 LLID 进行标识。目前，PON 的主要业务承载方式有 Ethernet over GEM(以太网承载于 GEM) 和 IP over GEM(IP 承载于 GEM)。

[0006] 当采用 PON 网络，比如 GPON(或 EPON) 或下一代 GPON(或 EPON) 作为上述 U-TRAN 网络或 WiMAX 网络的传输网络时，基于 PON 的移动承载示意图如图 2 所示，光路终结点 (Optical Line Termination，OLT) 当收到来自 BS1 的数据包，只能将该数据包继续上传给无线网关，再由无线网关将该数据包转发给 BS2，相当于该 PON 网络只能支持 S1 接口 (BS 和无线网关之间的接口)，不能支持 X2 接口 (BS 之间的接口)。

[0007] 如何使作为传输网络的上述 PON 网络支持 X2 接口，实现 BS 之间真正意义上的直接互通，而不是通过无线网关互通，是基于 PON 网络的移动承载急待解决的问题。

发明内容

[0008] 本发明的实施例提供了一种支持基站数据交换的装置、系统及方法，以解决作为传输网络的 PON 网络支持 X2 接口的问题。

[0009] 一种支持基站数据交换的光路终结点 OLT，包括：

[0010] PON配置单元，用于给基站BS分配与BS的IP地址相对应的PON业务逻辑端口，所述PON业务逻辑端口包括入和出PON业务逻辑端口，用于与所述BS中的BS间通信接口交互数据报文；

[0011] IP转发单元，用于通过所述PON业务逻辑端口接收源BS发送的数据报文，根据该数据报文的目的IP地址、入物理端口或入光网络单元ONU端口、和入PON业务逻辑端口，查询预先建立的IP转发表，获取所述数据报文的出物理端口或出ONU端口、出PON业务逻辑端口，利用所述出物理端口或出ONU端口、出PON业务逻辑端口将所述数据报文转发给目的BS。

[0012] 一种BS，包括：

[0013] 切换处理单元，用于生成BS间传输的数据报文，将该数据报文传输给IP转发单元；

[0014] IP转发单元，用于根据所述切换处理单元传输过来的数据报文的目的IP地址，查询预先建立的IP转发表，获取所述数据报文对应的出PON业务逻辑端口，并通过该出PON业务逻辑端口将所述数据报文发送给OLT。

[0015] 一种支持基站数据交换的系统，包括OLT、源BS和目的BS，其中，

[0016] 所述源BS生成所述源BS和所述目的BS间传输的数据报文，根据该数据报文的目的IP地址，查询预先建立的IP转发表，获取所述数据报文对应的出PON业务逻辑端口，并通过该出PON业务逻辑端口将所述数据报文发送给OLT；

[0017] 所述OLT接收源BS发送的数据报文，根据该数据报文的目的IP地址、入物理端口或入光网络单元ONU端口、和入PON业务逻辑端口，查询预先建立的IP转发表，获取所述数据报文的出物理端口或出ONU端口、出PON业务逻辑端口，利用所述出物理端口或出ONU端口、出PON业务逻辑端口将所述数据报文转发给所述目的BS。

[0018] 一种基站数据交换的方法，预先建立IP转发表，所述方法具体包括：

[0019] 接收源BS发送的数据报文；

[0020] 根据所述数据报文的目的IP地址、入物理端口或入ONU端口、和入PON业务逻辑端口，查询所述IP转发表，获取所述数据报文的出物理端口、出PON业务逻辑端口，利用所述出物理端口或出ONU端口、出PON业务逻辑端口将所述数据报文转发给目的BS。

[0021] 由上述本发明的实施例提供的技术方案可以看出，本发明实施例通过OLT支持X2/R8、S1/R6接口传输的数据报文，通过DHCP监听基于建立BS的IP地址与用于X2/R8接口传输的PON业务逻辑端口的IP转发表，利用该IP转发表实现了基站数据的本地交换，实现BS之间的互通。

附图说明

[0022] 为了更清楚地说明本发明实施例的技术方案，下面将对实施例描述中所需要使用的附图作简单地介绍，显而易见地，下面描述中的附图仅仅是本发明的一些实施例，对于本领域普通技术人员来讲，在不付出创造性劳动性的前提下，还可以根据这些附图获得其他的附图。

[0023] 图1为现有技术中的一种LTE网络的架构示意图；

[0024] 图2为现有技术中的一种基于PON的移动承载示意图；

[0025] 图 3 为本发明实施例一提供的一种支持 OLT 本地交换的 PON 系统的结构示意图；

[0026] 图 4 为本发明实施例二提供的一种 OLT 的功能结构示意图；

[0027] 图 5 为本发明实施例二提供的另一种 OLT 的功能结构示意图；

[0028] 图 6 为本发明实施例二提供的一种 BS 的功能结构示意图；

[0029] 图 7 为本发明实施例二提供的另一种 BS 的功能结构示意图；

[0030] 图 8 为本发明实施例三提供的信令处理单元建立 X2/R8 接口的 IP 转发表的处理流程图；

[0031] 图 9 为本发明实施例三提供的一种实现 OLT 本地交换的数据转发流程图。

具体实施方式

[0032] 本发明实施例中，OLT 给 BS 分配与 BS 的 IP 地址相对应的 PON 业务逻辑端口，所述 PON 业务逻辑端口包括入和出 PON 业务逻辑端口，用于与所述 BS 中的 BS 间通信接口交互数据报文。

[0033] OLT 通过所述入 PON 业务逻辑端口接收源 BS 发送的数据报文，根据所述数据报文的目的 IP 地址、入物理端口或入光网络单元 (optical network unit，ONU) ONU 端口、入 PON 业务逻辑端口，查询预先建立的 IP 转发表，获取所述数据报文的出物理端口或出 ONU 端口、出 PON 业务逻辑端口，利用所述出物理端口或出 ONU 端口、出 PON 业务逻辑端口将所述数据报文转发给目的 BS。

[0034] 进一步地，OLT 侦听 BS 和 DHCP 服务器之间的 DHCP 报文，得到所述 BS 的 IP 地址；

[0035] 所述 OLT 根据所述 BS 的 IP 地址、PON 业务逻辑端口建立所述 IP 转发表，所述 IP 转发表中包括：入物理端口或入 ONU 端口、入 PON 业务逻辑端口、目的地址、出物理端口或出 ONU 端口、和出 PON 业务逻辑端口。

[0036] 进一步地，OLT 通过所述 PON 业务逻辑端口接收源 BS 发送的 ARP 请求消息，向所述源 BS 发送携带 OLT 的 MAC 地址的 ARP 应答消息；

[0037] 所述 OLT 通过所述 PON 业务逻辑端口，接收所述源 BS 根据所述 OLT 的 MAC 地址发送过来的数据报文，所述数据报文的目的接收方为目的 BS。

[0038] 进一步地，所述 OLT 将所述数据报文封装于所述出 PON 业务逻辑端口的 PON 帧，通过所述出物理端口或出 ONU 端口将封装后的所述数据报文转发给目的 BS。

[0039] 进一步地，OLT 通过自学习建立基于 BS 的 IP 地址、所述 OLT 分配的用于与所述 BS 中的 BS 和无线网关间通信接口交互数据报文的 PON 业务逻辑端口的 MAC 转发表；

[0040] OLT 通过所述 PON 业务逻辑端口接收源 BS 发送的 ARP 请求消息，向所述源 BS 发送携带无线网关的 MAC 地址的 ARP 应答消息；

[0041] 所述 OLT 通过所述 PON 业务逻辑端口接收所述源 BS 根据所述 OLT 和无线网关的 MAC 地址发送过来的数据报文，所述数据报文的目的接收方为无线网关；

[0042] 所述 OLT 根据所述数据报文的入物理端口或入 ONU 端口、入 PON 业务逻辑端口查询所述 MAC 转发表，获取所述数据报文的出物理端口或出 ONU 端口、出 PON 业务逻辑端口，将所述数据报文封装于所述出 PON 业务逻辑端口的 PON 帧，通过所述出物理端口将封装后的所述数据报文转发给无线网关。

[0043] 进一步地，所述 OLT 和 BS 采用三层转发方式支持 BS 之间的通信接口传输的数据

报文，并且该数据报文采用特定的VLAN标识，采用二层转发方式支持BS和无线网关之间的通信接口传输的数据报文；

[0044] 或者，

[0045] 所述OLT和BS采用IP over GEM方式支持BS之间的通信接口传输的数据报文，采用ETH over GEM方式支持BS和无线网关之间的通信接口传输的数据报文。

[0046] 为便于对本发明实施例的理解，下面将结合附图以几个具体实施例为例做进一步的解释说明，且各个实施例并不构成对本发明实施例的限定。

[0047] 实施例一

[0048] 该实施例提供的一种支持OLT本地交换的PON系统的结构示意图如图3所示。

[0049] 在图3所示的PON系统中，OLT支持X2/R8、S1/R6接口传输的数据报文，给BS分配用于X2/R8、S1/R6接口传输的PON业务逻辑端口。OLT支持动态主机配置协议(Dynamic Host Configuration Protocol，DHCP)监听，通过DHCP监听分配给BS的IP地址，建立基于BS的IP地址与PON业务逻辑端口的IP转发表，所述PON业务逻辑端口包括入和出PON业务逻辑端口，从而实现基站数据的本地交换，以支持X2/R8接口。此外，OLT采用二层转发方式支持S1/R6接口传输的数据报文，OLT对S1/R6接口的用户数据的二层业务隔离功能保持不变。BS可以内嵌ONT，不同BS对应不同的ONT ID，该ONT ID可以作为BS ID使用。

[0050] 在实现应用中，OLT可以通过下述两种方案来实现支持X2/R8、S1/R6接口传输的数据报文：

[0051] 方案1、OLT采用三层转发方式支持X2/R8接口传输的数据报文，X2/R8接口传输的数据报文采用特定的虚拟局域网(Virtual Local Area Network，VLAN)标识；OLT还采用二层转发方式支持S1/R6接口传输的数据报文；此外，OLT还支持地址解析协议代理(Address Resolution Protocol Proxy，ARP代理)，对于来自X2/R8接口的地址解析协议(Address ResolutionProtocol，ARP)请求，ARP Proxy以OLT的媒质接入控制层(MdiumAccess Control，MAC)地址回应给BS；对于来自S1/R6接口的ARP请求，ARP Proxy以无线网关(如AGW或ASN GW)的MAC地址回应给BS。

[0052] 上述方案1可以应用于GPON、EPON、下一代GPON或下一代EPON作为传输网络的情况。

[0053] 方案2、OLT采用IP over GEM方式支持X2/R8接口传输的数据报文，BS无需知道相邻BS的MAC地址，只需知道相邻BS的IP地址即可，从而X2/R8接口无需支持VLAN和/或ARP，由于ETH不存在，无需解析ETH，进一步降低了移动承载网的传输时延，进而降低了无线切换的时延；OLT还采用ETHover GEM方式支持S1/R6接口传输的数据报文，PON系统的VLAN应用保持不变，VLAN规划不受本地交换功能引入的影响，不需重新规划，OLT对S1/R6接口的用户数据的ETH二层隔离功能保持不变。OLT还可以采用二层转发方式，支持S1/R6接口传输的数据报文，OLT对S1/R6接口的用户数据的ETH二层隔离功能保持不变。

[0054] 上述方案2可以应用于GPON或下一代GPON作为传输网络的情况。

[0055] 实施例二

[0056] 针对上述实施一中的方案1，该实施例提供的一种OLT的功能结构图如图4所示，包括：PON配置单元、IP转发单元，进一步地，还包括网络侧接口处理单元、PON接口单元、信令处理单元、、MAC转发单元等功能单元，下面分别介绍各个功能单元的作用：

[0057] PON 接口单元，用于实现 OLT 和 BS 之间的 PON 接口通信功能，对于 GPON 及其下一代 GPON，完成 PON 协议栈中的 PON 物理媒质相关层功能和 GPON 传输汇聚层 (GPON Transmission Converge，GTC) 成帧子层功能；对于 EPON 及其下一代 EPON，完成 EPON 物理层和数据链路层功能。

[0058] 网络侧接口处理单元，用于实现 OLT 和无线网关之间的网络侧接口的通信功能。

[0059] PON 配置单元，用于实现配置 PON 业务逻辑端口（如 GEM Port/LLID 端口），上述配置操作包括：建立、修改或删除 PON 业务逻辑端口及其相关 QoS 参数。给 BS 分配与 BS 的 IP 地址或 IPv6 地址前缀相对应的用于 X2/R8 接口传输的 PON 业务逻辑端口和用于 S1/R6 接口传输的 PON 业务逻辑端口。

[0060] 信令处理单元，用于实现 DHCP 监听功能，并根据监听得到的分配给 BS 的 IP 地址和为 BS 分配的用于 X2/R8 接口传输的 PON 业务逻辑端口建立 IP 转发表，所述 IP 转发表中包括：入物理端口或入 ONU 端口、入 PON 业务逻辑端口、出物理端口或出 ONU 端口、出 PON 业务逻辑端口和目的地址。另外，该单元还可支持 ARP Proxy 功能，对于来自 X2/R8 接口的 ARP 请求，以 OLT 的 MAC 地址回应给 BS；对于来自 S1/R6 接口的 ARP 请求，以无线网关（如 AGW 或 ASN GW）的 MAC 地址回应给 BS。

[0061] 上述 IP 转发表如下述表 1 所示。

[0062] 表 1

[0063]

入端口/ONU 端口	入业务逻辑端口	目的地址	DSCP	出端口/ONU 端口	出业务逻辑端口
1	n	IP@1	1	2	k
2	k	IP@2	2	2	m
网络侧端口	-	IP@3	3	1	2
2	k+1	IP@4	4	网络侧端口	-
……					

[0064] IP 转发单元，用于基于 PON 业务逻辑端口，通过信令处理单元建立的 IP 转发表进行 IP 转发，该 IP 转发主要针对 X2/R8 接口传输的数据报文。上述 IP 转发单元的入端口或出端口可为 PON 物理端口、网络侧端口。当所述 OLT 集成了 ONU 时，也可按同一 PON 物理端口下的不同 ONU 划分上述 IP 转发单元的逻辑端口，该逻辑端口称为 ONU 端口，入 ONU 端口或出 ONU 端口用 ONU ID 进行标识。在同一个运营商管理域内，不同 ONU 的 ONU ID 不同。业务逻辑端口标识为 GEM port ID 或 LLID。

[0065] 若上述 IP 转发单元的入端口或出端口为网络侧端口，则入 PON 业务逻辑端口或出 PON 业务逻辑端口将被忽略。上述 IP 转发单元的入端口和出端口可以为同一个端口，即实

现在同一个 PON 端口内的三层转发，此时入 PON 业务逻辑端口和出 PON 业务逻辑端口不能相同。

[0066] 以 GPON 为例，上述 IP 转发单元完成的三层转发过程如下：

[0067] 当 X2/R8 接口传输的 IP 分组到达 OLT 时，OLT 的 IP 转发单元根据上述 IP 分组的入端口（如入 ONU ID = 1）、入 PON 业务逻辑端口（如 GPID = 1）和目的地址（如 IP@1），查询上述表 1 所示的 IP 转发表，得到出端口（如出 ONUID = 2）和出 PON 业务逻辑端口（如 GPID = k），则 PON 接口单元对 IP 分组添加 GEM 帧头，其中的 GEM PORT ID 为查询得到的出 PON 业务逻辑端口值（如如 GPID = k），然后将 GEM 帧出出端口（如出 ONU ID = 2）送出。

[0068] MAC 转发单元，用于基于 PON 业务逻辑端口，通过 MAC 转发表进行 MAC 转发，该 MAC 转发主要针对 S1/R6 接口传输的数据报文。上述 MAC 转发表采用 MAC 自学习的方法建立。若上述 MAC 转发单元的入端口或出端口为网络侧端口，则入 PON 业务逻辑端口或出 PON 业务逻辑端口可被忽略。上述 MAC 转发表如下述表 2 所示。

[0069] 表 2 ：PON-based MAC 转发表

[0070]

入端口/ONU 端口	入业务逻辑端口	目的地址	VLAN 标识	出端口/ONU 端口	出业务逻辑端口
ONU1	n	MAC @1	VLAN1	网络侧端口	-
网络侧端口	-	MAC @2	VLAN2	ONU2	m
……					

[0071] 上述 MAC 转发的具体处理过程如下：

[0072] 在上行方向，当 S1/R6 接口传输的 MAC 帧到达 OLT 时，OLT 的 MAC 转发单元根据 MAC 帧的入端口（如入 ONU ID = 1）、入 PON 业务逻辑端口（如 GPID = n）和目的地址（如 MAC@1），查询上述表 2 所示的 MAC 转发表，得到出端口（如出网络侧端口），然后，通过该出端口（如出网络侧端口）将上述 MAC 帧送出。

[0073] 在下行方向，当 S1/R6 接口传输的 MAC 帧到达 OLT 时，OLT 的 MAC 转发单元根据 MAC 帧的入端口（如入网络侧端口）和目的地址（如 MAC@1），查询上述表 2 所示的 MAC 转发表，得到出端口（如出 ONU ID = 2）、出 PON 业务逻辑端口（如 GPID = m），则 PON 接口单元将 MAC 帧添加 GEM 帧头，其中的 GEM PORT ID 为查得的出 PON 业务逻辑端口值（如如 GPID = m），然后，通过该出端口（如出 ONU ID = 2）将上述 MAC 帧送出。

[0074] 针对上述实施一中的方案 2，该实施例提供的另一种 OLT 的功能结构图如图 5 所示，包括 ：GPON 接口单元、网络侧接口处理单元、光网络单元管理和控制接口 (ONU Management and Control Interface，OMCI) 配置单元、信令处理单元、IP 转发单元、MAC 转发单元等功能单元，下面分别介绍各个功能单元的作用 ：

[0075] GPON 接口单元，用于实现 OLT 和 BS 之间的 GPON 接口通信功能。对于 X2/R8 接口的 PON 业务逻辑端口，实现 IP over GEM 功能 ；对于 S1/R6 接口的 PON 业务逻辑端口，实现

ETH over GEM 功能。

[0076] OMCI 配置单元，用于实现用于配置 GPON 业务逻辑端口（如 GEMPort/LLID 端口），上述配置操作包括：建立、修改或删除 PON 业务逻辑端口及其相关 QoS 参数。

[0077] 上述图 5 所示的 OLT 中的网络侧接口处理单元、信令处理单元、IP 转发单元和 MAC 转发单元的功能上述图 4 所示的 OLT 中的对应单元的功能相同。

[0078] 针对上述实施一中的方案 1，该实施例提供的一种 BS 的功能结构示意图如图 6 所示，包括：无线处理单元、切换处理单元、信令处理单元、PON 接口单元、PON 配置单元、IP 转发单元和 MAC 转发单元。下面分别介绍各个单元的具体功能。

[0079] PON 接口单元，用于实现 OLT 和 BS 之间的 PON 接口通信功能，对于 GPON 及其下一代 GPON，完成 PON 协议栈中的 PON 物理媒质相关层功能和 GTC 成帧子层功能；对于 EPON 及其下一代 EPON，完成 EPON 物理层和数据链路层功能。

[0080] PON 配置单元，用于实现配置 PON 业务逻辑端口（如 GEM Port/LLID 端口），上述配置操作包括：建立、修改或删除 PON 业务逻辑端口及其相关 QoS 参数。

[0081] 无线处理单元，用于实现 BS 和用户终端之间的无线接口通信功能，生成 S1/R6 接口的数据报文，将该数据报文传输给 MAC 转发单元。

[0082] 切换处理单元，用于实现 BS 之间的无线切换功能，生成 X2/R8 接口的 IP 报文，将该 IP 报文传输给 IP 转发单元。

[0083] 信令处理单元，用于作为 DHCP Client 实现 DHCP 功能，并根据 DHCP 过程得到的分配给 BS 的 IP 地址，以及 OLT 为 BS 分配的用于 X2/R8 接口传输的 PON 业务逻辑端口，建立 IP 转发表，根据该 IP 转发表可以得到 BS 发送给 OLT 的 X2/R8 报文对应的 PON 业务逻辑端口。该信令处理单元还向 MAC 转发单元发起 ARP 请求，请求 X2/R8 报文的目的 IP 地址所对应的 MAC 地址。

[0084] IP 转发单元，用于基于 PON 业务逻辑端口，通过信令处理单元建立的 IP 转发表，根据目的 IP 地址查询切换处理单元传输过来的 X2/R8 报文对应的 PON 物理端口、PON 业务逻辑端口。可选地，通过向 MAC 转发单元发起 ARP 请求，获取上述 X2/R8 报文的目的 IP 地址所对应的 MAC 地址。然后，根据上述 PON 业务逻辑端口和 MAC 地址，将上述 X2/R8 报文通过 PON 接口单元发送给 OLT。

[0085] MAC 转发单元，用于基于 PON 业务逻辑端口，通过 MAC 转发表对无线处理单元传输过来或者 OLT 传输过来的 S1/R6 接口的数据报文进行 MAC 转发。上述 MAC 转发表采用 MAC 自学习的方法建立。若上述 MAC 转发单元的入端口或出端口为用户侧端口（如用户频段或无线通信连接），则入 PON 业务逻辑端口或出 PON 业务逻辑端口可被忽略。上述 MAC 转发表可以如上述表 3 所示。

[0086] 表 3：MAC 转发表

[0087]

入端口/ONT 口	入业务逻辑端口	目的地址	VLAN 标识	出端口/ONT 端口	出业务逻辑端口
ONT1	n	MAC @1	VLAN1	用户侧端口	-

入端口/ONT 口	入业务逻辑端口	目的地址	VLAN 标识	出端口/ONT 端口	出业务逻辑端口
用户侧端口	–	MAC @2	VLAN2	ONT2	m
……					

[0088] 上述 MAC 转发的具体处理过程如下：

[0089] 在上行方向，当无线处理单元传输过来的 S1/R6 接口的数据报文的 MAC 帧到达该单元时，该单元根据 MAC 帧的入端口（如入 ONT ID = 1）、入 PON 业务逻辑端口（如 GPID = n）和目的地址（如 MAC@1），查询上述表 3 所示的 MAC 转发表，得到出端口（如出用户侧端口），然后，通过该出端口（如出用户侧端口）将上述 MAC 帧通过 PON 接口单元发送给 OLT。

[0090] 在下行方向，当 OLT 传输过来的 S1/R6 接口的数据报文的 MAC 帧到达该单元时，该单元根据 MAC 帧的入端口（如入用户侧端口）和目的地址（如 MAC@1），查询上述表 3 所示的 MAC 转发表，得到出端口（如出 ONTID = 2）、出 PON 业务逻辑端口（如 GPID = m），则 PON 接口单元将 MAC 帧添加 GEM 帧头，其中的 GEM PORT ID 为查得的出 PON 业务逻辑端口值（如如 GPID = m），然后，通过该出端口（如出 ONT ID = 2）将上述 MAC 帧送出。

[0091] 针对上述实施一中的方案 2，该实施例提供的另一种 BS 的功能结构示意图如图 7 所示，包括：IP 转发单元、切换处理单元，还进一步地包括信令处理单元、GPON 接口单元、OMCI 配置单元、无线处理单元和 MAC 转发单元。下面分别介绍各个单元的具体功能。

[0092] OMCI 配置单元，用于实现用于配置 GPON 业务逻辑端口（如 GEMPort/LLID 端口），如建立、修改或删除 PON 业务逻辑端口及其相关 QoS 参数。

[0093] GPON 接口单元，用于实现 GPON 接口通信功能，对于 X2/R8 接口的 GPON 业务逻辑端口，实现 IP over GEM 功能；对于 S1/R6 接口的 GPON 业务逻辑端口，实现 ETH over GEM 功能。

[0094] 上述图 7 所示的 BS 中的无线处理单元、切换处理单元、信令处理单元、IP 转发单元和 MAC 转发单元的功能上述图 6 所示的 BS 中的对应单元的功能相同。

[0095] 无线处理单元，用于实现 BS 和用户终端之间的无线接口通信功能，生成 S1/R6 接口的数据报文，将该数据报文传输给 MAC 转发单元。

[0096] 切换处理单元，用于实现 BS 之间的无线切换功能，生成 X2/R8 接口的 IP 报文，将该 IP 报文传输给 IP 转发单元。

[0097] 信令处理单元，用于作为 DHCP Client 实现 DHCP 功能，并根据 DHCP 过程得到的分配给 BS 的 IP 地址，以及 OLT 为 BS 分配的用于 X2/R8 接口传输的 GPON 业务逻辑端口，建立 IP 转发表，根据该 IP 转发表可以得到 BS 发送给 OLT 的 X2/R8 报文对应的 GPON 业务逻辑端口。该信令处理单元还向 MAC 转发单元发起 ARP 请求，请求 X2/R8 报文的目的 IP 地址所对应的 MAC 地址。

[0098] IP 转发单元，用于基于 GPON 业务逻辑端口，通过信令处理单元建立的 IP 转发表，根据目的 IP 地址查询切换处理单元传输过来的 X2/R8 报文对应的 GPON 物理端口、GPON 业务逻辑端口。可选地，通过向 MAC 转发单元发起 ARP 请求，获取上述 X2/R8 报文的目的 IP

地址所对应的 MAC 地址。然后，根据上述 GPON 业务逻辑端口和 MAC 地址，将上述 X2/R8 报文通过 GPON 接口单元发送给 OLT。

[0099] MAC 转发单元，用于基于 PON 业务逻辑端口，通过 MAC 转发表对无线处理单元传输过来或者 OLT 传输过来的 S1/R6 接口的数据报文进行 MAC 转发。

[0100] 实施例三

[0101] 该实施例提供的上述实施例二中的信令处理单元建立 X2/R8 接口的 IP 转发表的处理流程如图 8 所示，包括如下处理步骤：

[0102] 步骤 81、OLT 分别配置源 BS 和目的 BS 的 DHCP 通道所用的 PON 业务逻辑端口（如 GEM port/LLID）。

[0103] 步骤 82、源 BS 和目的 BS 分别与 OLT 之间进行 DHCP 地址分配过程。

[0104] 源 BS 和目的 BS 分别向 DHCP 服务器请求 IP 地址或 IPv6 地址前缀，DHCP 服务器进行 DHCP 地址分配或地址前缀委派过程，给源 BS 和目的 BS 分别分配 IP 地址或 IPv6 地址前缀。通常 DHCP 服务器分配给不同 BS 的 IPv6 地址前缀也不同。

[0105] 步骤 83、OLT 实现 DHCP Relay 功能中转 DHCP 消息，对源 BS 和目的 BS 与 DHCP 服务器之间的 DHCP 报文进行侦听。

[0106] 步骤 84、OLT 通过 OMCI 协议，分别配置与源 BS 和目的 BS 所获得的 IP 地址或 IPv6 地址前缀相对应的用于 X2/R8 接口的 PON 业务逻辑端口和用于 S1/R6 接口的 PON 业务逻辑端口。

[0107] 步骤 85、OLT（或其内部集成的 ONU）根据 DHCP 侦听得到的分配给源 BS 和目的 BS 的 IP 地址或 IPv6 地址前缀，以及根据 OLT 为源 BS 和目的 BS 配置的用于 X2/R8 接口的 PON 业务逻辑端口的标识，建立相应的 IP 转发表。所述 IP 转发表中包括：入物理端口或入光网络单元 ONU 端口、入 PON 业务逻辑端口、目的地址、出物理端口或出 ONU 端口、以及出 PON 业务逻辑端口。

[0108] 该实施例提供的一种实现 OLT 本地交换的数据转发流程如图 9 所示，包括如下处理步骤：

[0109] 步骤 91、BS 通过用于 X2/R8 接口传输的 PON 业务逻辑端口向 OLT 发起 ARP 请求消息。

[0110] 步骤 92、OLT 根据 PON 业务逻辑端口标识，识别出上述 ARP 请求消息是来自 X2/R8 接口，则以 OLT 的 MAC 地址回复 ARP 应答消息给 BS。

[0111] 步骤 93、BS 通过用于 S1/R6 接口传输的 PON 业务逻辑端口向 OLT 发起 ARP 请求消息。

[0112] 步骤 94、OLT 根据 PON 业务逻辑端口标识，识别出上述 ARP 请求消息是来自 S1/R6 接口，则以无线网关的 MAC 地址回复 ARP 应答消息给 BS，上述无线网关可以为接入网关（Access Gateway，AGW）。

[0113] 步骤 95、当用户终端发生无线小区切换时，BS 收到将缓存在源基站的用户数据由 X2/R8 接口转移到目的基站的要求。

[0114] 步骤 96、源基站将 X2/R8 接口的报文封装入相应的用于 X2/R8 接口传输的 GEM PORT 的 PON 帧。

[0115] 步骤 97、源基站将上述封装后的 X2/R8 接口的报文发送至 OLT，对于 GPON 及下一

代 GPON，上述封装后的 X2/R8 接口的报文可通过 IP over GEM 方式发送至 OLT。

[0116] 步骤 98、OLT 根据接收的 X2/R8 接口的报文的目的 IP 地址（还可包含 DSCP）、入物理端口或入 ONU 端口、入 PON 业务逻辑端口，查询所述 IP 转发表，获取所述数据报文的出物理端口或出 ONU 端口、出 PON 业务逻辑端口，利用所述出物理端口或出 ONU 端口、出 PON 业务逻辑端口将所述数据报文转发给目的 BS。

[0117] 步骤 99、OLT 将接收的 X2/R8 接口的报文封装入查询得到的 PON 业务逻辑端口的 PON 帧。

[0118] 步骤 910、OLT 将封装后的 X2/R8 接口的报文从相应的出端口发至目的 BS，对于 GPON 及下一代 GPON，封装后的 X2/R8 接口的报文可通过 IP overGEM 方式发至 BS。

[0119] 步骤 911、对于 S1/R6 接口的报文，BS 将其封装入相应的用于 S1/R6 接口传输的 PON 业务逻辑端口的 PON 帧。BS 将封装后的 S1/R6 接口的报文发至 OLT，对于 GPON 及下一代 GPON，S1/R6 报文可通过 ETH over GEM 方式发至 OLT。

[0120] OLT 对接收的 S 1/R6 接口的报文进行 MAC 转发，发往 AGW。

[0121] 其中，上述步骤 91 和 92 仅针对上述实施一中的方案 2，上述实施一中的方案 2 无需用到上述步骤 91 和 92。

[0122] 本领域普通技术人员可以理解实现上述实施例方法中的全部或部分流程，是可以通过计算机程序来指令相关的硬件来完成，所述的程序可存储于一计算机可读取存储介质中，该程序在执行时，可包括如上述各方法的实施例的流程。其中，所述的存储介质可为磁碟、光盘、只读存储记忆体 (Read-Only Memory，ROM) 或随机存储记忆体 (Random Access Memory，RAM) 等。

[0123] 综上所述，本发明实施例实现了 OLT 支持 X2/R8、S1/R6 接口传输的数据报文，OLT 给 BS 分配用于 X2/R8、S1/R6 接口传输的 PON 业务逻辑端口。实现了 OLT 通过 DHCP 监听得到 BS 的 IP 地址，并建立 BS 的 IP 地址与用于 X2/R8 接口传输的 PON 业务逻辑端口的 IP 转发表，利用该 IP 转发表实现了基站数据的本地交换，使作为传输网络的 PON 网络支持 X2 接口，实现 BS 之间真正意义上的直接互通，而不是通过无线网关互通。

[0124] 本发明实施例还实现了 OLT 通过自学习建立基于 BS 的 IP 地址、OLT 为 BS 分配的用于 BS 和无线网关之间的通信接口传输的 PON 业务逻辑端口的 MAC 转发表，根据该 MAC 转发表对 BS 和无线网关之间传输的数据报文进行转发。

[0125] 以上所述，仅为本发明较佳的具体实施方式，但本发明的保护范围并不局限于此，任何熟悉本技术领域的技术人员在本发明揭露的技术范围内，可轻易想到的变化或替换，都应涵盖在本发明的保护范围之内。因此，本发明的保护范围应该以权利要求的保护范围为准。

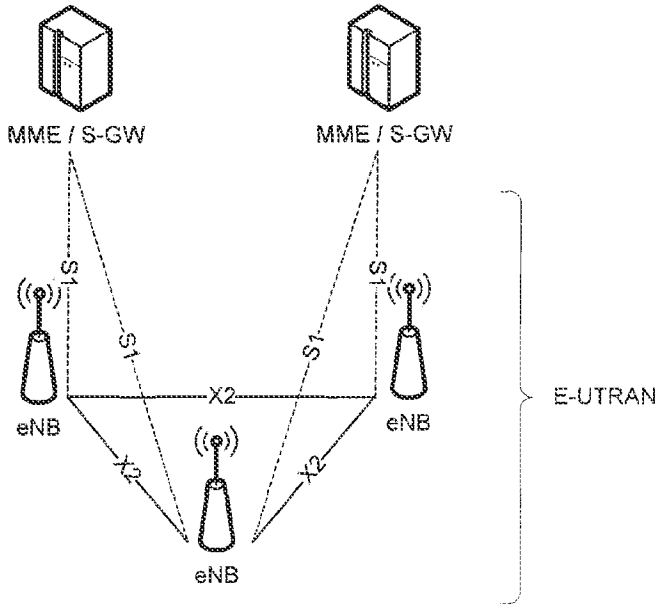

MME / S-GW
MME / S-GW
S1
S1
S1
S1
X2
X2
X2
eNB
eNB
eNB
E-UTRAN

图 1

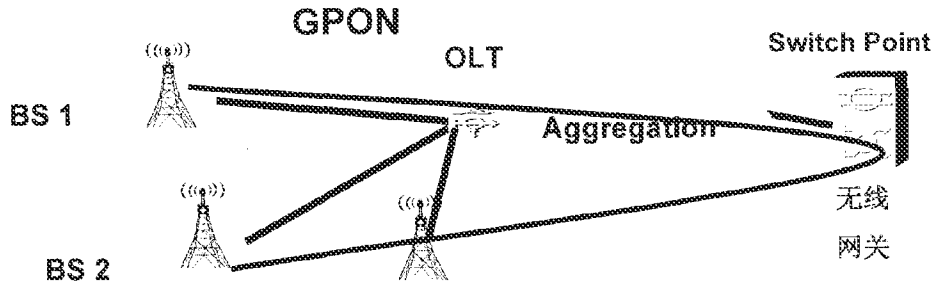

GPON
OLT
Switch Point
BS 1
Aggregation
无线
网关
BS 2

图 2

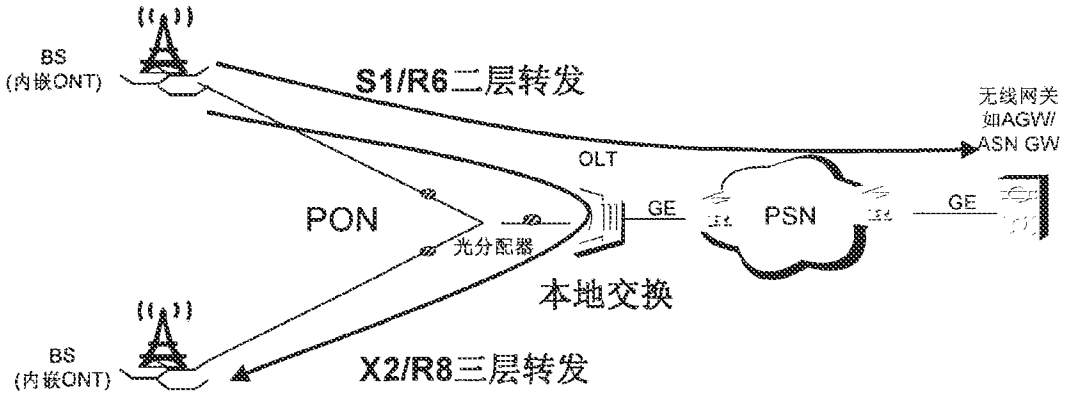

BS
(内嵌ONT)
S1/R6二层转发
无线网关
如AGW/
ASN GW
OLT
PON
光分配器
GE
PSN
GE
本地交换
BS
(内嵌ONT)
X2/R8三层转发

图 3

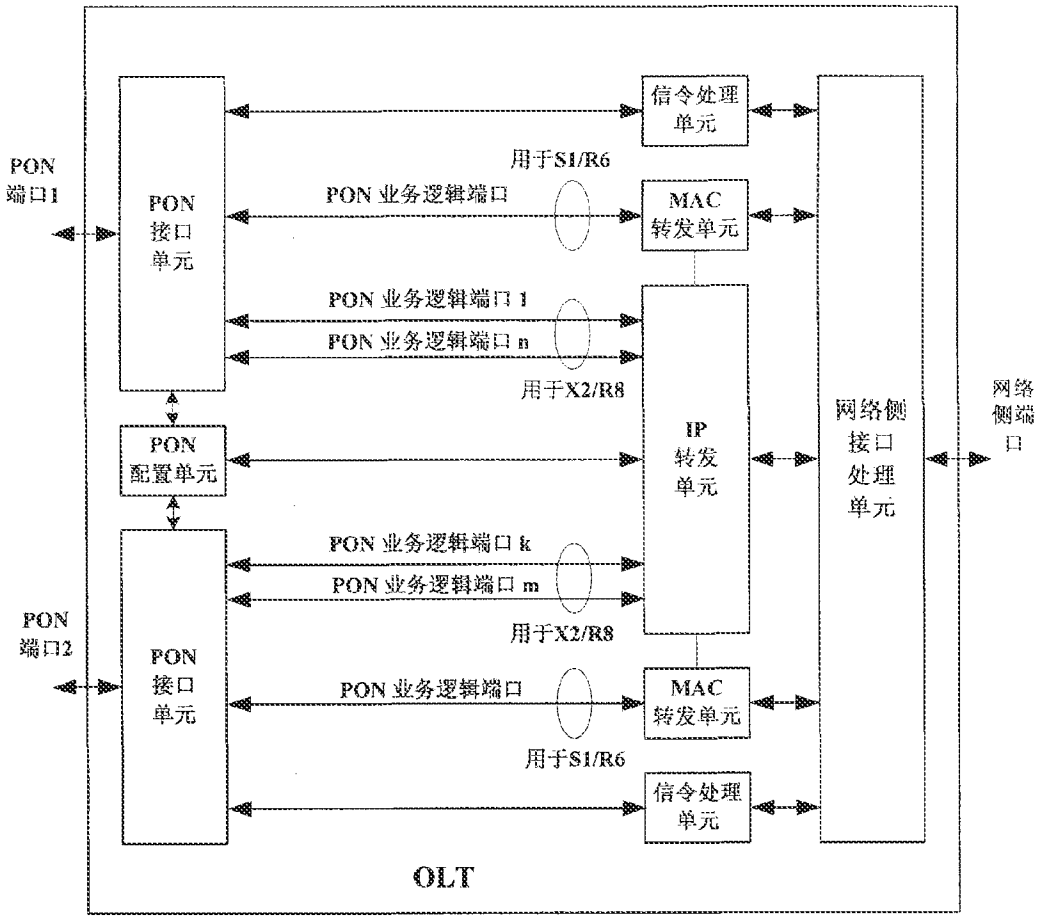

PON
端口1
PON
接口
单元
信令处理
单元
用于S1/R6
PON 业务逻辑端口
MAC
转发单元
PON 业务逻辑端口 1
PON 业务逻辑端口 n
用于X2/R8
IP
转发
单元
网络侧
接口
处理
单元
网络
侧端
口
PON
配置单元
PON 业务逻辑端口 k
PON 业务逻辑端口 m
用于X2/R8
PON
端口2
PON
接口
单元
PON 业务逻辑端口
MAC
转发单元
用于S1/R6
信令处理
单元
OLT

图 4

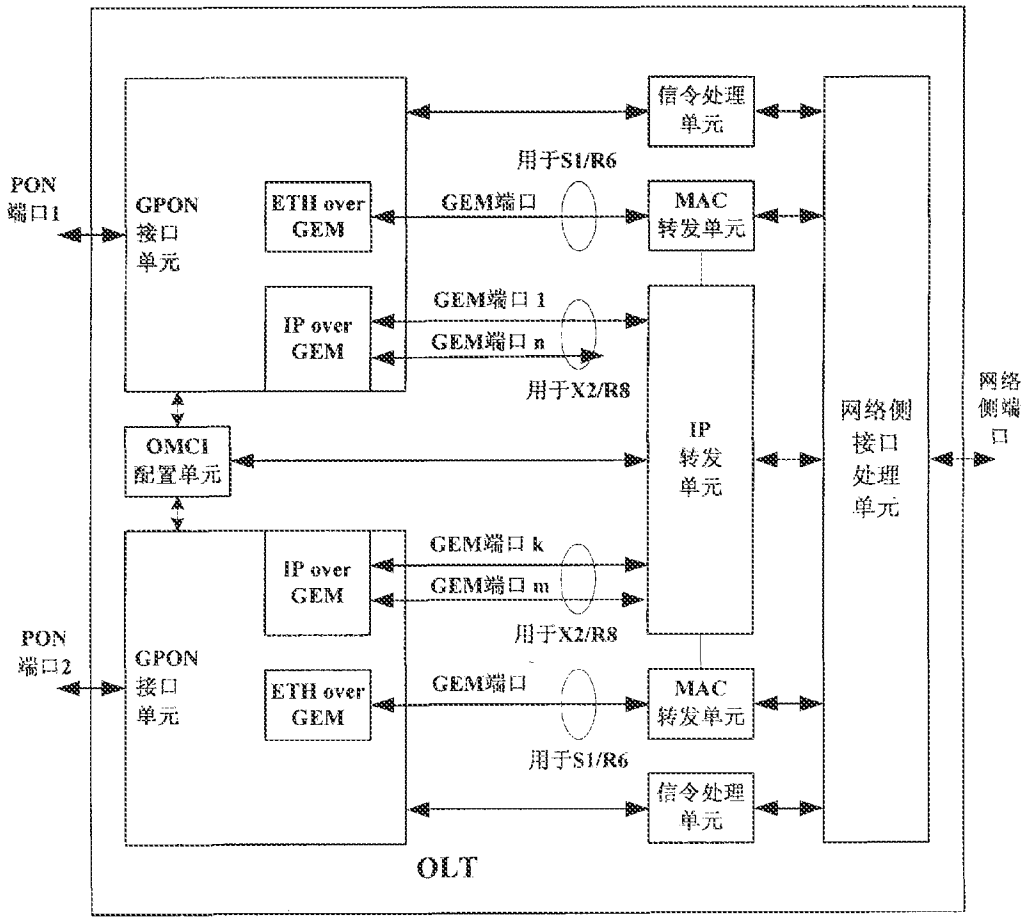

PON
端口1
GPON
接口
单元
ETH over
GEM
GEM端口
信令处理
单元
用于S1/R6
MAC
转发单元
IP over
GEM
GEM端口 1
GEM端口 n
用于X2/R8
OMCI
配置单元
IP
转发
单元
网络侧
接口
处理
单元
网络
侧端
口
IP over
GEM
GEM端口 k
GEM端口 m
用于X2/R8
PON
端口2
GPON
接口
单元
ETH over
GEM
GEM端口
MAC
转发单元
用于S1/R6
信令处理
单元
OLT

图 5

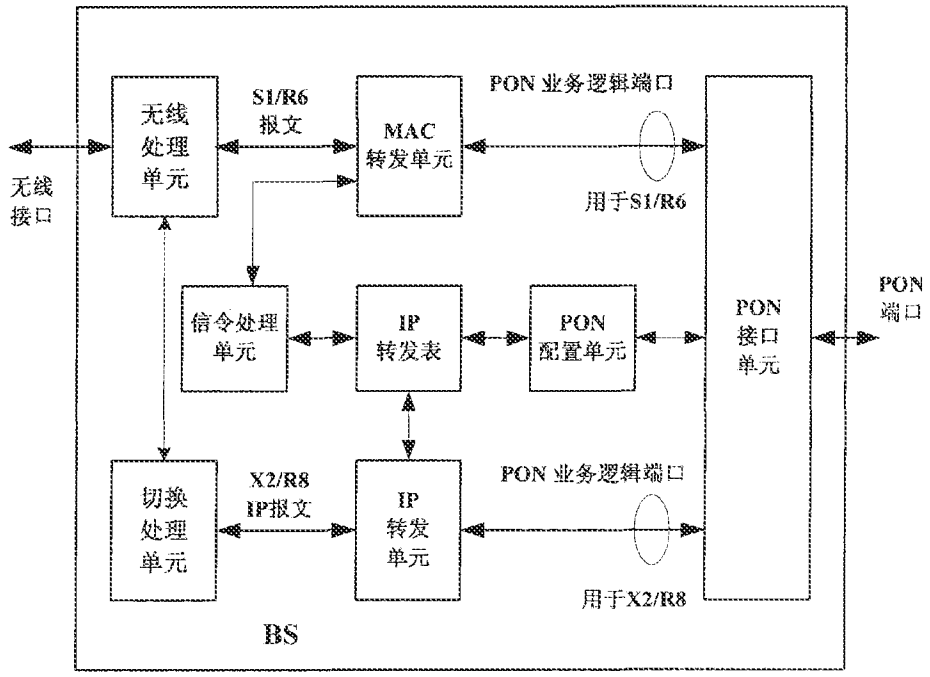

无线接口
无线处理单元
S1/R6报文
MAC转发单元
PON 业务逻辑端口
用于S1/R6
PON接口单元
PON端口
信令处理单元
IP转发表
PON配置单元
切换处理单元
X2/R8 IP报文
IP转发单元
PON 业务逻辑端口
用于X2/R8
BS

图 6

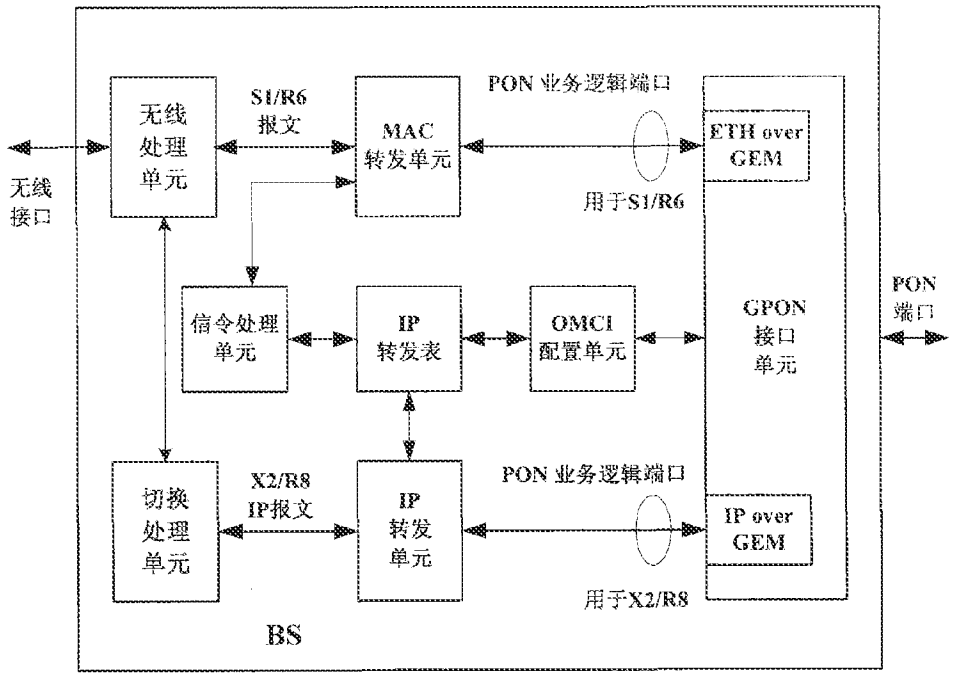

无线接口
无线处理单元
S1/R6报文
MAC转发单元
PON 业务逻辑端口
ETH over GEM
用于S1/R6
PON端口
信令处理单元
IP转发表
OMCI配置单元
GPON接口单元
切换处理单元
X2/R8 IP报文
IP转发单元
PON 业务逻辑端口
IP over GEM
用于X2/R8
BS

图 7

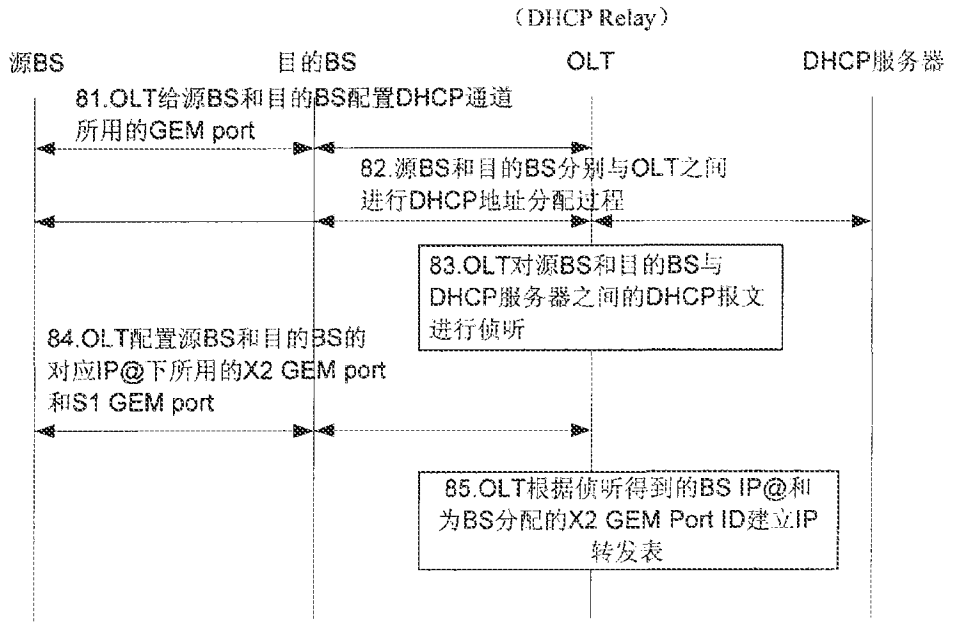

（DHCP Relay）
源BS
目的BS
OLT
DHCP服务器
81.OLT给源BS和目的BS配置DHCP通道所用的GEM port
82.源BS和目的BS分别与OLT之间进行DHCP地址分配过程
83.OLT对源BS和目的BS与DHCP服务器之间的DHCP报文进行侦听
84.OLT配置源BS和目的BS的对应IP@下所用的X2 GEM port和S1 GEM port
85.OLT根据侦听得到的BS IP@和为BS分配的X2 GEM Port ID建立IP转发表

图 8

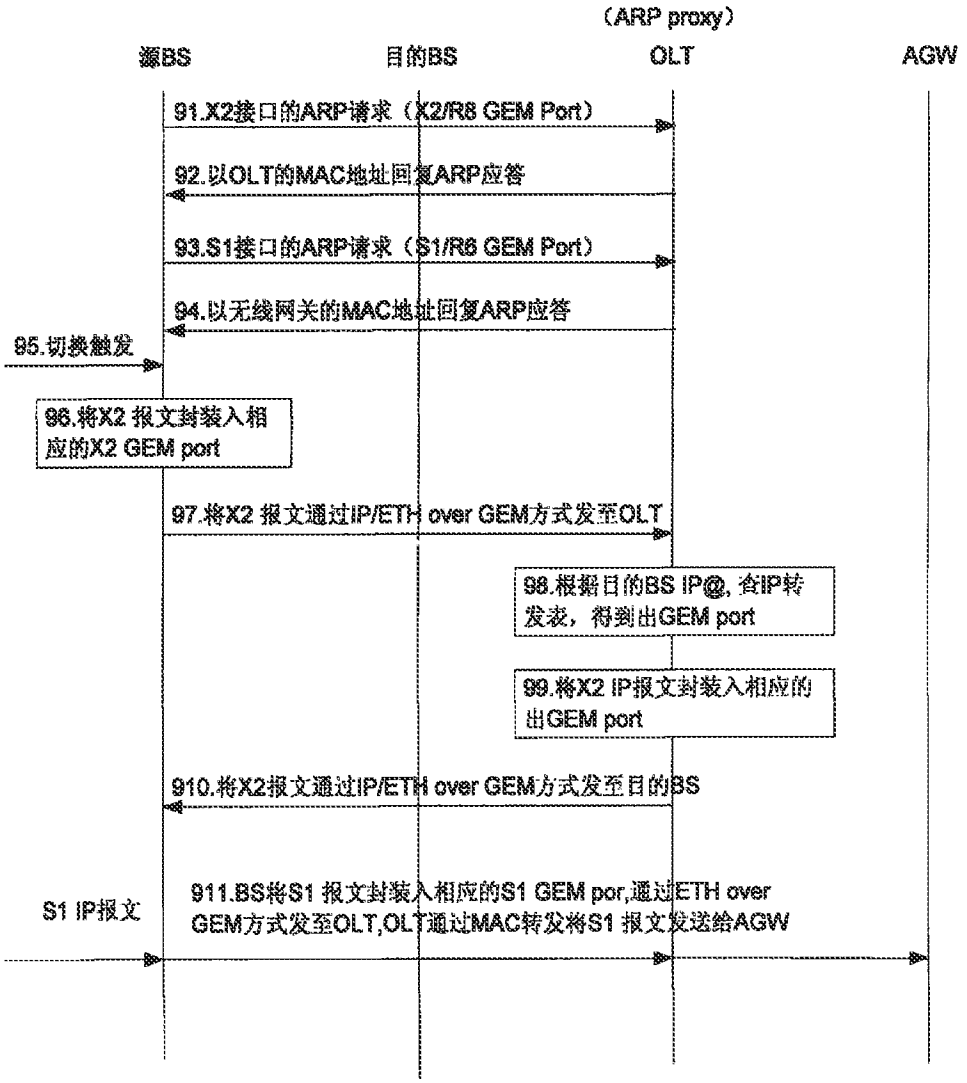

(ARP proxy)
源BS
目的BS
OLT
AGW
91.X2接口的ARP请求（X2/R8 GEM Port）
92.以OLT的MAC地址回复ARP应答
93.S1接口的ARP请求（S1/R6 GEM Port）
94.以无线网关的MAC地址回复ARP应答
95.切换触发
96.将X2 报文封装入相应的X2 GEM port
97.将X2 报文通过IP/ETH over GEM方式发至OLT
98.根据目的BS IP@, 查IP转发表，得到出GEM port
99.将X2 IP报文封装入相应的出GEM port
910.将X2报文通过IP/ETH over GEM方式发至目的BS
S1 IP报文
911.BS将S1 报文封装入相应的S1 GEM por,通过ETH over GEM方式发至OLT,OLT通过MAC转发将S1 报文发送给AGW

图 9

COPY

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/072633

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/24 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H04L, H04Q, H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CPRSABS, CNTXT, CNKI: DOCSIS, backstage, passive, optical network, DPOE, configuration, ONU, OLT, analysis, channel, address, management

VEN: DOCSIS, BACKSTAGE, PASSIVE, OPTICAL W NETWORK?, CONFIGUR+, DOPE. ONU, OLT, ANALYTIC+, CHANNEL?, ADDRESS??, MANAGEMENT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 101997725 A (ZTE CORP.), 30 March 2011 (30.03.2011), abstract, description, paragraphs 16-21, paragraphs 40-42, and paragraphs 56-57, and figure 2	1-11
A	CN 101888575 A (ZTE CORP.), 17 November 2010 (17.11.2010), the whole document	1-11
A	CN 101741712 A (HUAWEI TECHNOLOGIES CO., LTD.), 16 June 2010 (16.06.2010), the whole document	1-11

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 June 2012 (10.06.2012)	**28 June 2012 (28.06.2012)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **FU, Lingxiao** Telephone No.: (86-10) **62411235**

Form PCT/ISA/210 (second sheet) (July 2009)

COPY

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/072633

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 101997725 A	30.03.2011	None	
CN 101888575 A	17.11.2010	WO 2012013042 A1	02.02.2012
CN 101741712 A	16.06.2010	WO 2010057414 A1	27.05.2010

COPY

国际检索报告

国际申请号
PCT/CN2012/072633

A. 主题的分类

H04L 12/24 (2006.01) i

按照国际专利分类(IPC)或者同时按照国家分类和 IPC 两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

IPC: H04L, H04Q, H04W

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用）)

CPRSABS, CNTXT, CNKI: DOCSIS，后台，无源，光网络，DPOE，配置，ONU，OLT，解析，通道，地址，管理

VEN: DOCSIS, BACKSTAGE, PASSIVE, OPTICAL W NETWORK?, CONFIGUR+, DOPE. ONU, OLT, ANALYTIC+, CHANNEL?, ADDRESS??, MANAGEMENT

C. 相关文件

类　型*	引用文件，必要时，指明相关段落	相关的权利要求
X	CN101997725A（中兴通讯股份有限公司）30.3 月 2011（30.03.2011） 摘要，说明书第 16-21 段，第 40-42 段，第 56-57 段，附图 2	1-11
A	CN101888575A（中兴通讯股份有限公司）17.11 月 2010（17.11.2010） 全文	1-11
A	CN101741712A（华为技术有限公司）16.6 月 2010（16.06.2010） 全文	1-11

☐ 其余文件在 C 栏的续页中列出。　　☒ 见同族专利附件。

* 引用文件的具体类型：
"A" 认为不特别相关的表示了现有技术一般状态的文件
"E" 在国际申请日的当天或之后公布的在先申请或专利
"L" 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件（如具体说明的）
"O" 涉及口头公开、使用、展览或其他方式公开的文件
"P" 公布日先于国际申请日但迟于所要求的优先权日的文件
"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件
"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性
"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性
"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
10.6 月 2012 (10.06.2012)	**28.6 月 2012 (28.06.2012)**
ISA/CN 的名称和邮寄地址： 中华人民共和国国家知识产权局 中国北京市海淀区蓟门桥西土城路 6 号 100088 传真号：　(86-10)62019451	受权官员 付凌霄 电话号码：(86-10) **62411235**

PCT/ISA/210 表(第 2 页) (2009 年 7 月)

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国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2012/072633

检索报告中引用的专利文件	公布日期	同族专利	公布日期
CN101997725A	30.03.2011	无	
CN101888575A	17.11.2010	WO2012013042A1	02.02.2012
CN101741712A	16.06.2010	WO2010057414A1	27.05.2010

Electronic Acknowledgement Receipt

EFS ID:	17467319
Application Number:	14009703
International Application Number:	
Confirmation Number:	1821
Title of Invention:	DPOE System And Service Auto-Configuration Method And Network Based Thereon
First Named Inventor/Applicant Name:	Meiyan Zang
Customer Number:	36163
Filer:	Patricia E. Hong/Jose Espejo
Filer Authorized By:	Patricia E. Hong
Attorney Docket Number:	95-1008
Receipt Date:	21-NOV-2013
Filing Date:	03-OCT-2013
Time Stamp:	14:48:26
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	2013_11_21_95-1008_IDS.pdf	33172 12972b2b06ee87903db46426470e109e57bfecb0	no	4

Warnings:	
Information:	

This is not an USPTO supplied IDS fillable form					
2	Foreign Reference	2013_11_21_95-1008_CN101997725A.pdf	13229013 d142d1ee5e25a4a0b0475dd3ec9be3e5b2a7c231	no	14
Warnings:					
Information:					
3	Foreign Reference	2013_11_21_95-1008_CN101888575A.pdf	12473540 8b614645d7da61ed7ca7b2c728c08b8b252af297	no	14
Warnings:					
Information:					
4	Foreign Reference	2013_11_21_95-1008_CN101741712A.pdf	21949841 278ea0d86bf3ee19af16854dc024b153936b38be	no	22
Warnings:					
Information:					
5	Non Patent Literature	2013_11_21_95-1008_ISR.pdf	347316 d17dc82202ae5c226e1b5e0ef61dbd6b4cae9510	no	4
Warnings:					
Information:					
		Total Files Size (in bytes):	48032882		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/009,703	10/03/2013	Meiyan Zang	95-1008

CONFIRMATION NO. 1821

PUBLICATION NOTICE

36163
PLUMSEA LAW GROUP, LLC
10411 MOTOR CITY DRIVE
SUITE 320
BETHESDA, MD 20817

OC00000066207031

Title:DPOE System And Service Auto-Configuration Method And Network Based Thereon

Publication No.US-2014-0023366-A1
Publication Date:01/23/2014

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Doc Code: PA..

Document Description: Power of Attorney

PTO/AIA/82A (07-12)

Approved for use through 11/30/2014. OMB 0651-0035

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B or equivalent) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5. If the Power of Attorney by Applicant form is not accompanied by this transmittal form or an equivalent, the Power of Attorney will not be recognized in the application.

Application Number	14/009,703
Filing Date	10/3/2013
First Named Inventor	Meiyan ZANG
Title	DPOE System And Service Auto-Configuration Method And Network Based Thereon
Art Unit	2636
Examiner Name	Kenneth N. VANDERPUYE
Attorney Docket Number	95-1008

SIGNATURE of Applicant or Patent Practitioner

Signature	/Aslan Baghdadi/	Date	8/19/2014
Name	Aslan Baghdadi	Telephone	301-65-9040
Registration Number	34,542		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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Approved for use through 11/30/2011. OMB 0651-0035
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

☑ Practitioners associated with the Customer Number: 36163

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

☑ The address associated with Customer Number: 36163

OR

☐ Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address:

ZTE CORPORATION
ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan,
Shenzhen Guangdong 518057 China

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	Xianyan Zhou	Date	August 19, 2014
Name	Xianyan Zhou	Telephone	
Title	IP Manager, ZTE Corporation		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Electronic Acknowledgement Receipt

EFS ID:	19904303
Application Number:	14009703
International Application Number:	
Confirmation Number:	1821
Title of Invention:	DPOE System And Service Auto-Configuration Method And Network Based Thereon
First Named Inventor/Applicant Name:	Meiyan Zang
Customer Number:	36163
Filer:	Aslan Baghdadi/Joanna Sanchez
Filer Authorized By:	Aslan Baghdadi
Attorney Docket Number:	95-1008
Receipt Date:	19-AUG-2014
Filing Date:	03-OCT-2013
Time Stamp:	15:33:13
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	2014-08-19_95-1008_POA.pdf	218614 2436ac0cde9f99f5c35cbd2670846d496f870d9e	no	2

Warnings:	
Information:	

Total Files Size (in bytes):	218614

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New Applications Under 35 U.S.C. 111
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National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/009,703	10/03/2013	Meiyan Zang	95-1008

CONFIRMATION NO. 1821

IMPROPER CPOA LETTER

36163
PLUMSEA LAW GROUP, LLC
6710A Rockledge Drive
SUITE 400
BETHESDA, MD 20817



Date Mailed: 08/26/2014

NOTICE REGARDING POWER OF ATTORNEY

This is in response to the power of attorney filed 08/19/2014. The power of attorney in this application is not accepted for the reason(s) listed below:

- The power of attorney is from an assignee and the statement required by 37 CFR 3.73(c) has not been received.

/ttkim/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PTO/SB/80 (11-08)
Approved for use through 11/30/2011. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

☑ Practitioners associated with the Customer Number: 36163

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

☑ The address associated with Customer Number: 36163

OR

☐ Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address:

ZTE CORPORATION
ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan,
Shenzhen Guangdong 518057 China

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	Xianyan Zhou	Date	August 19, 2014
Name	Xianyan Zhou	Telephone	
Title	IP Manager, ZTE Corporation		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Meiyan ZANG et al.

Application No./Patent No.: 14/009,703 Filed/Issue Date: 3/20/2012

Titled: DPOE System And Service Auto-Configuration Method And Network Based Thereon

ZTE Corporation , a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;

2. ☐ an assignee of less than the entire right, title, and interest in (The extent (by percentage) of its ownership interest is _____ %); or

3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 031360, Frame 0229, or for which a copy therefore is attached.

OR

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/ Patricia E. Hong / September 11, 2014

Signature Date

Patricia E. Hong (Reg. No. 34,373) Attorney

Printed or Typed Name Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Electronic Acknowledgement Receipt

EFS ID:	20178095
Application Number:	14009703
International Application Number:	
Confirmation Number:	1821
Title of Invention:	DPOE System And Service Auto-Configuration Method And Network Based Thereon
First Named Inventor/Applicant Name:	Meiyan Zang
Customer Number:	36163
Filer:	Patricia E. Hong/Louise Lee
Filer Authorized By:	Patricia E. Hong
Attorney Docket Number:	95-1008
Receipt Date:	18-SEP-2014
Filing Date:	03-OCT-2013
Time Stamp:	15:01:12
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	2014_09_18-95_1008_POA_and_Statement_373.pdf	128526 a6811c501b5a41724a1ec43b6406cfd91fcf4689	no	2

Warnings:	
Information:	

Total Files Size (in bytes):	128526

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/009,703	10/03/2013	Meiyan Zang	95-1008

CONFIRMATION NO. 1821

POA ACCEPTANCE LETTER

36163
PLUMSEA LAW GROUP, LLC
6710A Rockledge Drive
SUITE 400
BETHESDA, MD 20817

OC00000070937165

Date Mailed: 09/24/2014

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/18/2014.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/ctuazon/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/009,703	10/03/2013	Meiyan Zang	95-1008	1821

36163 7590 05/20/2015

PLUMSEA LAW GROUP, LLC
6710A Rockledge Drive
SUITE 400
BETHESDA, MD 20817

EXAMINER	
SEDIGHIAN, MOHAMMAD REZA	

ART UNIT	PAPER NUMBER
2636	

MAIL DATE	DELIVERY MODE
05/20/2015	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 14/009,703	Applicant(s) ZANG ET AL.	
	Examiner M. R. SEDIGHIAN	Art Unit 2636	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/03/2013*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-13* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-13* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *10/03/2013* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☒ All b)☐ Some** c)☐ None of the:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *11/21/2013*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

1. The present application is being examined under the pre-AIA first to invent provisions.

2. This communication is responsive to applicant's 10/03/2013 amendments and remarks. The amendments have been entered. Claims 1-13 are now pending.

3. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-13 are rejected under pre-AIA 35 U.S.C. 102(e) as being anticipated by HAIPENG WANG (CN 101997725 (A) - 2011-03-30).

Regarding claims 1, 6, and 8, HAIPENG WANG teaches a method and system of service auto-configuration of a DOCSIS Provisioning Of EPON (DPOE) system (see abstract and fig. 2), comprising: the DPOE system acquiring a configuration file from a back-office management system (DOCSIS, SNMP AGENT, CLI, fig. 2), wherein the configuration file comprises configuration information of an optical network unit (ONU) (ONU, fig. 2) and configuration information of an optical line terminal (OLT) (OLT, fig. 2) in the DPOE system (DOCSIS, fig. 2, see translation, page 6, third paragraph); the DPOE system analyzing the acquired configuration file (translation, page 6, fourth paragraph, note the use of a Mapping processing module and a Management configuration module), and obtaining the configuration information

of the ONU (see translation, page 6, the first and last paragraph and claim 3) and the configuration information of the OLT (see translation, page 6, the first and last paragraph and claim 3); and the DPOE system configuring the OLT (OLT, fig. 2) locally (translation, page 8, third paragraph, and page 9, Example II, "sending OLT initialization configuration") and configuring the ONU (ONU, fig. 2) via a management channel (OAM, fig. 2) between the OLT and the ONU (translation, page 6, fourth paragraph, note the establishment of a communication channel with the PON device and OAM in fig. 2). As to claims 6 and 8, HAIPENG WANG further teaches the use of an acquisition unit (DOCSIS Agent in fig. 2) to acquire a configuration file from a back-office management system (DOCSIS, CLI, SNMP AGENT, in fig. 2), wherein the configuration file comprises configuration information of ONU and configuration information of OLT (see translation, page 8, the section related to embodiment shown in Figure 2), an analyzing unit to analyze the acquired configuration file (the analyzing operation by the DOCSIS Agent) and to obtain the configuration information of ONU and configuration information of OLT (translation, page 5, last paragraph and page 6, first paragraph, and claims 3, 4), and a configuration unit (DOCSIS Agent in fig. 2) to configure the OLT locally and to configure ONU via a management channel (OAM in fig. 2) between the OLT and the ONU (see translation, page 8, the section related to embodiment shown in Figure 2). As to claim 8, HAIPENG WANG further teaches the back-office management system (DOCSIS, CLI, SNMP AGENT, in fig. 2) is configured to save the configuration file (translation, page 6, third paragraph, note the use of database for storing corresponding service data), and download the configuration file to the DPOE system, wherein the configuration file comprises the

configuration information of the ONU and the configuration information of the OLT in the DPOE system (translation, page 5, last paragraph and page 6, first paragraph, and claims 3, 4).

Regarding claims 2, 10, and 12, HAIPENG WANG further teaches the configuration information of the OLT is configuration information related to services opened by the ONU (see translation, page 9, section (10), Steps S304, S305, Example II, and S304, S305, fig. 3).

Regarding claims 3 and 11, HAIPENG WANG further teaches the services opened by the ONU comprise an Ethernet based LAN (E-LAN) services (translation, page 10, fifth paragraph, for example, practical ONU of a certain interface to enter a VLAN); and the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT (see translation, page 9, Example II, sections (2) and (3)) related to the services opened by the ONU.

Regarding claims 4, 7, and 13, HAIPENG WANG further teaches when analyzing the acquired configuration file, the DPOE system further converts the configuration information of the ONU into a message format which can be identified by the ONU (translation, page 10, fourth paragraph, the "configuration message"), and converts the configuration information of the OLT into a message format which can be identified by the OLT (translation, page 10, fourth paragraph, the "configuration message").

Regarding claim 5, HAIPENG WANG further teaches the method is performed in a process of ONU initialization (translation, Page 8, Step S301, S302 and S301, discover, S302, discover, fig. 3).

Regarding claim 9, HAIPENG WANG further teaches the back-office management system comprises a trivial file transfer protocol (TFTP) server (Tftp Server, fig. 3) configured to:

receive a TFTP request initiated by the DPOE system (TFTP read request in fig. 3), respond to that TFTP request (TFTP: Data (File) and Response, in fig. 3), and download the configuration file to the DPOE system (see translation, page 9, TFTP server).

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. R. SEDIGHIAN whose telephone number is (571)272-3034. The examiner can normally be reached on 10 to 6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. R. SEDIGHIAN/
Primary Examiner, Art Unit 2636

Notice of References Cited	Application/Control No. 14/009,703	Applicant(s)/Patent Under Reexamination ZANG ET AL.	
	Examiner M. R. SEDIGHIAN	Art Unit 2636	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N	CN 101997725 A	03-2011	CN	HAIPENG WANG	H04L 12/24
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14009703	ZANG ET AL.
	Examiner	Art Unit
	M. R. SEDIGHIAN	2636

CPC- SEARCHED		
Symbol	Date	Examiner
H04B 10/27, 271, 272, 275, 2755, 278	5/17/2015	MRS
H04L 12/24	5/17/2015	MRS
H04Q 11/00	5/17/2015	MRS
H04J 14/023, 0232, 0238, 0239, 0242, 0243, 0245, 0246, 0247, 025, 0252	5/17/2015	MRS

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
398	71	5/17/2015	MRS
	70		
	72		
	66		
	58		

SEARCH NOTES		
Search Notes	Date	Examiner
see search history	5/17/2015	MRS

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14009703
Filing Date	2013-10-03
First Named Inventor	Meiyan Zang
Art Unit	2636
Examiner Name	Kenneth N. Vanderpuye M.R.Sedighian
Attorney Docket Number	95-1008

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
/M.R.S/	1	101997725A	CN		2011-03-30	ZTE CORP		☐
/M.R.S/	2	101888575A	CN		2010-11-17	ZTE CORP		☐
/M.R.S/	3	101741712	CN		2010-06-16	HUAWEI TECHNOLOGIES CO LTD		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14009703
	Filing Date	2013-10-03
	First Named Inventor	Meiyan Zang
	Art Unit	2636
	Examiner Name	Kenneth N. Vanderpuye M.R.Sedighian
	Attorney Docket Number	95-1008

If you wish to add additional Foreign Patent Document citation information please click the Add button

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
/M.R.S/	1	International Search Report mailed June 28, 2012 in International Application Number PCT/CN2012/072633.	☐

If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature	/M.R.Sedighian/	Date Considered	05/09/2015

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14009703
	Filing Date	2013-10-03
	First Named Inventor	Meiyan Zang
	Art Unit	2636
	Examiner Name	Kenneth N. Vanderpuye
	Attorney Docket Number	95-1008

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/ Patricia E. Hong /	Date (YYYY-MM-DD)	2013-11-21
Name/Print	Patricia E. Hong	Registration Number	34,373

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	2562	H04B10/27.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 18:21
S3	54	S1 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 18:28
S4	34	S3 and (configur$5 near5 (information or data) near5 OLT)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 18:29
S5	310	H04B10/271.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 18:44
S6	0	S5 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 18:44
S7	2957	H04B10/272.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 18:44
S8	68	S7 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 18:44
S9	34	S8 and (configur$5 near5 (information or data) near5 OLT)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 18:45
S10	590	H04B10/275.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:12
S11	0	S10 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:12
S12	199	H04B10/2755.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:13
S13	0	S12 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:13
S14	540	H04B10/278.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:13
S15	0	S14 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:13
S16	18	H04J14/023.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:14
S17	4	S16 and (configur$5 near5 (information or data) near5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	ADJ	ON	2015/05/17 19:14

		(ONU or ONT))	DERWENT; IBM_TDB			
S18	1137	H04J14/0232.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:39
S19	18	S18 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:39
S20	10	S19 and (configur$5 near5 (information or data) near5 OLT)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:40
S21	727	H04J14/0238.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:46
S22	14	S21 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:46
S23	11	S22 and (configur$5 near5 (information or data) near5 OLT)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:46
S24	105	H04J14/0239.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:57
S25	3	S24 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:57
S26	25	H04J14/0242.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:58
S27	1	S26 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:58
S28	0	H04J14/0243.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:58
S29	399	H04J14/0245.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:59
S30	0	S29 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:59
S31	3680	H04J14/0246.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:59
S32	27	S31 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 19:59
S33	13	S32 and (configur$5 near5 (information or data) near5 OLT)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:00
S34	1918	H04J14/0247.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:05
S35	43	S34 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:05
S36	24	S35 and (configur$5 near5 (information or data) near5	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	ADJ	ON	2015/05/17 20:06

		OLT)	DERWENT; IBM_TDB			
S37	403	H04J14/0249.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:10
S38	0	S37 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:10
S39	2820	H04J14/025.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:10
S40	23	S39 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:10
S41	13	S40 and (configur$5 near5 (information or data) near5 OLT)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:10
S42	1873	H04J14/0252.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:15
S43	44	S42 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:15
S44	23	S43 and (configur$5 near5 (information or data) near5 OLT)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:16
S45	9086	H04L12/24.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:19
S46	3	S45 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:19
S47	520	H04Q11/00.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:21
S48	6	S47 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 20:21
S49	5	((Meiyan) near2 (Zang)).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2015/05/17 21:54
S50	17	((Liquan) near2 (Yuan)).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2015/05/17 21:55
S51	2	S50 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 21:55
S52	1	((Chaoqin) near2 (Zhang)).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2015/05/17 21:56
S53	691	398/71.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 21:57
S54	36	S53 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 21:57
S55	14	S54 and (configur$5 near5 (information or data) near5 OLT)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 21:57
S56	491	398/70.ccls.	US-PGPUB; USPAT;	ADJ	ON	2015/05/17

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			21:59
S57	22	S56 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 21:59
S58	10	S57 and (configur$5 near5 (information or data) near5 OLT)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 21:59
S59	1006	398/72.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 22:00
S60	42	S59 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 22:00
S61	21	S60 and (configur$5 near5 (information or data) near5 OLT)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 22:01
S62	1227	398/66.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 22:13
S63	74	S62 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 22:13
S64	37	S63 and (configur$5 near5 (information or data) near5 OLT)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 22:13
S65	1453	398/58.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 22:22
S66	59	S65 and (configur$5 near5 (information or data) near5 (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 22:22
S67	38	S66 and (configur$5 near5 (information or data) near5 OLT)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/05/17 22:22

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System and device for bearing data over cable service interface specification (DOCSIS) service based on passive optical network (PON)

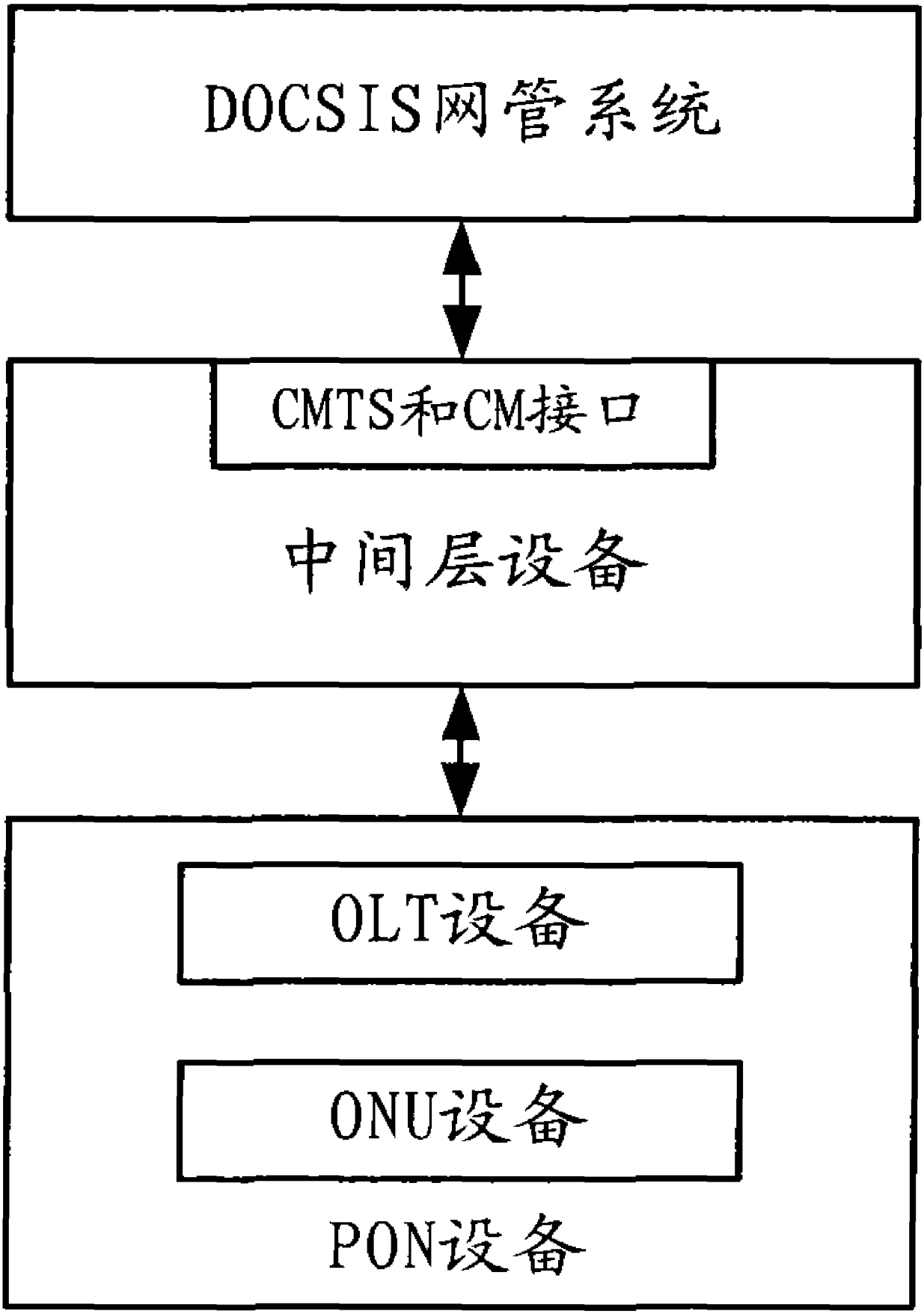
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Publication info: Wang, Haipeng (Inventor). ZTE Corp. (Assignee). CN 101997725 A . (Published 30 Mar 2011).

Abstract (English): The patent refers to the field of 'transmission of digital information'. The invention discloses a system and a service for bearing a data over cable service interface specification (DOCSIS) service based on a passive optical network (PON). The system comprises a DOCSIS network management system, PON equipment, and intermediate layer equipment arranged between the DOCSIS network management system and the PON equipment, wherein the intermediate layer equipment is used for mapping a service event reported by the PON equipment to be a DOCSIS service event according to the preset mapping rule, and managing the PON equipment based on the management configuration information sent by the DOCSIS network management system. The system ensures that the PON access equipment and the DOCSIS network management system are in a transparent mode so that the existing resources of operators and equipment manufacturers are used fully. The system is in a smooth and steady evolution mode from the aspect of network evolution.

Front page drawing:



Alternate title: 一种基于PON承载DOCSIS业务的系统和装置 (Chinese)

Publication number: CN 101997725 A (30 March 2011)

Application number: CN 201010558866 A (25 November 2010)

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IPC classification: Version 8:H04L 12/24 (main); H04Q 11/00

Publication language: Chinese

Application language: English

Database: China Patents Fulltext (1985 - current)

Claims:

English (machine translation):

1. A passive optical network-based PON data bearing cable service interface specification DOCSIS service system, characterized in that includes: DOCSIS network management system, and the equipment PON intermediate layer between the deployment apparatus;

The intermediate layer device, according to the pre-configured mapping rules, the service event apparatus appears in the newspaper PON mapped to a DOCSIS service event; and based on the DOCSIS network management system sends to the management of the configuration information to realize PON equipment management.

2. System according to Claim 1, characterized in that

The intermediate layer device configuration with a cable modem termination system and cable modem CMTS centimeter interface, with said DOCSIS used for communication in the network management system;

The intermediate layer device and said PON establishing a communication channel between devices, the channel is connected with the transmission control protocol TCP.

3. System according to Claim 1 or 2, characterized in that the pre-configured mapping rules includes: equipment for the stated PON ONU equipment of the optical network unit in the service event centimeter mapped to a DOCSIS service in the service event of the apparatus; in the optical line terminal equipment PON OLT equipment business events CMTS mapped to a DOCSIS service in the service event of the apparatus.

4. System according to Claim 3, characterized in that the stated ONU equipment business events include ONU service event the power up of the apparatus; said OLT equipment business events include OLT adds the card / deletes the card of the equipment service event.

5. System according to Claim 4, characterized in that

The intermediate layer device receives ONU PON apparatus appears in the newspaper of the service event the power up of the apparatus, according to the pre-configured mapping relationship, said service event ONU the power up of the apparatus is power-on event in the business of the DOCSIS centimeter, power up registration process analog centimeter, and the power-on is obtained as the configuration information in response to the message is transmitted to equipment PON.

6. System according to Claim 1 or 5, characterized in that the intermediate layer device and said PON apparatus in accordance with the form of the news of the interaction between the DOCSIS interface protocol frame Figure of the length of the user-defined type format TLV · · value.

7. System according to Claim 1 or 2, characterized in that said DOCSIS network management system sends a management configuration information comprises: DOCSIS configuration information and non-DOCSIS configuration information; wherein, the DOCSIS DOCSIS standard configuration information in the management information of the unique; non-DOCSIS configuration information can be with standard PON shared management information.

8. System according to Claim 7, characterized in that

The DOCSIS DOCSIS network management system will the configuration information is transmitted to the intermediate layer device, the device will be of the configuration information is mapped into DOCSIS PON equipment configuration information is sent to the stated PON apparatus, and the apparatus return to the receiving said PON after the outcome of the implementation of, local DOCSIS configuration, and the configuration result reporting to the DOCSIS network management system;

The DOCSIS DOCSIS network management system configuration information will not be transmitted directly to the the PON equipment.

9. System according to Claim 1, characterized in that the intermediate layer device, PON DOCSIS network management system and are disposed respectively in the device database, for storing the corresponding service data;

The timing to detect the DOCSIS network management system database, the service data in the database on the basis of the mapping rules whether one-to-one correspondence, if it is not, an alarm message is sent to an upper layer.

10. The system according to Claim 1, characterized in that the stated PON device comprises an Ethernet passive optical network equipment and EPON GPON equipment.

11. A kind of intermediate layer device, characterized in that comprises:

Mapping processing module, according to the pre-configured mapping rules, the service event apparatus appears in the newspaper PON mapped to a DOCSIS service event;

Management configuration module, DOCSIS-based network management system for the management of the configuration information sent to the stated PON equipment management.

12. Intermediate layer device according to Claim 11, characterized in that the intermediate layer by the configuration of the equipment and CMTS centimeter interface with the DOCSIS network management system communication; through the establishment of a communication channel with the PON device communication, the communication channel is connected with the transmission control protocol TCP.

13. Intermediate layer device according to Claim 11 or 12, characterized in that the pre-configured mapping rules includes: equipment for the stated PON ONU equipment of the optical network unit in the service event centimeter mapped to a DOCSIS service in the service event of the apparatus; in the optical line terminal equipment PON OLT equipment business events CMTS mapped to a DOCSIS service in the service event of the apparatus.

Specification:

DESCRIPTION

Technical Field

The present invention relates to communication Technical Field, in particular to a PON-based (Optical Network, passive optical network) bearing DOCSIS (Data Over Cable Service Interface Specification, cable service interface specification) service system and device.

Background Art

With the increasing development of network technology, network to the customers of the business of the business from the separation gradually to the IP-based integrated service transition, forming integrated multimedia environment, may be provided to the user, from a narrow-band to the broadband a plurality of business service. Cable television service and some broadband service transmitted through the coaxial cable network, particularly in north America, the technical maturity of DOCSIS, numerous Modem Cable user.

As the DWDM technology and the rapid development of computer technology, subscriber's network backbone and have already been the development of the like. The establishment of a new the network corresponding to the "last mile" network, has become an urgent requirement of the development of network. EPON that is, the hot-spot technology areas. Several EPON the best technical and the network of the combination of the structure. Using point-to-multipoint structure EPON, passive optical fiber transmission mode, the Ethernet offer a plurality of service. At present, IP Ethernet the whole local area network communication accounts for 95% or more, EPON due to the use of the above-mentioned economic and efficient structure, is connected to the access network end-user one of the most effective communication method. 10G Ethernet backbone EPON the occurrence of the future will also be the best optical network "the last mile" of the solution.

The DOCSIS network EPON system is upgraded to a direction of the access network in the future, how to protect operators have some resources, and to provide the operator a smooth transitional programme very important.

Content of the invention

The present invention provides a bearing PON-based system and device for DOCSIS service, upgrade of the network for a DOCSIS PON system to provide a smooth transition of the programme.

Specific, the present invention provides on the basis of the system of the business of the DOCSIS PON bearing, including: DOCSIS network management system, and the equipment PON intermediate layer between the deployment apparatus;

The intermediate layer device, according to the pre-configured mapping rules, the service event apparatus appears in the newspaper PON mapped to a DOCSIS service event; and based on the DOCSIS network management system sends to the management of the configuration information to realize PON equipment management.

Wherein, the intermediate layer device configuration with a cable modem termination system CMTS and cable modem interface centimeter, used for the network management system with said DOCSIS communication; the intermediate layer device and said PON establishing a communication channel between devices, the channel is connected with the transmission control protocol TCP.

The system of the present invention further has the following characteristics:

The pre-configured mapping rules includes: equipment for the stated PON ONU equipment of the optical network unit in the service event centimeter mapped to a DOCSIS service in the service event of the apparatus;

in the optical line terminal equipment PON OLT equipment business events CMTS mapped to a DOCSIS service in the service event of the apparatus.

Wherein, the stated ONU equipment business events include ONU service event the power up of the apparatus; said OLT equipment business events include OLT adds the card / deletes the card of the equipment service event.

The intermediate layer device receives ONU PON apparatus appears in the newspaper of the service event the power up of the apparatus, according to the pre-configured mapping relationship, said service event ONU the power up of the apparatus is power-on event in the business of the DOCSIS centimeter, power up registration process analog centimeter, and the power-on is obtained as the configuration information in response to the message is transmitted to equipment PON.

Furthermore, the intermediate layer device and said PON apparatus in accordance with the form of the news of the interaction between the DOCSIS interface protocol frame Figure of the length of the user-defined type format TLV · · value.

DOCSIS network management system to send the management of the configuration information comprises: DOCSIS configuration information and non-DOCSIS configuration information; wherein, the DOCSIS DOCSIS standard configuration information in the management information of the unique; non-DOCSIS configuration information can be with standard PON shared management information.

The DOCSIS DOCSIS network management system will the configuration information is transmitted to the intermediate layer device, the device will be of the configuration information is mapped into DOCSIS PON equipment configuration information is sent to the stated PON apparatus, and the apparatus return to the receiving said PON after the outcome of the implementation of, local DOCSIS configuration, and the configuration result reporting to the DOCSIS network management system; said DOCSIS network management system will be the non-DOCSIS configuration information is transmitted directly to the the PON equipment.

Furthermore, the intermediate layer device, PON DOCSIS network management system and are disposed respectively in the device database, for storing the corresponding service data;

The timing to detect the DOCSIS network management system database, the service data in the database on the basis of the mapping rules whether one-to-one correspondence, if it is not, an alarm message is sent to an upper layer.

The invention also provides an intermediate layer device, comprising:

Mapping processing module, according to the pre-configured mapping rules, the service event apparatus appears in the newspaper PON mapped to a DOCSIS service event;

Management configuration module, DOCSIS-based network management system for the management of the configuration information sent to the stated PON equipment management.

Wherein, the intermediate layer by the configuration of the equipment and CMTS centimeter interface with the DOCSIS network management system communication; through the establishment of a communication channel with the PON device communication, the communication channel is connected with the transmission control protocol TCP.

The pre-configured mapping rules includes: equipment for the stated PON ONU equipment of the optical network unit in the service event centimeter mapped to a DOCSIS service in the service event of the apparatus; in the optical line terminal equipment PON OLT equipment business events CMTS mapped to a DOCSIS service in the service event of the apparatus.

The beneficial results of this invention are as follows:

Using the system of the present invention, can make the access equipment and PON DOCSIS network management system transparent to each other, the access device PON, it can be considered that the upper layer is PON network management system; the DOCSIS network management system, it can be considered that the lower layer management node equipment DOCSIS (CMTS and centimeter), the operator and equipment manufacturers of the existing resources get maximized using, from the standpoint of the evolution of the network, as well as the evolution of a smooth and stable manner.

Description of drawings

In order to more clearly illustrate the embodiment of the invention or a technical proposal in the prior art, will be to the embodiment or the prior art to be used in the description for the Figure on a simple, it is obvious that, in the description below only the Figure is some embodiments of the present invention, for one of ordinary skill in the art is concerned, without paying creative the premise of work , can also be obtained according to these with other Figures.

Figure 1 is the invention provides a bearing PON DOCSIS based on the structure of the system of the business of the schematic;

Figure 2 is the embodiment of the invention provides a bearing EPON DOCSIS based on the structure of the system of the business of the schematic;

Figure 3 the intermediate layer in the embodiment of the invention device for simulating a centimeter power up registration flowchart;

Figure 4 is the embodiment of the invention in the DOCSIS network management system configuration block diagram of the system architecture;

Figure 5 is the invention provides a schematic diagram of the intermediate layer to the structure of a device.

Mode of execution

Will be combined with the embodiment of the invention the Figure, in this embodiment of the invention a clear the technical scheme, complete described, obviously, the embodiment described is only a portion of the embodiment of this invention, , but not all, of the embodiment. Based on the embodiment of the invention, one of ordinary skill in the art without making creative work is obtained on the premise that all of the other embodiments, all belong to the scope of protection of this invention.

The present invention provides a bearing PON-based system of the business of DOCSIS, its purpose is to offer a kind of the DOCSIS protocol how PON equipment, for example equipment EPON, the method of running on, that is, how to utilize EPON device for simulating a DOCSIS service, and on how to take advantage of existing equipment EPON DOCSIS management of the network management system. The system of the present invention adopts the external equipment EPON apparatus one intermediate layer, the intermediate layer is connected with the equipment EPON DOCSIS between devices with the network management system, the function is the DOCSIS protocol agreement EPON mutual conversion, at the same time a device for simulating EPON DOCSIS equipment. Wherein, the intermediate layer equipment apparatus and EPON to the user-defined protocol communication.

As shown in Figure 1, provide for this invention bearing PON of DOCSIS based on the structure of the system of the business of the schematic, the system comprising:

DOCSIS network management system, the deployment of the equipment and PON between the DOCSIS protocol and EPON agreement a mutual transformation intermediate layer device;

Specific, the intermediate layer device, according to the pre-configured mapping rules, the service event apparatus appears in the newspaper PON mapped to a DOCSIS service event; and based on the DOCSIS

network management system sends to the management of the configuration information to realize PON equipment management.

Wherein, the intermediate layer device configuration with CMTS (Cable Modem Termination System, cable modem termination system) and centimeter (Cable Modem, cable modem) interface, with said DOCSIS used for communication in the network management system;

PON intermediate layer between the equipment and the equipment set up a channel, the channel is connected to the TCP, and user-defined in accordance with the interface protocol of the DOCSIS TLV frame diagram (type length value··)format messages, including uploading ONU PON in the apparatus, the OLT adds the card / deletes the card , specific configuration message.

Based on the above system architecture and related configuration, the system of the present invention in pre-configured intermediate layer apparatus on the basis of the mapping rules for mapping processing is mainly shown in: the equipment PON ONU equipment of the optical network unit in the service event centimeter mapped to a DOCSIS service in the service event of the apparatus; in the optical line terminal equipment PON OLT equipment business events CMTS mapped to a DOCSIS service in the service event of the apparatus.

Wherein, ONU ONU equipment business event includes service event the power up of the apparatus; the equipment business OLT OLT adds the card / deletes the card of the equipment service event.

Now according to fig. 2 to fig. 4 gives the invention a preferred embodiment, and the description of the embodiment, further provides the technical details of the present invention, to enable it to better illustrate the invention the provision of the specific process method for, in order to facilitate the description, the following to EPON device as an example for description.

As shown in Figure 2, is in this embodiment based on the system of the business of the bearing EPON DOCSIS network diagram, the system includes: DOCSIS network management system, the intermediate layer equipment, apparatus and EPON DOCSIS background server.

DOCSIS background server and the DOCSIS network management system is connected to the intermediate layer device. The stated intermediate layer is configured with DOCSIS Agent in the apparatus, can simulate all the functions of the and CMTS centimeter; the intermediate layer device receives the DOCSIS management configuration information of the network management system are communicated and agreement information by said DOCSIS Agent processing, the DOCSIS Agent DOCSIS analyzing operation, the operation is mapped to a DOCSIS EPON related operation, then encapsulated into a self-defined communication data packet, transmitted to the apparatus through the interface in the OLT EPON. By the same token, the DOCSIS Agent OLT response and automatic reporting of the business event information is parsed according to user-defined norms, then mapped to a device operation EPON DOCSIS related operation, through the standard CMTS/CM interface to the DOCSIS network management system.

Wherein, the operational event comprises reporting OLT ONU the power up of the apparatus the service event and OLT adds the card / deletes the card service event.

Through two specific example below to the DOCSIS Agent EPON equipment operation is mapped to a DOCSIS related detailed description of the process operation, as follows:

Example one: of the basic service analog intermediate device is centimeter;

As shown in Figure 3, is an intermediate layer device for simulating the Cable ONU Modem power-up registration procedure the open process, the basic service, the process comprising:

Step S301, ONU OAM the power-up message through to discover OLT equipment.

Step S302, OLT OLT Agent will be received through the DOCSIS discover message package to conform to the

air interface protocol of the frame diagram format TLV Agent DOCSIS to the intermediate layer of the device.
Step S303, DOCSIS received Agent discover message analysis, mapping to centimeter power-on process, and starts analog centimeter power-up, power-on configuration parameters to obtain centimeter.
This step in the procedure of DOCSIS power analog Agent centimeter are as follows:
(1) analog Agent DOCSIS to centimeter in DOCSIS background server DHCP (dynamic host configuration protocol) server sending the discover message;
(2) in response to DHCP server to the DOCSIS Agent offer message;
(3) analog Agent centimeter DOCSIS to the DHCP server IP address request message is transmitted;
(4) the DHCP server of the IP address allocation centimeter, return the response messages to the centimeter, the response message comprising the assigned IP address, the configuration parameters include the file name of the centimeter, the TFTP server configuration file of IP address, Tod server (server time) information such as the IP address.
(5) to the centimeter Tod server sends time information request message;
(6) centimeter Tod server to return to the current date and time information; wherein, the definition of IETF RFC868 the centimeter from the time server to obtain an agreement of the current date and time;
(7) according to the centimeter TFTP server to the TFTP server IP address information request message transmits the configuration parameter;
(8) the TFTP server configuration parameter to send to the centimeter centimeter; wherein, the TFTP protocol centimeter from the TFTP server to download configuration parameter file, obtain the required various parameters;
(9) after obtaining centimeter configuration parameters, using the configuration parameter to the intermediate layer of the device for simulating CMTS an application for registration;
(10) receiving the centimeter CMTS after a registration response, completing the registration process.
Step S304, DOCSIS Agent the power-on configuration parameter mapping for centimeter ONU and power-on configuration parameters in accordance with DOCSIS TLV interface protocol frame diagram of the format of message sending Agent OLT.
Step S305, OLT Agent of the received message is parsed, obtaining ONU power-on configuration parameters ONU OAM to and through.
When the configuration of the centimeter after the successful sending all, centimeter in the normal working state, then the normal ONU management
Example II: the intermediate layer device for simulating the basic service CMTS, in particular to the intermediate layer equipment simulation OLT adds the card flow, including:
(1), operation is performed on OLT adds the card , OLT system to generate message notification OLT Agent up card;
(2), according to the message generation adds the card Agent OLT four OLT identification (query of OLT PON MAC), in order to comply with DOCSIS the label OLT frame diagram interface protocol format for encapsulation TLV, reporting to the intermediate layer device;
(3), the intermediate layer device receives this message, is generated through simulation data of four CMTS, and likewise in order to comply with DOCSIS frame Figure TLV format to the air interface protocol of the sending OLT initialization configuration; for example, the initialization PON MAC, such as the can;
(4) after the allocation is finished, reporting agent OLT device acknowledge message to the intermediate layer, the intermediate layer device for simulating a complete initialization CMTS.

On the other hand, on the basis of the present invention bearing EPON the system of the business of the DOCSIS DOCSIS network management system can also be realized by the management of EPON equipment, specifically manifested as:

EPON DOCSIS network management system in the normal operation of the device for simulating the DOCSIS system, according to the specific needs of the management operation EPON equipment. The system of the present invention in order to facilitate development of flexible management and reducing duplication, in DOCSIS network management system can be the configuration of the classification information, a category is the DOCSIS standard unique management information, the configuration information is defined as DOCSIS (for example: restart the cable modem, the allocation qos); and another standard EPON for shared management information, the configuration information is defined as non-DOCSIS (such as the system name, system power-on time, etc.).

For non-DOCSIS configuration, can be directly to the network management system through the DOCSIS EPON device management, the DOCSIS network management system directly non-DOCSIS configuration information to Telnet (remote disembarkations) CLI EPON equipment (Command Line Interface, command line interface) configuration; or directly through SNMP management mode, does not pass through the intermediate layer apparatus; for DOCSIS configuration, the management of the network management system DOCSIS intermediate layer device, DOCSIS intermediate layer device configuration information into the configuration information EPON, and to equipment EPON;

OLT EPON apparatus according to the configuration information received to the user-defined classification by judging, if it is the configuration of the OLT, referred to OLT configuration module processing, if it is the configuration of the ONU, OAM ONU through the configuration of the processing module. EPON apparatus after the completion of the implementation of apparatus the result is returned to the intermediate layer, the intermediate layer of the apparatus according to DOCSIS return result to configuration, then the result is returned to the DOCSIS network management system.

Of course, the above-mentioned realization mode is only a preferred embodiment, the present invention also can be not classify the configuration information, the intermediate layer of the download of the equipment configuration message.

Furthermore, DOCSIS network management system, the intermediate layer equipment, equipment EPON are configured with a database, for storing related operational data, as shown in Figure 4 ; the configuration of the database-based, DOCSIS network management system in the operational management, the database can be timed, the business data in the database according to the mapping rules to be one by one (for example, : practical ONU of a certain interface to enter a VLAN, then, in the intermediate layer apparatus and DOCSIS network management system should be centimeter of a certain interface add VLAN), if it is not, an alarm message is sent to an upper layer.

Using the system of the present invention, can make the access equipment and PON DOCSIS network management system transparent to each other, the access device PON, it can be considered that the upper layer is PON network management system; the DOCSIS network management system, it can be considered that the lower layer management node equipment DOCSIS (CMTS and centimeter), the operator and equipment manufacturers of the existing resources get maximized using, from the standpoint of the evolution of the network, as well as the evolution of a smooth and stable manner.

As shown in Figure 5, the invention also offers a kind of intermediate layer device, comprising:

Mapping processing module 510, according to the pre-configured mapping rules, the service event apparatus

appears in the newspaper PON mapped to a DOCSIS service event;
Management configuration module 520, DOCSIS-based network management system for the management of the configuration information sent to the stated PON equipment management.
Furthermore, the intermediate layer by the configuration of the equipment and CMTS centimeter interface with the DOCSIS network management system communication; through the establishment of a communication channel with the PON device communication, the communication channel is connected with the transmission control protocol TCP.
Mapping processing module 510 in the pre-configured mapping rules includes: equipment for the stated PON ONU equipment of the optical network unit in the service event centimeter mapped to a DOCSIS service in the service event of the apparatus; in the optical line terminal equipment PON OLT equipment business events CMTS mapped to a DOCSIS service in the service event of the apparatus.
Preferably, the management of the DOCSIS network management system sends configuration information comprises: said DOCSIS network management system sends a management configuration information comprises: DOCSIS configuration information and non-DOCSIS configuration information; wherein, the DOCSIS DOCSIS standard configuration information in the management information of the unique; non-DOCSIS configuration information can be with standard PON shared management information.
Based on the above-mentioned feature, the network management system when the DOCSIS DOCSIS configuration information is transmitted to the intermediate layer device, the management configuration module 520, configuration information is mapped into the DOCSIS PON equipment configuration information is sent to the stated PON apparatus, and the apparatus return to the receiving said PON after the outcome of the implementation of, local DOCSIS configuration, and the configuration result reporting to the DOCSIS network management system;
Of course, the above-mentioned configuration information divided is only a preferred embodiment, can also be realized in the concrete is not to be divided, when the non-dividing, management configuration module 520 of all of the configuration information for the operation.
The of the device of the invention, can be the access equipment and PON DOCSIS network management system transparent to each other, the access device PON, it can be considered that the upper layer is PON network management system; the DOCSIS network management system, it can be considered that the lower layer management node equipment DOCSIS (CMTS and centimeter), the operator and equipment manufacturers of the existing resources get maximized using, from the standpoint of the evolution of the network, as well as the evolution of a smooth and stable manner.
Obviously, those of skill in the art to make various modifications of this invention without disengagement and modify the spirit and scope of this invention. In this way, if the invention of these modifications and change this invention claim and its equivalent within the scope of the technology, the present invention is also intended to include such variations, and modify.

Cited patents:

Cited by search report (2 patents)

Publication number	Publication date	Inventor

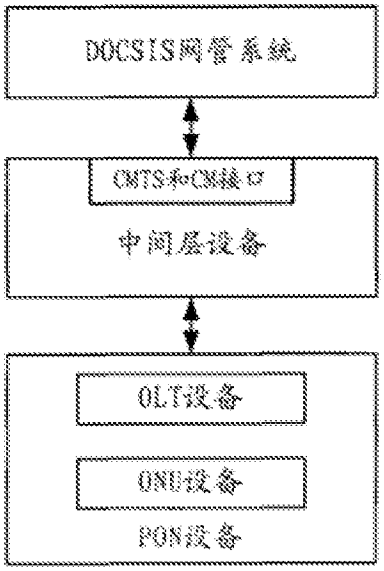
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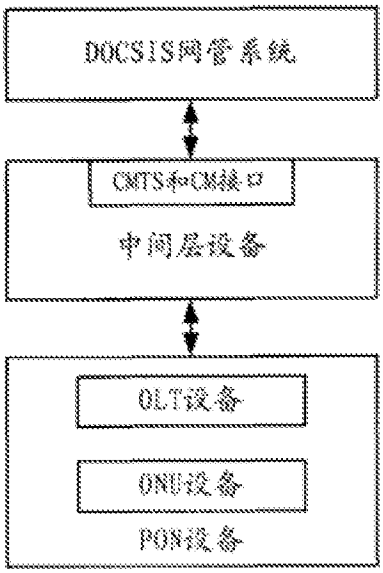
This patent is cited by the patents below (forwards citations).

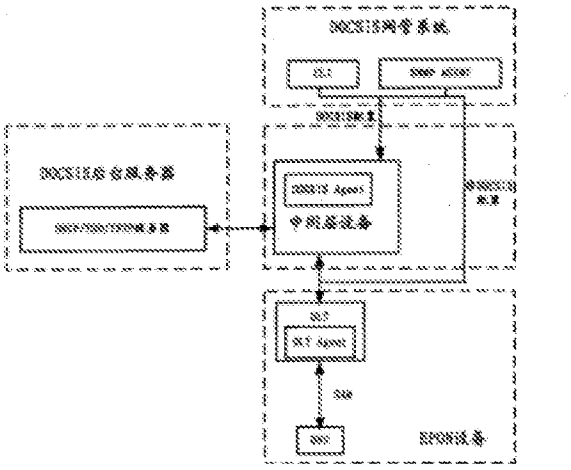
Publication number	Publication date
WO 2012139453 A1	2012 Oct 18
WO 2014032574 A1	2014 Mar 06
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WO 2012163045 A1	2012 Dec 06
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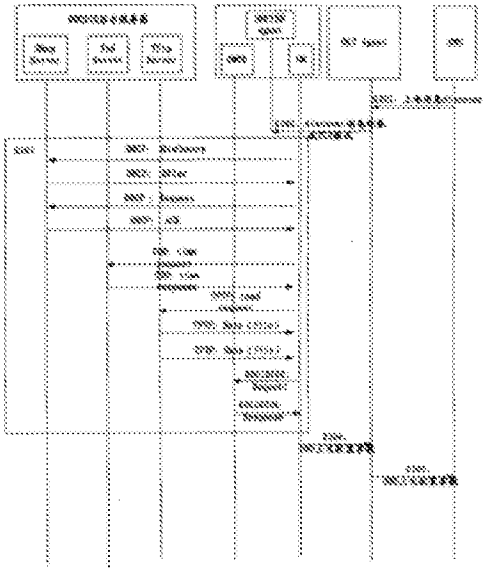
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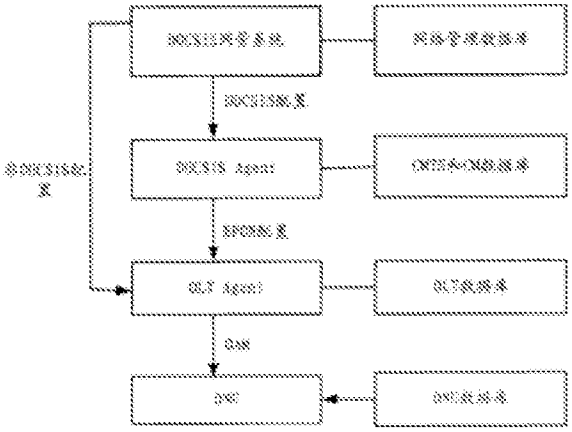


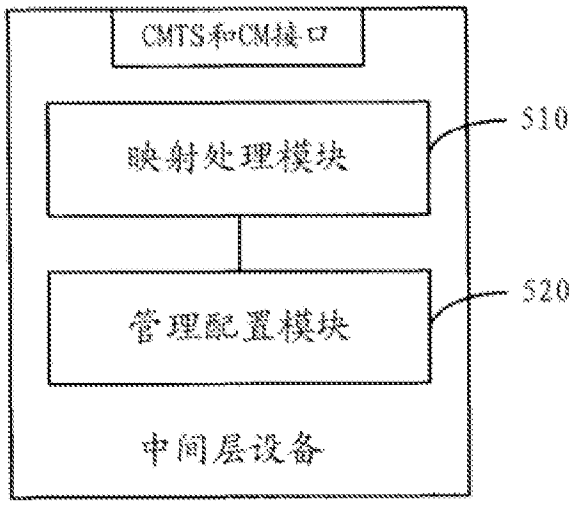
Drawing sheets










CMTS和CM接口
映射处理模块
S10
管理配置模块
S20
中间层设备

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BIB DATA SHEET

CONFIRMATION NO. 1821

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/009,703	10/03/2013	398	2636	95-1008

APPLICANTS

INVENTORS

Meiyan Zang, Shenzhen City, CHINA;
Liquan Yuan, Shenzhen City, CHINA;
Chaoqin Zhang, Shenzhen City, CHINA;

YES MRS

**** CONTINUING DATA ***************************

This application is a 371 of PCT/CN2012/072633 03/20/2012

YES MRS

**** FOREIGN APPLICATIONS *************************

CHINA 2011100921130.9 04/13/2011

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

10/11/2013

Foreign Priority claimed	☑ Yes ☐ No	☐ Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
35 USC 119(a-d) conditions met	☑ Yes ☐ No					
Verified and Acknowledged	/M. R. SEDIGHIAN/ Examiner's Signature	Initials	CHINA	3	13	3

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UNITED STATES

TITLE

DPOE System And Service Auto-Configuration Method And Network Based Thereon

FILING FEE RECEIVED		
1480	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

BIB (Rev. 05/07).

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14009703	ZANG ET AL.
	Examiner	**Art Unit**
	M. R. SEDIGHIAN	2636

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/17/2015								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/009,703	10/03/2013	Meiyan Zang	95-1008	1821

36163 7590 06/01/2015

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EXAMINER	
SEDIGHIAN, MOHAMMAD REZA	

ART UNIT	PAPER NUMBER
2636	

MAIL DATE	DELIVERY MODE
06/01/2015	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 14/009,703	Applicant(s) ZANG ET AL.	
	Examiner M. R. SEDIGHIAN	Art Unit 2636	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/03/2013*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-13* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-13* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *10/03/2013* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☒ All b)☐ Some** c)☐ None of the:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *11/21/2013*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
14/009,703	03 October, 2013	ZANG ET AL.	95-1008

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EXAMINER	
M. R. SEDIGHIAN	
ART UNIT	PAPER
2636	20150526

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

/M. R. SEDIGHIAN/
Primary Examiner, Art Unit 2636

PTO-90C (Rev.04-03)

1. The present application is being examined under the pre-AIA first to invent provisions.

2. This communication is responsive to applicant's 10/03/2013 amendments and remarks. The amendments have been entered. Claims 1-13 are now pending.

3. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 1-13 are rejected under pre-AIA 35 U.S.C. 102(a) as being anticipated by HAIPENG WANG (CN 101997725 (A) - 2011-03-30).

Regarding claims 1, 6, and 8, HAIPENG WANG teaches a method and system of service auto-configuration of a DOCSIS Provisioning Of EPON (DPOE) system (see abstract and fig. 2), comprising: the DPOE system acquiring a configuration file from a back-office management system (DOCSIS, SNMP AGENT, CLI, fig. 2), wherein the configuration file comprises configuration information of an optical network unit (ONU) (ONU, fig. 2) and configuration information of an optical line terminal (OLT) (OLT, fig. 2) in the DPOE system (DOCSIS, fig. 2, see translation, page 6, third paragraph); the DPOE system analyzing the acquired configuration file (translation, page 6, fourth paragraph, note the use of a Mapping processing module and a Management configuration module), and obtaining the configuration information of the ONU (see translation, page 6, the first and last paragraph and claim 3) and the configuration information of the OLT (see translation, page 6, the first and last paragraph and

claim 3); and the DPOE system configuring the OLT (OLT, fig. 2) locally (translation, page 8, third paragraph, and page 9, Example II, "sending OLT initialization configuration") and configuring the ONU (ONU, fig. 2) via a management channel (OAM, fig. 2) between the OLT and the ONU (translation, page 6, fourth paragraph, note the establishment of a communication channel with the PON device and OAM in fig. 2). As to claims 6 and 8, HAIPENG WANG further teaches the use of an acquisition unit (DOCSIS Agent in fig. 2) to acquire a configuration file from a back-office management system (DOCSIS, CLI, SNMP AGENT, in fig. 2), wherein the configuration file comprises configuration information of ONU and configuration information of OLT (see translation, page 8, the section related to embodiment shown in Figure 2), an analyzing unit to analyze the acquired configuration file (the analyzing operation by the DOCSIS Agent) and to obtain the configuration information of ONU and configuration information of OLT (translation, page 5, last paragraph and page 6, first paragraph, and claims 3, 4), and a configuration unit (DOCSIS Agent in fig. 2) to configure the OLT locally and to configure ONU via a management channel (OAM in fig. 2) between the OLT and the ONU (see translation, page 8, the section related to embodiment shown in Figure 2). As to claim 8, HAIPENG WANG further teaches the back-office management system (DOCSIS, CLI, SNMP AGENT, in fig. 2) is configured to save the configuration file (translation, page 6, third paragraph, note the use of database for storing corresponding service data), and download the configuration file to the DPOE system, wherein the configuration file comprises the configuration information of the ONU and the configuration information of the OLT in the DPOE system (translation, page 5, last paragraph and page 6, first paragraph, and claims 3, 4).

Regarding claims 2, 10, and 12, HAIPENG WANG further teaches the configuration information of the OLT is configuration information related to services opened by the ONU (see translation, page 9, section (10), Steps S304, S305, Example II, and S304, S305, fig. 3).

Regarding claims 3 and 11, HAIPENG WANG further teaches the services opened by the ONU comprise an Ethernet based LAN (E-LAN) services (translation, page 10, fifth paragraph, for example, practical ONU of a certain interface to enter a VLAN); and the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT (see translation, page 9, Example II, sections (2) and (3)) related to the services opened by the ONU.

Regarding claims 4, 7, and 13, HAIPENG WANG further teaches when analyzing the acquired configuration file, the DPOE system further converts the configuration information of the ONU into a message format which can be identified by the ONU (translation, page 10, fourth paragraph, the "configuration message"), and converts the configuration information of the OLT into a message format which can be identified by the OLT (translation, page 10, fourth paragraph, the "configuration message").

Regarding claim 5, HAIPENG WANG further teaches the method is performed in a process of ONU initialization (translation, Page 8, Step S301, S302 and S301, discover, S302, discover, fig. 3).

Regarding claim 9, HAIPENG WANG further teaches the back-office management system comprises a trivial file transfer protocol (TFTP) server (Tftp Server, fig. 3) configured to: receive a TFTP request initiated by the DPOE system (TFTP read request in fig. 3), respond to

that TFTP request (TFTP: Data (File) and Response, in fig. 3), and download the configuration file to the DPOE system (see translation, page 9, TFTP server).

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. R. SEDIGHIAN whose telephone number is (571)272-3034. The examiner can normally be reached on 10 to 6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/M. R. SEDIGHIAN/
Primary Examiner, Art Unit 2636

Notice of References Cited	Application/Control No. 14/009,703	Applicant(s)/Patent Under Reexamination ZANG ET AL.	
	Examiner M. R. SEDIGHIAN	Art Unit 2636	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
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FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
*	N	CN 101997725 A	03-2011	CN	HAIPENG WANG	H04L 12/24
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	Q					
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14009703
Filing Date	2013-10-03
First Named Inventor	Meiyan Zang
Art Unit	2636
Examiner Name	Kenneth N. Vanderpuye M.R.Sedighian
Attorney Docket Number	95-1008

U.S.PATENTS

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/M.R.S/	1	101997725A	CN		2011-03-30	ZTE CORP		☐
/M.R.S/	2	101888575A	CN		2010-11-17	ZTE CORP		☐
/M.R.S/	3	101741712	CN		2010-06-16	HUAWEI TECHNOLOGIES CO LTD		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14009703
	Filing Date	2013-10-03
	First Named Inventor	Meiyan Zang
	Art Unit	2636
	Examiner Name	Kenneth N. Vanderpuye
	Attorney Docket Number	95-1008

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/M.R.S/	1	International Search Report mailed June 28, 2012 in International Application Number PCT/CN2012/072633.	☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14009703
	Filing Date	2013-10-03
	First Named Inventor	Meiyan Zang
	Art Unit	2636
	Examiner Name	Kenneth N. Vanderpuye
	Attorney Docket Number	95-1008

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Signature	/ Patricia E. Hong /	Date (YYYY-MM-DD)	2013-11-21
Name/Print	Patricia E. Hong	Registration Number	34,373

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14009703	ZANG ET AL.
	Examiner	Art Unit
	M. R. SEDIGHIAN	2636

CPC- SEARCHED		
Symbol	Date	Examiner
H04B 10/27, 271, 272, 275, 2755, 278	5/17/2015	MRS
H04L 12/24	5/17/2015	MRS
H04Q 11/00	5/17/2015	MRS
H04J 14/023, 0232, 0238, 0239, 0242, 0243, 0245, 0246, 0247, 025, 0252	5/17/2015	MRS

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US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
398	71	5/17/2015	MRS
	70		
	72		
	66		
	58		

SEARCH NOTES		
Search Notes	Date	Examiner
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INTERFERENCE SEARCH			
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
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	Examiner	Art Unit
	M. R. SEDIGHIAN	2636

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/26/2015								
	1	✓								
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Art Unit	2636
Examiner Name	Mohammad Reza SEDIGHIAN
Attorney Docket Number	95-1008

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	Examiner Name	Mohammad Reza SEDIGHIAN
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	1	Canadian Office Action dated May 13, 2015 of Canadian patent Application No. 2,832,394.	☐

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Name/Print	Patricia E. Hong	Registration Number	34,373

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(19) 世界知识产权组织
国 际 局

(43) 国际公布日
2012 年 10 月 18 日 (18.10.2012)

WIPO | PCT

(10) 国际公布号
WO 2012/139453 A1

(51) 国际专利分类号:
H04L 12/24 (2006.01)

(21) 国际申请号: PCT/CN2012/072633

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(26) 公布语言: 中文

(30) 优先权:
201110092130.9 2011 年 4 月 13 日 (13.04.2011) CN

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(54) Title: DPOE SYSTEM AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON

(54) 发明名称 : 一种 DPOE 系统及基于该系统业务自动配置方法和网络

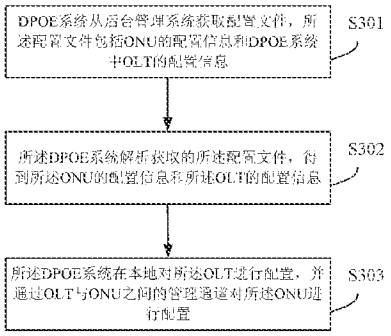


图 3 / Fig. 3

S301 A DPOE SYSTEM ACQUIRING A CONFIGURATION FILE FROM THE BACKGROUND MANAGEMENT SYSTEM, THE CONFIGURATION FILE COMPRISING THE CONFIGURATION INFORMATION OF THE ONU AND THE CONFIGURATION INFORMATION OF AN OLT IN THE DPOE SYSTEM
S302 THE DPOE SYSTEM PARSING THE ACQUIRED CONFIGURATION FILE, OBTAINING THE CONFIGURATION INFORMATION OF THE ONU AND THE CONFIGURATION INFORMATION OF THE OLT
S303 THE DPOE SYSTEM CONFIGURING THE OLT LOCALLY AND CONFIGURING THE ONU VIA A MANAGEMENT CHANNEL BETWEEN THE OLT AND THE ONU

(57) **Abstract**: A DPOE system and a service auto-configuration method and network based thereon, the DPOE system comprising an acquisition unit, an parsing unit and a configuration unit; the service auto-configuration network based on the system comprising a DPOE system, a background management system and an optical network unit (ONU); the service auto-configuration method based on the system comprising: the DPOE system acquiring a configuration file from the background management system, the configuration file comprising the configuration information of the ONU and the configuration information of an OLT in the DPOE system; the DPOE system parsing the configuration file, obtaining the configuration information of the ONU and the configuration information of the OLT; configuring the OLT locally and configuring the ONU via a management channel between the OLT and the ONU; thus the service can be activated without separately configuring the OLT after completing the initialization process of the ONU.

(57) **摘要**: DPOE 系统以及基于该系统业务自动配置的方法及网络, 其中 DPOE 系统包括获取单元、解析单元和配置单元;基于该系统业务自动配置的网络包括 DPOE 系统、后台管理系统以及光网络单元(ONU), 基于该系统业务自动配置的方法包括: DPOE 系统从后台管理系统获取配置文件, 所述配置文件包括 ONU 的配置信息和 DPOE 系统中 OLT 的配置信息; 所述 DPOE 系统解析所述配置文件, 得到 ONU 的配置信息和 OLT 的配置信息, 在本地对所述 OLT 进行配置, 并通过 OLT 与 ONU 之间的管理通道对所述 ONU 进行配置。从而在 ONU 的初始化过程完成后, 不需要对 OLT 单独另行进行配置, 即可使业务进行开通。

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— 发明人资格(细则 4.17(iv))

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一种 DPOE 系统及基于该系统业务自动配置方法和网络

技术领域

本发明涉及通信领域，具体涉及一种无源光网络（Passive Optical Network，简称 PON），特别是基于有线传输数据业务接口规范（Data over Cable Service Interface System，DOCSIS）后台管理系统的以太网无源光网络系统的业务自动配置方法。

背景技术

基于 DOCSIS 管理后台的 PON 系统，以 DPOE（基于 DOCSIS 管理后台的以太网无源光网络）网络为例，图 1 是 DPOE 网络的拓扑结构图，该网络由包含 TFTP（Trivial File Transfer Protocol，简单文件传送协议）服务器的后台管理系统，包含 vCM(虚拟同轴电缆调制解调器)、OLT(Optical Line Terminal，光线路终端)以及其他设备的 DPOE 系统，DPOE ONU(Optical Network Unit，光网络单元)以及连接在 ONU 上的 CPE(Customer Premise Equipment，用户终端设备)终端组成。ONU 发起注册的过程是模拟同轴调整解调器的初始化过程，由 vCM 发起，并从 TFTP 服务器获取配置文件，DPOE 系统再把获取的配置文件的配置信息配置通过管理通道发送给 ONU。

如图 2 所示，目前的 ONU 的数据配置过程主要是通过如下过程完成：

S201：ONU 上电，开始初始化过程；

S202：ONU 和 DPOE 系统完成 PON 层的初始化过程；

S203：DPOE 系统对 ONU 进行认证，认证通过，完成注册；

S204 ~S205：DPOE 系统中的 vCM 会发起根据 DOCSIS 3.0 规范中规定的初始化过程，向后台管理系统发送 TFTP 请求，从后台管理系统的 TFTP 服务器上下载配置文件；

S206 ~S207：经过相关处理后，然后再通过相应的配置管理通道，配置到相关的 ONU 上，配置文件中包含运营商为 ONU 上连接的用户提供的服务属性和参数；

S208：对 ONU 完成数据配置后，ONU 通知 DPOE 系统，整个 ONU 的注册过程结束。

但是完成对 ONU 的配置，要使 ONU 上的业务正常运行，还需要对 OLT 进行相应的配置。一般情况下，对 OLT 的配置需要单独通过手工进行配置，或者通过命令行，或者通过网元管理系统（Element Management System，EMS）和 OLT 之间的简单网络管理协议（Simple Network Management Protocol，SNMP）接口进行。

对应企业用户开通业务，一般需要大量的对 DPOE 系统的 OLT 的配置，完成业务的开通，所以对于开通这些业务的 ONU，需要同时配置 OLT 的相关参数。

例如，一般针对以太网虚拟专网（Ethernet Virtual Private LAN，EVP-LAN）业务的正常开通，需要在 OLT 和 ONU 进行如虚拟局域网（Virtual Local Area Network，VLAN）的相关配置，包括

在 ONU 上需要进行的配置为：

1、ONU 上标识端口 UNI 上运行的具体业务的 VLAN;

2、ONU 上标识 UNI 端口的相应业务对应的逻辑链路标记（Logical Link Identifier，LLID）/通用封装方法（Generic Encapsulation Method，GEM ）端口标识 PORT ID。

DPOE 系统的 OLT:

1、DPOE 系统的 OLT 上（PON 线卡）与 UNI 端口上运行的具体业务关联的 LLID/GEM PORT ID;

2、DPOE 系统的 OLT PON 线卡上针对 ONU 上端口 UNI 上运行的具体业务使用的 VLAN;

3、DPOE 系统的 OLT 业务处理板上标识 ONU 上 UNI 端口上运行的具体业务对应的 VLAN;

4、DPOE 系统的 OLT 业务处理板上与 ONU UNI 端口上运行的具体业务关联的多协议标签交换（Multi-Protocol Label Switching，MPLS）实例;

5、DPOE 系统的 OLT 上与 ONU UNI 端口上运行的具体业务关联的 MPLS 伪线标识;

6、DPOE 系统的 OLT 启动 MPLS 协议;

7、DPOE 系统的 OLT 上对应 ONU 上 UNI 端口上运行的具体业务，对应的上联口的 VLAN 标识。

由此可见，运行该业务，需要在 DPOE 系统的 OLT 上进行的相应多次配置，比较复杂，这种分别配置 ONU 和 OLT 的方式，在配置效率上不高。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，更会影响整个系统的配置效率。

发明内容

本发明需要解决的技术问题是提供一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统以及基于该系统业务自动配置的方法及网络，以使 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通，以提高整个系统的配置效率。

为了解决上述技术问题，本发明提供了一种基于 DOCSIS 管理后台的无源光网络（DPOE）系统业务自动配置的方法，包括:

DPOE 系统从后台管理系统获取配置文件，该配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息;

DPOE 系统解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息;

DPOE 系统在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

优选地，OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

优选地，ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种;

OLT 的配置信息包括与 ONU 开通的业务相关的 OLT 的 VLAN、用户端

口和用户 MAC 地址中的一种或多种。

优选地，DPOE 系统解析获取的配置文件时，还将 ONU 的配置信息转换为 ONU 可以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

优选地，方法是在 ONU 初始化过程中执行的。

此外，为了解决上述技术问题，本发明还提供了一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统，包括获取单元、解析单元和配置单元；其中，

获取单元设置为：从后台管理系统获取配置文件，该配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中 OLT 的配置信息；

解析单元设置为：解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息；

配置单元设置为：在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

优选地，解析单元还设置为：解析获取的配置文件时，将 ONU 的配置信息转换为 ONU 可以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

此外，为了解决上述技术问题，本发明还提供了一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统业务自动配置的网络，包括 DPOE 系统、后台管理系统以及光网络单元(ONU)，其中，

DPOE 系统采用如上面所述的 DPOE 系统；

后台管理系统设置为：保存配置文件，并将配置文件下载到 DPOE 系统中， 该配置文件包括 ONU 的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息。

优选地，后台管理系统包括简单文件传送协议（TFTP）服务器，设置为：接收 DPOE 系统发起的 TFTP 请求，并响应该 TFTP 请求，将配置文件下载到 DPOE 系统中。

优选地，OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

优选地，ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种；

OLT 的配置信息包括与 ONU 开通的业务相关的 OLT 的 VLAN、用户端口和用户 MAC 地址中的一种或多种。

本发明实施例提供的 DPOE 系统以及基于该系统业务自动配置的方法及网络，通过一个包括有 ONU 配置信息和 DPOE 系统中 OLT 配置信息的配置文件，同时完成 OLT 和 ONU 的自动化配置，在 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，可以非常好地提高整个系统的配置效率。

附图概述

图 1 为 DPOE 网络的拓扑结构图；

图 2 为常规 ONU 数据配置流程图；

图 3 为本发明实施例 DPOE 系统业务自动配置的方法流程图；

图 4 为本发明实施例的 OLT 和 ONU 的自动配置的流程图。

本发明的较佳实施方式

为使本发明的目的、技术方案和优点更加清楚明白，下文中将结合附图对本发明的实施例进行详细说明。需要说明的是，在不冲突的情况下，本申请中的实施例及实施例中的特征可以相互任意组合。

如图 3 所示，本发明实施例提供了一种 DPOE 系统业务自动配置的方法，包括以下步骤：

S301：DPOE 系统从后台管理系统获取配置文件，配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息；

在 ONU 初始化过程中，DPOE 系统中的 vCM(虚拟同轴电缆调制解调器)向后台管理系统发起 TFTP 请求，DPOE 系统从该后台管理系统获取配置文件，配置文件中包含了增加了的针对 DPOE 系统的 OLT 的配置信息，OLT 的配置信息是和 ONU 开通的业务相关的配置信息，这样 DPOE 系统获取的配置文件包括配置 ONU 和 OLT 的配置信息。

S302：DPOE 系统解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息；

DPOE 系统解析获取的配置文件时，还将 ONU 的配置信息转换为 ONU 可以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

S303：DPOE 系统在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

DPOE 系统获取配置文件后解析配置文件，并区分配置 ONU 和 OLT 的配置信息，在本地对 OLT 进行配置，配置 ONU 的信息通过 DPOE 系统和 ONU 之间的管理通道进行传递，并配置 ONU 的相关参数。管理通道可以包括 GPON 的 OMCI 通道或 EPON 系统的扩展 OAM。

对应企业用户开通业务，一般开通的业务包括但不限于基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务和基于以太网的局域网（E-LAN）业务。需要大量的对 DPOE 系统的 OLT 的配置，完成业务的开通，所以对于开通这些业务的 ONU，需要同时配置 OLT 的相关参数，比如 VLAN、用户端口和用户媒体访问控制（Medium Access Control，MAC）地址等信息。

相应地，本发明实施例还提供了一种 DPOE 系统，包括获取单元、解析单元、配置单元，其中，

获取单元，用于从后台管理系统获取配置文件，该配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息；

解析单元，用于解析获取的配置文件，得到 ONU 的配置信息和 OLT 的配置信息；

解析单元解析获取的配置文件时，还将 ONU 的配置信息转换为 ONU 可

以识别的消息格式，将 OLT 的配置信息转换为 OLT 可以识别的消息格式。

配置单元，用于在本地对 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对 ONU 进行配置。

在一个应用示例中，DPOE 系统的 Vcm 可以实现上述获取单元、解析单元和配置单元的相应功能。

在具体实施时，Vcm 可以作为单独的功能实体，也可以集成在 OLT 上成为 OLT 的一部分。

相应地，本发明实施例还提供了一种 DPOE 系统业务自动配置的网络，包括 DPOE 系统、后台管理系统以及光网络单元 ONU，其中，

DPOE 系统可以采用上面提供的 DPOE 系统；

后台管理系统，用于保存配置文件，并将配置文件下载到 DPOE 系统中，该配置文件包括 ONU 的配置信息和 DPOE 系统中 OLT 的配置信息。

该后台管理系统包括 TFTP 服务器，TFTP 服务器用于接收 DPOE 系统发起的 TFTP 请求，并响应该 TFTP 请求，把配置文件下载到 DPOE 系统中。

其中 OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

ONU 开通的业务包括 E-LINE 业务、E-TREE 业务和 E-LAN 业务中的一种或多种；

OLT 的配置信息包括与 ONU 开通的业务相关的 OLT 的 VLAN、用户端口和用户 MAC 地址中的一种或多种。

在一个应用示例中，如图 4 所示，在 ONU 上电注册的过程中，同时完成对 ONU 和 DPOE 系统的 OLT 进行配置的过程为：

S401：ONU 上电，开始初始化过程；

S402：ONU 和 DPOE 系统完成 PON 层的初始化过程；

S403：DPOE 系统对 ONU 进行认证，认证通过；

S404：vCM 向后台管理系统的动态主机配置协议（Dynamic Host Configuration Protocol，DHCP）服务器起 DHCP 请求；

S405：后台管理系统的 DHCP 服务器针对 DHCP 请求进行响应，给 vCM

分配 IP 地址;

S406: vCM 向后台管理系统的 TFTP 服务器发起 TFTP 请求，请求获取该 vCM 对应的 ONU 的配置数据文件;

S407: 后台管理系统的 TFTP 服务器响应 vCM 发起的 TFTP 请求，把该 vCM 对应的 ONU 的配置文件下载到 DPOE 系统中;

S408: 对上述配置文件进行分析处理，该配置文件中包含有针对 EVP-LAN 业务自动运行需要针对 DPOE 系统的 OLT 进行配置的 TLV，比如: 在 OLT 上增加针对 ONU 上端口 UNI1 运行的业务 V1 进行标识的 VLAN 为 V2，该 TLV 为现有 DOCSIS3.0 标准中新增加的 TLV，该 TLV 的格式如表 1 所示如下:

表 1: DOCSIS3.0 标准中新增加的 TLV 的格式

长度 (octets)	字段(name)		取值 (hex)	备注（Notes）
1	Type(类型)		0x02	DPOE 系统的 OLT 上标识某业务对应的 VLAN 标识
1	长度（Length）		可变	11+N
6	取值（Value）	ONU 标识	可变（varies）	ONU 的 MAC 地址标识
1		ONU 端口号	可变（varies）	
2		ONU 上运行的业务对应的 VLAN 标识	可变（varies）	
2		OLT 上对 ONU 某 UNI 端口运行的某业务的 VLAN 标识	可变 (varies)	
N		自定义字段（Vendor-specific field）	可变（varies）	

再如：配置 OLT 上与 ONU 端口 UNI1 上运行的业务 V1 关联的 MPLS 伪线标识 PW1，该 TLV 可如表 2 所示如下：

表 2：DOCSIS3.0 标准中新增加的 TLV 的格式

长度 (octets)	字段(name)		取值 (hex)	备注（Notes）
1	Type(类型)		0x05	OLT 上标识某业务对应的 MPLS 的 PW 的标识
1	长度（Length）		可变	13+N
6	取值（Value）	ONU 标识	可变（varies）	ONU 的 MAC 地址标识
1		ONU 端口号	可变（varies）	
2		ONU 上运行的业务对应的 VLAN 标识	可变（varies）	
4		OLT 上对 ONU 某 UNI 端口运行的某业务的 PW 标识	可变 (varies)	
N		自定义字段（Vendor-specific field）	可变（varies）	

S409：经过步骤 S408 的分析处理，把配置文件中的基于 DOCSIS 的 TLV 分别转换为 ONU 和 OLT 可以识别的消息格式。DPOE 系统会识别哪些配置消息针对 OLT，哪些配置消息针对 ONU。比如，DPOE 系统可以根据 type 字段的内容自动识别 OLT 的配置数据以及 ONU 的配置数据，如果是针对 OLT 进行配置的，则使配置消息在 OLT 本地生效，如果是针对 ONU 进行配置的数据，则进行步骤 S410。

S410：OLT 把针对 ONU 进行配置的数据通过 OLT 和 ONU 之间的管理通道，比如扩展 OAM、OMCI，把相关数据配置到 ONU 上。

S411：对 ONU 完成数据配置后，ONU 通知 DPOE 系统，整个 ONU 的注册过程结束

此时，即可开通 ONU 上 UNI1 连接的用户的 EVP-LAN 业务，而不再需要其他额外配置。

从上述实施例可以看出，相对于现有技术，本发明在配置文件中增加了针对 DPOE 系统的 OLT 的配置信息，同时完成对 OLT 和 ONU 进行自动化配置，在 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，可以非常好地提高整个系统的配置效率。

以上，仅是本发明的最佳实施例而已，并非用于本发明的保护范围。凡在本发明的精神和原则之内，所做的任何修改都应包含在本发明的保护范围之内。

工业实用性

本发明实施例提供的 DPOE 系统以及基于该系统业务自动配置的方法及网络，通过一个包括有 ONU 配置信息和 DPOE 系统中 OLT 配置信息的配置文件，同时完成 OLT 和 ONU 的自动化配置，在 ONU 的初始化过程完成后，不需要对 OLT 单独另行进行配置，即可使业务进行开通。特别是针对 ONU 上的关键业务运行需要在 OLT 上进行比较复杂的对应配置时，可以非常好地提高整个系统的配置效率。

权 利 要 求 书

1、 一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统业务自动配置的方法，包括:

所述 DPOE 系统从后台管理系统获取配置文件，所述配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息;

所述 DPOE 系统解析获取的所述配置文件，得到所述 ONU 的配置信息和所述 OLT 的配置信息;

所述 DPOE 系统在本地对所述 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对所述 ONU 进行配置。

2、 如权利要求 1 所述的方法，其中，

所述 OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

3、 如权利要求 2 所述的方法，其中，

所述 ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种;

所述 OLT 的配置信息包括与所述 ONU 开通的业务相关的 OLT 的虚拟局域网（VLAN）、用户端口和用户媒体访问控制（MAC）地址中的一种或多种。

4、 如权利要求 1 所述的方法，其中，

所述 DPOE 系统解析获取的所述配置文件时，还将所述 ONU 的配置信息转换为 ONU 可以识别的消息格式，将所述 OLT 的配置信息转换为 OLT 可以识别的消息格式。

5、 如权利要求 1 所述的方法，其中，

所述方法是在 ONU 初始化过程中执行的。

6、 一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统，包

括获取单元、解析单元和配置单元;

所述获取单元设置为：从后台管理系统获取配置文件，所述配置文件包括光网络单元(ONU)的配置信息和 DPOE 系统中 OLT 的配置信息;

所述解析单元设置为：解析获取的所述配置文件，得到所述 ONU 的配置信息和所述 OLT 的配置信息;

所述配置单元设置为：在本地对所述 OLT 进行配置，并通过 OLT 与 ONU 之间的管理通道对所述 ONU 进行配置。

7、 如权利要求 6 所述的系统，其中，

所述解析单元还设置为：解析获取的所述配置文件时，将所述 ONU 的配置信息转换为 ONU 可识别的消息格式，将所述 OLT 的配置信息转换为 OLT 可识别的消息格式。

8、 一种基于 DOCSIS 管理后台的以太网无源光网络（DPOE）系统业务自动配置的网络，包括 DPOE 系统、后台管理系统以及光网络单元(ONU)，其中，

所述 DPOE 系统采用如权利要求 6 或 7 所述的 DPOE 系统;

所述后台管理系统设置为：保存配置文件，并将所述配置文件下载到 DPOE 系统中， 所述配置文件包括 ONU 的配置信息和 DPOE 系统中光线路终端(OLT)的配置信息。

9、 如权利要求 8 所述的网络，其中，

所述后台管理系统包括简单文件传送协议（TFTP）服务器，设置为：接收 DPOE 系统发起的 TFTP 请求，并响应该 TFTP 请求，将所述配置文件下载到 DPOE 系统中。

10、 如权利要求 8 或 9 所述的网络，其中，

所述 OLT 的配置信息是与 ONU 开通的业务相关的配置信息。

11、 如权利要求 10 所述的网络，其中，

所述 ONU 开通的业务包括基于以太网的线路（E-LINE）业务、基于以太网的树形（E-TREE）业务以及基于以太网的局域网（E-LAN）业务中的一种或多种;

所述OLT的配置信息包括与所述ONU开通的业务相关的OLT的VLAN、用户端口和用户 MAC 地址中的一种或多种。

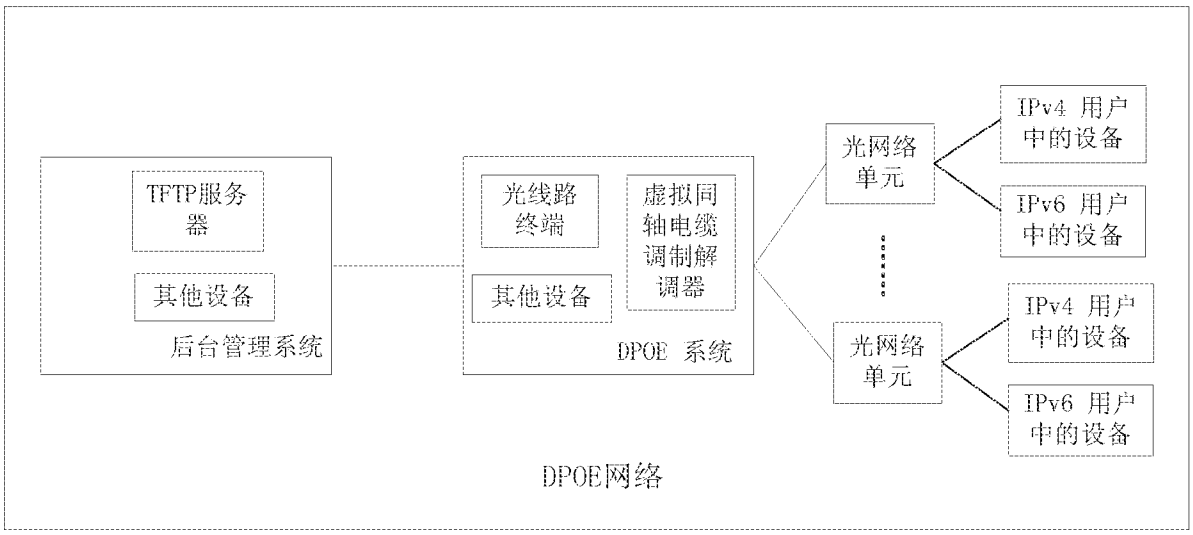

TFTP服务器
其他设备
后台管理系统
光线路终端
其他设备
虚拟同轴电缆调制解调器
DPOE 系统
光网络单元
光网络单元
IPv4 用户中的设备
IPv6 用户中的设备
IPv4 用户中的设备
IPv6 用户中的设备
DPOE网络

图 1

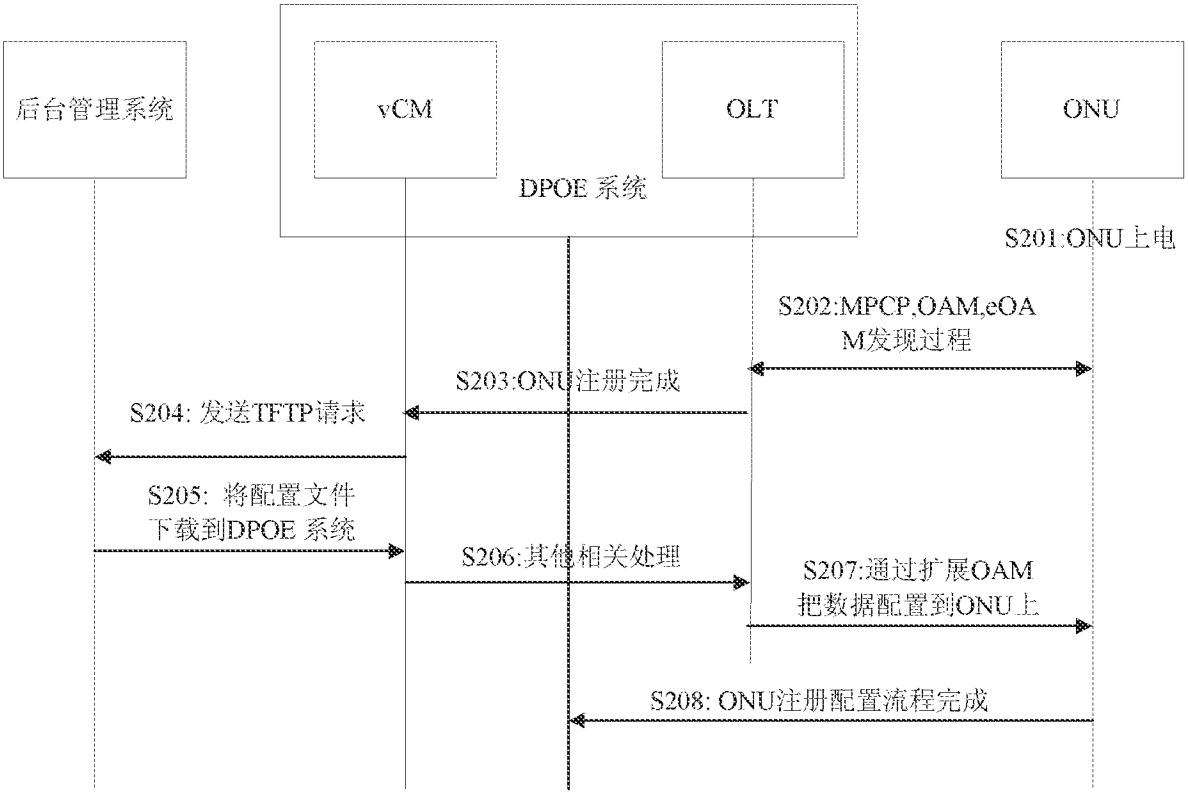

后台管理系统
vCM
OLT
DPOE 系统
ONU
S201:ONU上电
S202:MPCP,OAM,eOAM发现过程
S203:ONU注册完成
S204: 发送TFTP请求
S205: 将配置文件下载到DPOE 系统
S206:其他相关处理
S207:通过扩展OAM把数据配置到ONU上
S208: ONU注册配置流程完成

图 2

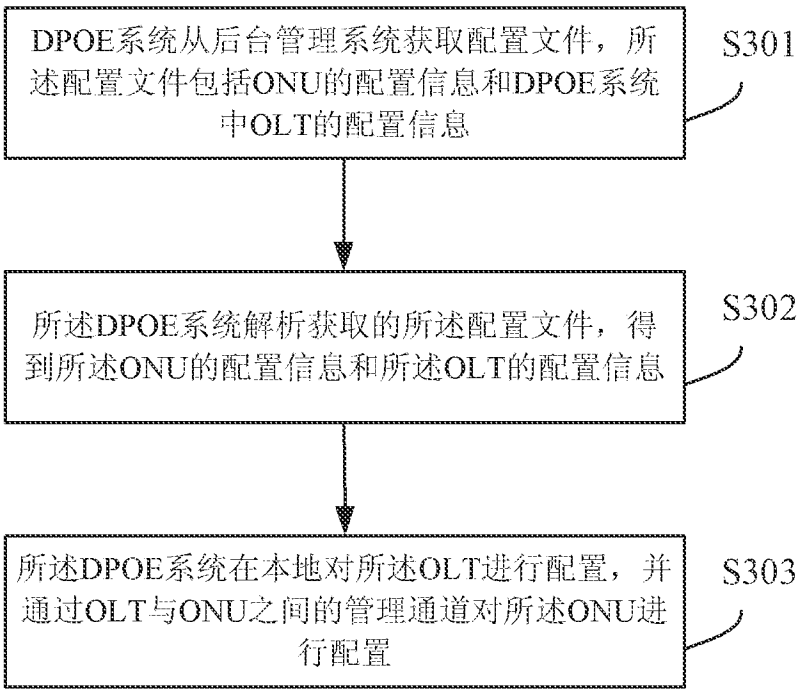

DPOE系统从后台管理系统获取配置文件，所述配置文件包括ONU的配置信息和DPOE系统中OLT的配置信息
S301
所述DPOE系统解析获取的所述配置文件，得到所述ONU的配置信息和所述OLT的配置信息
S302
所述DPOE系统在本地对所述OLT进行配置，并通过OLT与ONU之间的管理通道对所述ONU进行配置
S303

图 3

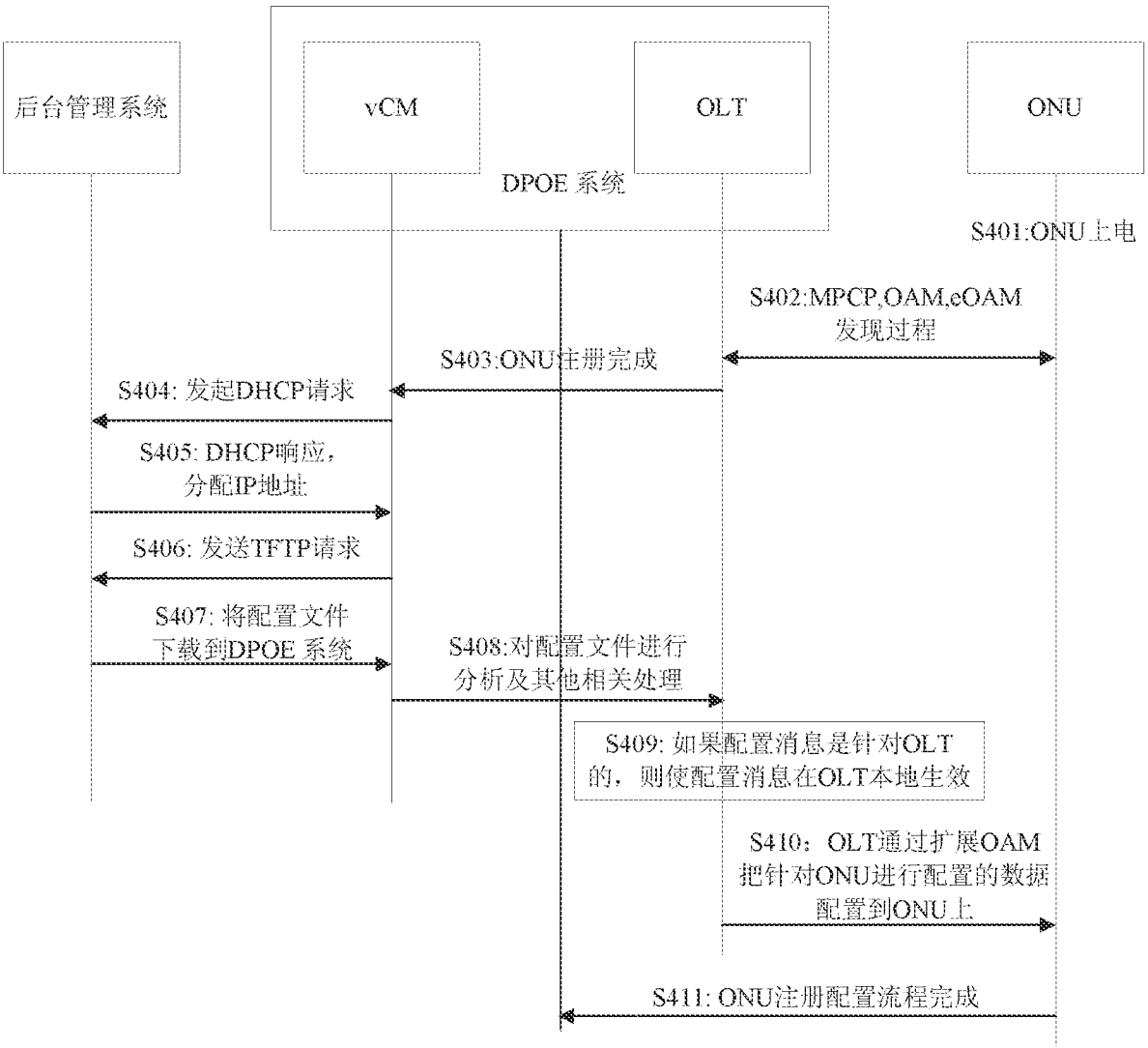

后台管理系统
vCM
OLT
ONU
DPOE 系统
S401:ONU上电
S402:MPCP,OAM,eOAM
发现过程
S403:ONU注册完成
S404: 发起DHCP请求
S405: DHCP响应，
分配IP地址
S406: 发送TFTP请求
S407: 将配置文件
下载到DPOE 系统
S408:对配置文件进行
分析及其他相关处理
S409: 如果配置消息是针对OLT
的，则使配置消息在OLT本地生效
S410：OLT通过扩展OAM
把针对ONU进行配置的数据
配置到ONU上
S411: ONU注册配置流程完成

图 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/072633

A. CLASSIFICATION OF SUBJECT MATTER

H04L 12/24 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H04L, H04Q, H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CPRSABS, CNTXT, CNKI: DOCSIS, backstage, passive, optical network, DPOE, configuration, ONU, OLT, analysis, channel, address, management

VEN: DOCSIS, BACKSTAGE, PASSIVE, OPTICAL W NETWORK?, CONFIGUR+, DOPE, ONU, OLT, ANALYTIC+, CHANNEL?, ADDRESS??, MANAGEMENT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 101997725 A (ZTE CORP.), 30 March 2011 (30.03.2011), abstract, description, paragraphs 16-21, paragraphs 40-42, and paragraphs 56-57, and figure 2	1-11
A	CN 101888575 A (ZTE CORP.), 17 November 2010 (17.11.2010), the whole document	1-11
A	CN 101741712 A (HUAWEI TECHNOLOGIES CO., LTD.), 16 June 2010 (16.06.2010), the whole document	1-11

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 June 2012 (10.06.2012)	**28 June 2012 (28.06.2012)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **FU, Lingxiao** Telephone No.: (86-10) **62411235**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/072633

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 101997725 A	30.03.2011	None	
CN 101888575 A	17.11.2010	WO 2012013042 A1	02.02.2012
CN 101741712 A	16.06.2010	WO 2010057414 A1	27.05.2010

国际检索报告

国际申请号
PCT/CN2012/072633

A. 主题的分类

H04L 12/24 (2006.01) i

按照国际专利分类(IPC)或者同时按照国家分类和 IPC 两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

IPC: H04L, H04Q, H04W

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用）)

CPRSABS, CNTXT, CNKI: DOCSIS，后台，无源，光网络，DPOE，配置，ONU，OLT，解析，通道，地址，管理

VEN: DOCSIS, BACKSTAGE, PASSIVE, OPTICAL W NETWORK?, CONFIGUR+, DOPE. ONU, OLT, ANALYTIC+, CHANNEL?, ADDRESS??, MANAGEMENT

C. 相关文件

类　型*	引用文件，必要时，指明相关段落	相关的权利要求
X	CN101997725A（中兴通讯股份有限公司）30.3 月 2011（30.03.2011） 摘要，说明书第 16-21 段，第 40-42 段，第 56-57 段，附图 2	1-11
A	CN101888575A（中兴通讯股份有限公司）17.11 月 2010（17.11.2010） 全文	1-11
A	CN101741712A（华为技术有限公司）16.6 月 2010（16.06.2010） 全文	1-11

☐ 其余文件在 C 栏的续页中列出。　　☒ 见同族专利附件。

* 引用文件的具体类型：
"A" 认为不特别相关的表示了现有技术一般状态的文件
"E" 在国际申请日的当天或之后公布的在先申请或专利
"L" 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件（如具体说明的）
"O" 涉及口头公开、使用、展览或其他方式公开的文件
"P" 公布日先于国际申请日但迟于所要求的优先权日的文件
"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件
"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性
"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性
"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
10.6 月 2012 (10.06.2012)	**28.6 月 2012 (28.06.2012)**
ISA/CN 的名称和邮寄地址： 中华人民共和国国家知识产权局 中国北京市海淀区蓟门桥西土城路 6 号 100088 传真号：　(86-10)62019451	受权官员 付凌霄 电话号码：(86-10) **62411235**

国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2012/072633

检索报告中引用的专利文件	公布日期	同族专利	公布日期
CN101997725A	30.03.2011	无	
CN101888575A	17.11.2010	WO2012013042A1	02.02.2012
CN101741712A	16.06.2010	WO2010057414A1	27.05.2010

Electronic Acknowledgement Receipt

EFS ID:	23106811
Application Number:	14009703
International Application Number:	
Confirmation Number:	1821
Title of Invention:	DPOE System And Service Auto-Configuration Method And Network Based Thereon
First Named Inventor/Applicant Name:	Meiyan Zang
Customer Number:	36163
Filer:	Patricia E. Hong/Carolyn Lewis
Filer Authorized By:	Patricia E. Hong
Attorney Docket Number:	95-1008
Receipt Date:	04-AUG-2015
Filing Date:	03-OCT-2013
Time Stamp:	12:08:42
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	2015_08_04_95-1008_IDS.pdf	612440 57ca493cd171d29ead90619e41f0232b09e333a9	no	4

Warnings:	
Information:	

2	Foreign Reference	2015-08-04_95-1008_FOR_1_WO2012139453A1.pdf	18396167 53b3b5ad38b1e23953f0303231efbd75ed8b90e7	no	22
Warnings:					
Information:					
3	Non Patent Literature	2015-08-04_95-1008_NPL_1_Canadian_Office_Action_Of_Patent_Application_2832394.pdf	3107174 af87d646545c18d70898070c2b36f2398f3b157c	no	3
Warnings:					
Information:					
		Total Files Size (in bytes):	22115781		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Appln. No.	:	14/009,703	Confirmation No. 1821
Applicant	:	Meiyan ZANG	
Filed	:	10/3/2013	
Title	:	DPOE System And Service Auto-Configuration Method And Network Based Thereon	
TC/A.U.	:	2636	
Examiner	:	Mohammad Reza Sedighian	
Attorney Docket No.:		95-1008	
Customer No.	:	36163	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE TO NON-FINAL OFFICE ACTION

In response to the Office Action of June 1, 2015, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 8 of this paper.

Conclusion begins on page 13 of this paper.

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

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

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

the DPOE system analyzing the acquired configuration file, and obtaining both the configuration information of the ONU and the configuration information of the OLT; and

the DPOE system configuring the OLT locally according to the configuration information of the OLT and meanwhile configuring the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU[[.]];

wherein, the method is performed in a process of ONU initialization.

2. (Original) The method according to claim 1, wherein,

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

3. (Original) The method according to claim 2, wherein,

the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and

the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to the services opened by the ONU.

4. (Original) The method according to claim 1, wherein,

when analyzing the acquired configuration file, the DPOE system further converts the configuration information of the ONU into a message format which can be identified by the ONU, and converts the configuration information of the OLT into a message format which can be identified by the OLT.

5. (Cancelled)

6. (Currently Amended) A data over cable service interface system (DOCSIS) ~~management back-office~~ Provisioning Of EPON (DPOE) system, comprising an acquisition unit, an analyzing unit and a configuration unit; wherein, during a process of an optical network unit (ONU) initialization,

the acquisition unit is configured to acquire a configuration file from a back-office management system, wherein the configuration file comprises both configuration information of ~~an optical network unit (~~the ONU~~)~~ and configuration information of an optical line terminal (OLT) in the DPOE system;

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

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

7. (Original) The system according to claim 6, wherein,

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

8. (Currently Amended) A service auto-configuration network of a DOCSIS Provisioning Of EPON (DPOE) system, comprising a DPOE system, a back-office management system and ~~an~~ a plurality of optical network units (ONUs); wherein,

the DPOE system comprises an acquisition unit, an analyzing unit and a configuration unit; wherein, during a process of an optical network unit (ONU) initialization,

the acquisition unit is configured to acquire a configuration file from a back-office management system, wherein the configuration file comprises both configuration information of ~~an optical network unit (~~the ONU~~)~~ and configuration information of an optical line terminal (OLT) in the DPOE system;

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

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

the back-office management system is configured to: save the configuration file, and download the configuration file to the DPOE system, wherein the configuration file comprises the configuration information of the ONU and the configuration information of the OLT in the DPOE system.

9. (Original) The network according to claim 8, wherein,

the back-office management system comprises a trivial file transfer protocol (TFTP) server configured to: receive a TFTP request initiated by the DPOE system, respond to that TFTP request, and download the configuration file to the DPOE system.

10. (Previously Presented) The network according to claim 8, wherein,

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

11. (Original) The network according to claim 10, wherein,

the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and

the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to the services opened by the ONU.

12. (Previously Presented) The network according to claim 9, wherein,

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

13. (Previously Presented) The network according to claim 8, wherein, the analyzing unit is further configured to, when analyzing the acquired configuration file, convert the configuration information of the ONU into a message format which can be identified by the ONU and convert the configuration information of the OLT into a message format which can be identified by the OLT.

REMARKS

As a preliminary matter, Applicants wish to thank the Examiner for thorough examination of the present application as evidenced in the non-final Office Action mailed on June 1, 2015. As discussed with the Examiner on June 8, 2015, the Office Action dated May 20, 2015 was withdrawn and replaced by the Office Action dated June 1, 2015. The Office Action dated June 1, 2015 additionally re-started the period for response. The present Response is responsive to the Office Action dated June 1, 2015. As presented above, claims 1, 6 and 8 have been amended, and claim 5 has been cancelled.

Claims 1-4 and 6-13 remain pending upon entry of the previous amendment. Reconsideration and allowance are respectfully requested. No new matter has been added.

Response to Claim Rejections

The Office Action rejectsclaims 1-13 under pre-AIA 35 U.S.C. 102(a) as being anticipated by HAIPENG WANG (CN 101997725 (A) - 2011-03-30).

Independent claims 1, 6 and 8 have been amended to clarify the invention. Additionally, the Applicants respectfully traverse the rejection based on above amendments and following remarks:

Claim 1

The amended Claim 1 of the present application defines:

“A service auto-configuration method of a DOCSIS Provisioning Of EPON (DPOE) system, comprising:

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

the DPOE system analyzing the acquired configuration file, and obtaining both the configuration information of the ONU and the configuration information of the OLT; and

the DPOE system configuring the OLT locally according to the configuration information of the OLT and meanwhile configuring the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU[[.]];

wherein, the method is performed in a process of ONU initialization."

Amended Claim 1 of the present application is amended to incorporate the subject matter of the original claim 5. No new matter has been added.

The amended Claim 1 defines how to automatically configure the services **in a DPoE system**; specifically, in a process of ONU initialization, the DPOE system acquires a configuration file from a back-office management system, wherein the configuration file comprises **both** configuration information of an optical network unit (ONU) and configuration information of an optical line terminal (OLT) in the DPOE system; the DPOE system analyzes the acquired configuration file, and obtaining **both** the configuration information of the ONU and the configuration information of the OLT; and the DPOE system configures the OLT locally according to the configuration information of the OLT and

meanwhile configures the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU. The technical scheme defined in the amended claim 1 can make the service be opened **without performing further configuration to the OLT individually *after*** the process of the ONU initialization is completed, so as to improve the configuration efficiency of the whole system.

With regard to **HAIPENG WANG**, the reference describes a system for carrying DOCSIS services based on a PON, in which the core solution is **how to map the service between the ONU and the CM through a middleware**. Specifically, as shown in FIGS. 3 and 4 of **HAIPENG WANG**, FIG. 3 describes a power-on and registration process of the **ONU**, and FIG. 4 describes a card up process of the **OLT**; in which, "*step S304, the DOCSIS Agent maps CM power-on configuration parameters to ONU power-on configuration parameters and packages the parameters to a message in a TLV format that meets the DOCSIS frame diagram interface protocol, and then sends to the OLT Agent*"; and "*step S305, the OLT Agent parses the received message to obtain the ONU power-on configuration parameters and send them to the ONU through the OAM*". It can be seen that in the power-on and registration process of the **ONU**, there is no parameters for the OLT at all; in other words, **HAIPENG WANG discloses a solution of operating the ONU and the OLT respectively** in the PON for carrying the DOCSIS services.

Therefore, **HAIPENG WANG** fails to disclose any features of the amended claim 1 at all, **since in the amended claim 1 both the ONU and the OLT are configured at the same time**.

Therefore, as discussed above, it can be seen that the technical scheme defined in the amended claim 1 of the present application is quite

different from what disclosed in **HAIPENG WANG**, and the amended claim 1 conforms to the provisions of pre-AIA 35 U.S.C. 102(a).

As discussed above, it can be seen that the amended claim 1 of the present application differs from **HAIPENG WANG**, and **all** the technical features defined in the amended claim 1 of the present application are not disclosed by **HAIPENG WANG**.

By using these differences (distinguishing technical features), the amended claim 1 can make the service be opened **without performing further configuration to the OLT individually *after*** the process of the ONU initialization is completed, so as to improve the configuration efficiency of the whole system.

The above distinguishing technical features are not commonly used in the art.

The subject matter of the amended claim 1 of the present application is non-obvious to the person having ordinary skill in the art.

Thus Applicants respectfully submit that the amended claim 1 of the present application conforms to the related provisions of pre-AIA 35 U.S.C. 103(a).

Claims 2-4

Since the amended claim 1 of the present application conforms to the provisions of pre-AIA 35 U.S.C. 102(a) and pre-AIA 35 U.S.C. 103(a), claims 2-4 of the present application, which are dependent on the amended claim 1, also conform to the provisions of pre-AIA 35 U.S.C. 102(a) and pre-AIA 35 U.S.C. 103(a).

Claims 6 and 8

Claims 6 and 8 are amended, the amended claim 6 defines a data over cable service interface system (DOCSIS) Provisioning Of EPON (DPOE) system corresponding to the method of the amended claim 1, and the amended claim 8 defines a service auto-configuration network of a DOCSIS Provisioning Of EPON (DPOE) system corresponding to the method of the amended claim 1.

Since the amended claim 1 of the present application conforms to the provisions of pre-AIA 35 U.S.C. 102(a) and pre-AIA 35 U.S.C. 103(a), the amended claims 6 and 8 also conform to the provisions of pre-AIA 35 U.S.C. 102(a) and pre-AIA 35 U.S.C. 103(a) correspondingly.

Claims 7 and 9-13

Since the amended claims 6 and 8 of the present application conform to the provisions of pre-AIA 35 U.S.C. 102(a) and pre-AIA 35 U.S.C. 103(a), the amended claims 7 and 9-13 of the present application, which are dependent on the amended claim 6 or 8, also conform to the provisions of pre-AIA 35 U.S.C. 102(a) and pre-AIA 35 U.S.C. 103(a).

Conclusion

In view of the foregoing, all of the pending claims in this application are believed to be in condition for allowance. No fee is believed due. Should the Examiner have any questions or determine that any further action is desirable to place this application in even better condition for allowance, the Examiner is encouraged to contact the Applicant's representative at the number listed below.

Since this Amendment is being filed within the three-month shortened statutory period for response, which expires on September 1, 2015, no extension of time or other fees are believed to be due, except as detailed in the attached documents or herein. However, any extension of time necessary to prevent abandonment is hereby requested, and any fee necessary for consideration of this response is hereby authorized to be charged to Deposit Account Number 502846.

Respectfully submitted,

PLUMSEA LAW GROUP, LLC

Date: August 31, 2015 By: / Patricia E. Hong /

Patricia E. Hong
Registration Number: 34,373
Telephone number: 301-365-9040

Electronic Acknowledgement Receipt

EFS ID:	23355919
Application Number:	14009703
International Application Number:	
Confirmation Number:	1821
Title of Invention:	DPOE System And Service Auto-Configuration Method And Network Based Thereon
First Named Inventor/Applicant Name:	Meiyan Zang
Customer Number:	36163
Filer:	Patricia E. Hong/Carolyn Lewis
Filer Authorized By:	Patricia E. Hong
Attorney Docket Number:	95-1008
Receipt Date:	31-AUG-2015
Filing Date:	03-OCT-2013
Time Stamp:	14:16:47
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Arguments/Remarks Made in an Amendment	2015_08_31_95-1008_OA_Response.pdf	128866 46da53853f3cc9370568a5b62a2914a89d1071d9	no	13

Warnings:	
Information:	

Total Files Size (in bytes):	128866

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/009,703	Filing Date 10/03/2013	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **08/31/2015**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 12	Minus	** 20	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/BRENDA HINES/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/009,703	10/03/2013	Meiyan Zang	95-1008	1821

36163 7590 10/20/2015

PLUMSEA LAW GROUP, LLC
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EXAMINER	
SEDIGHIAN, MOHAMMAD REZA	

ART UNIT	PAPER NUMBER
2636	

MAIL DATE	DELIVERY MODE
10/20/2015	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 14/009,703	Applicant(s) Zang et al.	
	Examiner M.R.Sedighian	Art Unit 2636	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *8/31/15*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-4 and 6-13* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☒ Claim(s) *6-13* is/are allowed.

7)☒ Claim(s) *1-3* is/are rejected.

8)☒ Claim(s) *4* is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *10/3/13* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☒ All b)☐ Some** c)☐ None of the:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *8/4/15*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

1. The present application is being examined under the pre-AIA first to invent provisions.

2. This communication is responsive to applicant's 8/31/2015 amendments and remarks. The amendments have been entered. Claims 1-4 and 6-13 are now pending.

3. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Bernard (US Patent Application Publication No: 2008/0069564 A1).

Regarding claim 1, Bernard teaches a service auto-configuration method of a DOCSIS Provisioning Of EPON (DPOE) system (see abstract and 10a, fig. 7), comprising: the DPOE system (10a, fig. 7) acquiring (30-1, fig. 7) a configuration file from a back-office management system (30, fig. 7), wherein the configuration file comprises both configuration information of an optical network unit (ONU) (ONT 16 in fig. 7) and configuration information of an optical line terminal (OLT) (OLT 18 in fig. 7) in the DPOE system (see paragraphs 0066, 0067, 0068); the DPOE system analyzing the acquired configuration file (paragraphs 0050, 0051), and obtaining both the configuration information of the ONU and the configuration information of the OLT (paragraphs 0050, 0066, 0068); and the DPOE system configuring the OLT locally according to the configuration information of the OLT (paragraph 0068) and meanwhile configuring the ONU (paragraph 0066, 0067) via a management channel between the OLT and the ONU (paragraph

0057); wherein the method is performed in a process of ONU initialization (paragraphs 0065, 0066, and 104, 106, fig. 12).

Regarding claim 2, Bernard further teaches the configuration information of the OLT is configuration information related to services opened by the ONU (paragraph 0056).

Regarding claim 3, Bernard further teaches the services opened by the ONU comprise an Ethernet based LAN (E-LAN) services (paragraph 0003); and the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT (paragraphs 0056, 0057, 0066).

5. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. Claims 6-13 are allowed over prior art of record.

7. Applicant's arguments with respect to claim 1 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

WU (US Patent Application Publication No: 2011/0131624 A1) is cited to show a method and apparatus for service configuration conversion in DOCSIS-over-PON system (see abstract and paragraphs 0026, 0042, 0054, 0055, and figs. 2, 3).

Bernard (US Patent Application Publication No: 2008/0037563 A1) is cited to show a method and system for configuring of an ONT (see abstract and paragraphs 0024, 0040, and figs. 1, 2A).

Bernard et al. (US Patent No: 8,023,820 B2) is cited to show a method and system for configuring of an OLT and ONTs (see abstract, col. 4, lines 52-67, col. 5, lines 1-6, and fig. 3)

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. R. SEDIGHIAN whose telephone number is (571)272-3034. The examiner can normally be reached on 10 to 6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. R. SEDIGHIAN/
Primary Examiner, Art Unit 2636

Notice of References Cited	Application/Control No. 14/009,703	Applicant(s)/Patent Under Reexamination ZANG ET AL.	
	Examiner M. R. SEDIGHIAN	Art Unit 2636	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2008/0069564 A1	03-2008	Bernard; Marc Rhael	H04Q11/0067	398/72
*	B	US-2011/0131624 A1	06-2011	WU; Wei	H04L41/0226	725/111
*	C	US-2008/0037563 A1	02-2008	Bernard; Marc R.	H04L41/0806	370/401
*	D	US-8,023,820 B2	09-2011	Bernard; Marc R.	H04J3/1694	398/66
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1986	((configur$5 or provision$3) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/13 18:23
L2	11	1 and DPOE	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/13 18:23
L3	6	1 and (DOCSIS adj2 Provision$3 adj2 (EPON or PON))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/13 18:28
L4	88	1 and DOCSIS	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/13 18:30

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EAST Search History

EAST Search History (Prior Art)

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L1	2912	H04B10/27.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 15:19
L2	187	1 and ((configur$5 or provision$3) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 15:20
L3	37	1 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 15:20
L4	324	H04B10/271.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 15:46
L5	0	4 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 15:46
L6	3117	H04B10/272.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 15:46
L7	26	6 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 15:46
L8	621	H04B10/275.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:04
L9	0	8 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:04
L10	211	H04B10/2755.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:04
L11	0	10 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:05
L12	568	H04B10/278.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:05

L13	0	12 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:05
L14	34	H04J14/023.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:05
L15	0	14 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:05
L16	1163	H04J14/0232.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:05
L17	6	16 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:05
L18	753	H04J14/0238.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:14
L19	1	18 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:14
L20	131	H04J14/0239.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:15
L21	5	20 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:15
L22	37	H04J14/0242.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:17
L23	0	22 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:17
L24	402	H04J14/0245.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:17
L25	0	24 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:17
L26	3789	H04J14/0246.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:18
L27	16	26 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	ADJ	ON	2015/10/12 16:18

		"same"))	IBM_TDB			
L28	1986	H04J14/0247.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:24
L29	14	28 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:24
L30	410	H04J14/0249.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:29
L31	0	30 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:29
L32	2924	H04J14/025.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:29
L33	14	32 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:29
L34	1936	H04J14/0252.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:31
L35	17	34 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 16:31

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14009703	ZANG ET AL.
	Examiner	**Art Unit**
	M. R. SEDIGHIAN	2636

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/26/2015	10/15/2015							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	O							
	5	✓	-							
	6	✓	=							
	7	✓	=							
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	10	✓	=							
	11	✓	=							
	12	✓	=							
	13	✓	=							

EAST Search History

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L1	10313	H04L12/4641.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:11
L2	7	1 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:12
L3	1030	H04L41/04.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:18
L4	1	3 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:18
L5	8079	H04L41/0806.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:18
L6	1	5 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:19
L7	1895	H04L41/0226.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:20
L8	5	7 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:20
L9	7886	H04L61/2015.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:22
L10	1	9 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:22
L11	505	398/70.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:22
L12	4	11 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:22

L13	697	398/71.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:23
L14	17	13 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:24
L15	1020	398/72.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:29
L16	28	15 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:29
L17	1262	398/66.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:39
L18	38	17 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:39
L19	1514	398/58.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:46
L20	30	19 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:46
L21	590	H04Q11/00.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:53
L22	0	21 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/12 17:53

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14009703	ZANG ET AL.
	Examiner	Art Unit
	M. R. SEDIGHIAN	2636

CPC- SEARCHED		
Symbol	Date	Examiner
H04B 10/27, 271, 272, 275, 2755, 278	10/6/15	MRS
H04J 14/023, 0232, 0238, 0239, 0242, 0243, 0245, 0246, 0247, 0249, 025, 0252	10/6/15	MRS
H04 L 12/4641, 41/04, 41/0806, 41/0226, 61/2015	10/7/15	MRS

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
398	71	10/7/15	MRS
	70		
	72		
	66		
	58		

SEARCH NOTES		
Search Notes	Date	Examiner
see search history	10/7/15	MRS

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14009703
Filing Date	2013-10-03
First Named Inventor	Meiyan ZANG
Art Unit	2636
Examiner Name	Mohammad Reza SEDIGHIAN
Attorney Docket Number	95-1008

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/M.R.S/	1	20140023366	A1	2014-01-23	ZANG, et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14009703
	Filing Date	2013-10-03
	First Named Inventor	Meiyan ZANG
	Art Unit	2636
	Examiner Name	Mohammad Reza SEDIGHIAN
	Attorney Docket Number	95-1008

/M.R.S/	1	Canadian Office Action dated May 13, 2015 of Canadian patent Application No. 2,832,394.	☐

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Examiner Signature	/Reza Sedighian/	Date Considered	10/18/2015

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14009703
	Filing Date	2013-10-03
	First Named Inventor	Meiyan ZANG
	Art Unit	2636
	Examiner Name	Mohammad Reza SEDIGHIAN
	Attorney Docket Number	95-1008

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Patricia E. Hong/	Date (YYYY-MM-DD)	2015-08-04
Name/Print	Patricia E. Hong	Registration Number	34,373

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S68	2889	H04B10/27.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 19:43
S69	55	S68 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 19:45
S70	324	H04B10/271.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:04
S72	3113	H04B10/272.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:04
S73	54	S72 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:05
S74	619	H04B10/275.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:31
S75	0	S74 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:31
S76	211	H04B10/2755.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:31
S77	0	S76 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:32
S78	568	H04B10/278.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:32
S79	0	S78 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:32
S80	34	H04J14/023.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:32

S81	8	S80 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:32
S82	1162	H04J14/0232.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:41
S83	14	S82 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:41
S84	750	H04J14/0238.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:46
S85	11	S84 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:47
S86	130	H04J14/0239.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:49
S87	1	S86 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:50
S88	37	H04J14/0242.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:50
S89	0	S88 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:50
S90	0	H04J14/0243.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:51
S91	402	H04J14/0245.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:51
S92	0	S91 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:51
S93	3789	H04J14/0246.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:51
S94	19	S93 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:51
S95	1986	H04J14/0247.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	ADJ	ON	2015/10/06 20:55

			IBM_TDB			
S96	35	S95 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:55
S97	410	H04J14/0249.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:59
S98	0	S97 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:59
S99	2924	H04J14/025.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:59
S100	21	S99 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 20:59
S101	1935	H04J14/0252.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 21:02
S102	36	S101 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/06 21:02
S104	10261	H04L12/4641.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 14:46
S105	9	S104 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 14:46
S106	1022	H04L41/04.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 14:55
S107	5	S106 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 14:56
S108	8023	H04L41/0806.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 15:00
S109	13	S108 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 15:00
S110	1890	H04L41/0226.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 15:25
S111	9	S110 and ((configur$5 near5	US-PGPUB; USPAT;	ADJ	ON	2015/10/07

		(information or data)) with OLT with (ONU or ONT))	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			15:26
S112	7868	H04L61/2015.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 15:45
S113	4	S112 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 15:45
S114	697	398/71.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 15:59
S115	25	S114 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 15:59
S116	697	398/71.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 16:56
S117	25	S116 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 16:56
S118	504	398/70.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 17:15
S119	14	S118 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 17:16
S120	1020	398/72.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 17:30
S121	29	S120 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/07 17:31
S122	1262	398/66.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/08 10:14
S123	62	S122 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/08 10:15
S124	1514	398/58.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/08 10:52
S125	57	S124 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/08 10:52

S126	1020	398/72.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/08 11:22
S127	29	S126 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/08 11:22
S128	598	H04Q11/00.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/08 11:43
S129	1	S128 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/08 11:43
S130	6	((Meiyan) near2 (Zang)).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2015/10/08 11:44
S131	20	((Liquan) near2 (Yuan)).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2015/10/08 11:46
S132	3	S131 and ((configur$5 near5 (information or data)) with OLT with (ONU or ONT))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/10/08 11:46
S133	1	((Chaoqin) near2 (Zhang)).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2015/10/08 11:46

10/8/2015 2:27:55 PM
C:\Users\msedighian\Documents\EAST\Workspaces\14009703.wsp

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Appln. No.	:	14/009,703	Confirmation No. 1821
Applicant	:	Meiyan ZANG	
Filed	:	10/3/2013	
Title	:	DPOE System And Service Auto-Configuration Method And Network Based Thereon	
TC/A.U.	:	2636	
Examiner	:	Mohammad Reza Sedighian	
Attorney Docket No.:		95-1008	
Customer No.	:	36163	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AFTER FINAL OFFICE ACTION

In response to the final Office Action of October 20, 2015, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

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

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

the DPOE system analyzing the acquired configuration file, and obtaining both the configuration information of the ONU and the configuration information of the OLT; and

the DPOE system configuring the OLT locally according to the configuration information of the OLT and meanwhile configuring the ONU according to the configuration information of the ONU via a management channel between the OLT and the ONU;

wherein, the method is performed in a process of ONU initialization**[[.]]**; and

wherein, when analyzing the acquired configuration file, the DPOE system further converts the configuration information of the ONU into a message format which can be identified by the ONU, and converts the configuration information of the OLT into a message format which can be identified by the OLT.

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

3. (Original) The method according to claim 2, wherein,

the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and

the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to the services opened by the ONU.

4 - 5. (Canceled)

6. (Previously Presented) A data over cable service interface system (DOCSIS) Provisioning Of EPON (DPOE) system, comprising an acquisition unit, an analyzing unit and a configuration unit; wherein, during an process of an optical network unit (ONU) initialization,

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

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

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

7. (Original) The system according to claim 6, wherein,

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

8. (Previously Presented) A service auto-configuration network of a DOCSIS Provisioning Of EPON (DPOE) system, comprising a DPOE system, a back-office management system and a plurality of optical network units (ONUs); wherein,

the DPOE system comprises an acquisition unit, an analyzing unit and a configuration unit; wherein, during an process of an optical network unit (ONU) initialization,

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;

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

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

the back-office management system is configured to: save the configuration file, and download the configuration file to the DPOE system, wherein the configuration file comprises the configuration information of the ONU and the configuration information of the OLT in the DPOE system.

9. (Original) The network according to claim 8, wherein,

the back-office management system comprises a trivial file transfer protocol (TFTP) server configured to: receive a TFTP request initiated by the DPOE system, respond to that TFTP request, and download the configuration file to the DPOE system.

10. (Previously Presented) The network according to claim 8, wherein, the configuration information of the OLT is configuration information related to services opened by the ONU.

11. (Original) The network according to claim 10, wherein, the services opened by the ONU comprise one or more of Ethernet based line (E-LINE) services, Ethernet based tree (E-TREE) services and Ethernet based LAN (E-LAN) services; and

the configuration information of the OLT comprises one or more of a virtual local area network (VLAN), a user port and a user media access control (MAC) address of the OLT related to the services opened by the ONU.

12. (Previously Presented) The network according to claim 9, wherein, the configuration information of the OLT is configuration information related to services opened by the ONU.

13. (Previously Presented) The network according to claim 8, wherein, the analyzing unit is further configured to, when analyzing the acquired configuration file, convert the configuration information of the ONU into a message format which can be identified by the ONU and convert the configuration information of the OLT into a message format which can be identified by the OLT.

REMARKS

This Amendment is submitted in response to the Final Office Action mailed on October 20, 2015. Claim 1 has been amended to incorporate claim 4 (now cancelled). Claim 5 was previously cancelled. Upon entry of this Amendment, claims 1-3 and 6-13 will be pending in this application.

Response to Claim Rejections - 35 USC§102

Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Bernard (U.S. Patent Pub. No. 2008/0069564). The Office Action states that claim 4 would be allowable if rewritten in independent form. Independent claim 1 has been amended to incorporate allowable claim 4. Accordingly, Applicant respectfully submits that claim 1, as amended, is in condition for allowance. Furthermore, without conceding to the correctness of the Examiner's remarks thereto, Applicant respectfully submits that claims 2 and 3 are allowable, at least, for the same reasons given for claim 1 because claims 2 and 3 are each ultimately dependent on claim 1.

Allowable Subject Matter

Applicants thank the Examiner for acknowledging the allowable subject matter of claims 6-13.

Conclusion

In view of the foregoing, all of the pending claims in this application are believed to be in condition for allowance. No fee is believed due. Should the Examiner have any questions or determine that any further action is desirable to place this application in even better condition for allowance, the Examiner is encouraged to contact the Applicant's representative at the number listed below.

Since this Amendment is being filed within the three-month shortened statutory period for response, which expires on January 20, 2016, no extension of time or other fees are believed to be due, except as detailed in the attached documents or herein. However, any extension of time necessary to prevent abandonment is hereby requested, and any fee necessary for consideration of this response is hereby authorized to be charged to Deposit Account Number 502846.

Respectfully submitted,

PLUMSEA LAW GROUP, LLC

Date: December 11, 2015 By: /Thomas E. Vesbit/

Thomas E. Vesbit
Registration Number: **50,562**
Telephone number: 301-365-9040

Electronic Acknowledgement Receipt

EFS ID:	24335514
Application Number:	14009703
International Application Number:	
Confirmation Number:	1821
Title of Invention:	DPOE System And Service Auto-Configuration Method And Network Based Thereon
First Named Inventor/Applicant Name:	Meiyan Zang
Customer Number:	36163
Filer:	Thomas E. Vesbit/Brian Moffenbeier
Filer Authorized By:	Thomas E. Vesbit
Attorney Docket Number:	95-1008
Receipt Date:	11-DEC-2015
Filing Date:	03-OCT-2013
Time Stamp:	13:28:06
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		2015_12_11_95-1008_OA_Response.pdf	30680 5351c1148fe3164c92a3210fb40b862f791c01fe	yes	7

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response After Final Action	1	1
	Claims	2	5
	Applicant Arguments/Remarks Made in an Amendment	6	7
Warnings:			
Information:			
	Total Files Size (in bytes):	30680	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/009,703	Filing Date 10/03/2013	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)		
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)		
	12/11/2015	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	* 11	Minus	** 20	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	**0**

		(Column 1)		(Column 2)	(Column 3)		
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/KAREN VESTAL/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

36163 7590 12/28/2015

PLUMSEA LAW GROUP, LLC
6710A Rockledge Drive
SUITE 400
BETHESDA, MD 20817

EXAMINER
SEDIGHIAN, MOHAMMAD REZA

ART UNIT	PAPER NUMBER
2636	

DATE MAILED: 12/28/2015

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/009,703	10/03/2013	Meiyan Zang	95-1008	1821

TITLE OF INVENTION: DPOE SYSTEM AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	03/28/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

36163 7590 12/28/2015
PLUMSEA LAW GROUP, LLC
6710A Rockledge Drive
SUITE 400
BETHESDA, MD 20817

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/009,703	10/03/2013	Meiyan Zang	95-1008	1821

TITLE OF INVENTION: DPOE SYSTEM AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	03/28/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
SEDIGHIAN, MOHAMMAD REZA	2636	398-058000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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14/009,703	10/03/2013	Meiyan Zang	95-1008	1821

36163 7590 12/28/2015

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EXAMINER	
SEDIGHIAN, MOHAMMAD REZA	
ART UNIT	**PAPER NUMBER**
2636	

DATE MAILED: 12/28/2015

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/009,703	Applicant(s) ZANG ET AL.	
	Examiner M. R. SEDIGHIAN	Art Unit 2636	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *12/11/15*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-3, 6-13, renumbered as 1-11*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☒ All b) ☐ Some *c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/M. R. SEDIGHIAN/
Primary Examiner, Art Unit 2636

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14009703	ZANG ET AL.
	Examiner	**Art Unit**
	M. R. SEDIGHIAN	2636

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/26/2015	10/15/2015	12/21/2015						
1	1	✓	✓	=						
2	2	✓	✓	=						
3	3	✓	✓	=						
	4	✓	O	-						
	5	✓	-	-						
4	6	✓	=	=						
5	7	✓	=	=						
6	8	✓	=	=						
7	9	✓	=	=						
9	10	✓	=	=						
10	11	✓	=	=						
8	12	✓	=	=						
11	13	✓	=	=						

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	6	((Meiyan) near2 (Zang)).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2015/12/19 16:40
L2	23	((Liquan) near2 (Yuan)).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2015/12/19 16:41
L3	1	((Chaoqin) near2 (Zhang)).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2015/12/19 16:42

12/19/2015 4:43:03 PM
C:\Users\msedighian\Documents\EAST\Workspaces\14009703.wsp

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L3	10753	H04L12/4641.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:14
L4	6	3 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:15
L5	1084	H04L41/04.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:15
L6	1	5 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:16
L7	8395	H04L41/0806.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:23
L8	1	7 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:23
L9	1922	H04L41/0226.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:24
L10	5	9 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:24
L11	8073	H04L61/2015.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:28
L12	1	11 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:28
L13	7098	H04Q11/0067.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:28
L14	121	13 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:28

L15	3067	H04B10/27.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:43
L16	38	15 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/17 15:43

12/ 17/ 2015 4:02:01 PM
C:\ Users\ msedighian\ Documents\ EAST\ Workspaces\ 14009703.wsp

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	329	H04B10/271.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 14:54
L2	0	1 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 14:54
L3	3177	H04B10/272.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 14:54
L4	26	3 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 14:54
L5	633	H04B10/275.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 14:59
L6	0	5 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 14:59
L7	212	H04B10/2755.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 14:59
L8	0	7 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 14:59
L9	580	H04B10/278.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:00
L10	2	9 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:00
L11	36	H04J14/023.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:00
L12	0	11 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:00

L13	1175	H04J14/0232.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:00
L14	7	13 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:01
L15	765	H04J14/0238.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:05
L16	1	15 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:05
L17	146	H04J14/0239.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:06
L18	5	17 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:06
L19	39	H04J14/0242.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:08
L20	0	19 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:08
L21	0	H04J14/0243.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:08
L22	409	H04J14/0245.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:08
L23	0	22 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:08
L24	3849	H04J14/0246.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:08
L25	18	24 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:08
L26	2013	H04J14/0247.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:11
L27	14	26 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	ADJ	ON	2015/12/19 15:11

		"same"))	IBM_TDB			
L28	414	H04J14/0249.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:13
L29	0	28 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:13
L30	2977	H04J14/025.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:13
L31	16	30 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:14
L32	1961	H04J14/0252.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:16
L33	17	32 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:16
L34	699	398/71.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:21
L35	17	34 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:21
L36	506	398/70.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:24
L37	4	36 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:25
L38	1029	398/72.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:26
L39	28	38 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:26
L40	1272	398/66.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:31
L41	39	40 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:31
L43	1534	398/58.ccls.	US-PGPUB; USPAT;	ADJ	ON	2015/12/19

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			15:32
L44	30	43 and ((configur$5 or provision$3) with OLT with (ONU or ONT) with (Both or "same"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2015/12/19 15:33

12/ 19/ 2015 3:33:49 PM
C:\ Users\ msedighian\ Documents\ EAST\ Workspaces\ 14009703.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14009703	ZANG ET AL.
	Examiner	Art Unit
	M. R. SEDIGHIAN	2636

CPC- SEARCHED		
Symbol	Date	Examiner
H04B 10/27, 271, 272, 275, 2755, 278	12/19/15	MRS
H04J 14/023, 0232, 0238, 0239, 0242, 0243, 0245, 0246, 0247, 0249, 025, 0252	12/19/15	MRS
H04 L 12/4641, 41/04, 41/0806, 41/0226, 61/2015	12/17/15	MRS
H04Q 11/0067	12/17/15	MRS

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
398	71	12/19/15	MRS
	70		
	72		
	66		
	58		

SEARCH NOTES		
Search Notes	Date	Examiner
see search history	12/17/15	MRS

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
see search result		12/19/15	MRS

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14009703	ZANG ET AL.
	Examiner	**Art Unit**
	M. R. SEDIGHIAN	2636

CPC								
Symbol							**Type**	**Version**
H04B		10	/	27			F	2013-01-01
H04L		41	/	04			I	2013-01-01
H04L		41	/	0806			I	2013-01-01
H04L		12	/	4641			I	2013-01-01
H04Q		11	/	0067			I	2013-01-01
H04L		41	/	0226			A	2013-01-01
H04L		61	/	2015			A	2013-01-01
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CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	11	
/M. R. SEDIGHIAN/ Primary Examiner.Art Unit 2636	12/21/2015	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14009703	ZANG ET AL.
	Examiner	**Art Unit**
	M. R. SEDIGHIAN	2636

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
398	70	H	0	4	J	14 / 00 (2006.01.01)						

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
398	71	66			

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	11	
/M. R. SEDIGHIAN/ Primary Examiner.Art Unit 2636	12/21/2015	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14009703	ZANG ET AL.
	Examiner	**Art Unit**
	M. R. SEDIGHIAN	2636

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1														
2	2														
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	5														
4	6														
5	7														
6	8														
7	9														
9	10														
10	11														
8	12														
11	13														

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	11	
/M. R. SEDIGHIAN/ Primary Examiner.Art Unit 2636	12/21/2015	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4

OK TO Enter
MRS
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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Appln. No.	:	14/009,703	Confirmation No. 1821
Applicant	:	Meiyan ZANG	
Filed	:	10/3/2013	
Title	:	DPOE System And Service Auto-Configuration Method And Network Based Thereon	
TC/A.U.	:	2636	
Examiner	:	Mohammad Reza Sedighian	
Attorney Docket No.:		95-1008	
Customer No.	:	36163	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AFTER FINAL OFFICE ACTION

In response to the final Office Action of October 20, 2015, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
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36163 7590 12/28/2015
PLUMSEA LAW GROUP, LLC
6710A Rockledge Drive
SUITE 400
BETHESDA, MD 20817

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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/009,703	10/03/2013	Meiyan Zang	95-1008	1821

TITLE OF INVENTION: DPOE SYSTEM AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	03/28/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
SEDIGHIAN, MOHAMMAD REZA	2636	398-058000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
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1 Plumsea Law Group, LLC
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

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(A) NAME OF ASSIGNEE: ZTE CORPORATION
(B) RESIDENCE: (CITY and STATE OR COUNTRY): Beijing, P.R. China

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

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☐ Publication Fee (No small entity discount permitted)
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☐ Applicant certifying micro entity status. See 37 CFR 1.29
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
☐ Applicant asserting small entity status. See 37 CFR 1.27
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
☐ Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature / Patricia E. Hong / Date 2 February 2016
Typed or printed name Patricia E. Hong Registration No. 34,373

Electronic Patent Application Fee Transmittal

Application Number:	14009703
Filing Date:	03-Oct-2013
Title of Invention:	DPOE SYSTEM AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON
First Named Inventor/Applicant Name:	Meiyan Zang
Filer:	Patricia E. Hong/Sandra Salmeron
Attorney Docket Number:	95-1008

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt

EFS ID:	24794256
Application Number:	14009703
International Application Number:	
Confirmation Number:	1821
Title of Invention:	DPOE SYSTEM AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON
First Named Inventor/Applicant Name:	Meiyan Zang
Customer Number:	36163
Filer:	Patricia E. Hong/Sandra Salmeron
Filer Authorized By:	Patricia E. Hong
Attorney Docket Number:	95-1008
Receipt Date:	02-FEB-2016
Filing Date:	03-OCT-2013
Time Stamp:	14:03:28
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$960
RAM confirmation Number	335
Deposit Account	502846
Authorized User	HONG, PATRICIA E.

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	2016_02_02_95-1008_Issue_Fee_Transmittal.pdf	231433 0336eede43341090c2c3efbc34d5707047ade2af	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	31021 da8009f8283c7ee9d26e0e1e3442773ba3a250e5	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	262454		

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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PLUMSEA LAW GROUP, LLC
6710A Rockledge Drive
SUITE 400
BETHESDA, MD 20817

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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/009,703	10/03/2013	Meiyan Zang	95-1008	1821

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EXAMINER	ART UNIT	CLASS-SUBCLASS
SEDIGHIAN, MOHAMMAD REZA	2636	398-058000

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4a. The following fee(s) are submitted:
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NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature / Patricia E. Hong / Date 2 February 2016
Typed or printed name Patricia E. Hong Registration No. 34,373

02/03/2016 INTEFSW 00000335 14009703
01 FC:1501 960.00 OP

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Commissioner for Patents
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Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

36163 7590 12/28/2015
PLUMSEA LAW GROUP, LLC
6710A Rockledge Drive
SUITE 400
BETHESDA, MD 20817

COPY submitted 2016-02-08
with requested correction

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/009,703	10/03/2013	Meiyan Zang	95-1008	1821

TITLE OF INVENTION: DPOE SYSTEM AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	03/28/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
SEDIGHIAN, MOHAMMAD REZA	2636	398-058000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 Plumsea Law Group, LLC
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: ZTE CORPORATION
(B) RESIDENCE: (CITY and STATE OR COUNTRY): ~~Beijing, P.R. China~~ Shenzhen City, China

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☒ Payment by credit card. Via EFS-WEB
- ☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 502846 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ☐ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ☐ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature / Patricia E. Hong / Date 2 February 2016
Typed or printed name Patricia E. Hong Registration No. 34,373

Electronic Acknowledgement Receipt

EFS ID:	24851023
Application Number:	14009703
International Application Number:	
Confirmation Number:	1821
Title of Invention:	DPOE SYSTEM AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON
First Named Inventor/Applicant Name:	Meiyan Zang
Customer Number:	36163
Filer:	Patricia E. Hong
Filer Authorized By:	
Attorney Docket Number:	95-1008
Receipt Date:	08-FEB-2016
Filing Date:	03-OCT-2013
Time Stamp:	14:25:12
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	2016_02_08_95-1008_Request_for_Correction_of_Assignee_Residence.pdf	65226 ae82904ab8c8fcd9a68eaac472143b8488da3a9f	no	1

Warnings:	
Information:	

2	Issue Fee Payment (PTO-85B)	2016_02_08_95-1008_Corrected_PTOL_85.pdf	235763 7cbf359012fe1ac70c1f2ad2c66bce2ac804667f	no	1

Warnings:	
Information:	
Total Files Size (in bytes):	300989

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Appln. No.	:	14/009,703	Confirmation No. 1821
Applicant	:	Meiyan ZANG	
Filed	:	October 03, 2013	
Allowed:	:	December 28, 2015	
Title	:	DPOE System And Service Auto-Configuration Method And Network Based Thereon	
TC/A.U.	:	2636	
Examiner	:	Mohammad Reza Sedighian	
Attorney Docket No.	:	95-1008	
Customer No.	:	36163	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CORRECTION OF ASSIGNEE RESIDENCE
RESUBMISSION OF ISSUE FEE TRANSMITTAL

Sir:

In the Issue Fee Transmittal (PTOL-85) filed with the issue fee on February 2, 2016, the residence city of the applicant contained a typographical error. Applicant requests correction to the Issue Fee Transmittal to reflect the applicant residence as - - Shenzhen City, China - - instead of "Beijing, P.R China." A copy of the PTOL-85 with the correction marked is submitted.

Should fees be deemed necessary for consideration of this request, such fees are hereby requested and the Commissioner is authorized to charge deposit account number 502846 for payment.

Respectfully submitted,

PLUMSEA LAW GROUP, LLC

Dated: February 8, 2016 By: /Patricia E. Hong/
Patricia E. Hong
Registration No. 34,373

On page 6, paragraphs 4 and 5, please amend as follows:

FIG. 3 is a flow chart of a service auto-configuration method of a DPOE system according to an embodiment of the present ~~invention~~ document;

FIG. 4 is a flow chart of auto-configuration of an OLT and an ONU according to an embodiment of the present ~~invention~~ document.

Change(s) applied to document, /A.C./ 1/4/2016

On page 6, paragraphs 6 and 7, please amend as follows:

Preferred Embodiments of the Present Invention

In order to make the objective, the technical scheme and the advantage of the present ~~invention~~ document more clear and understandable, embodiments of the present ~~invention~~ document are described in detail in combination with accompanying drawings hereinafter. It should be illustrated that, in the case of not conflicting, the embodiments in the present application and features in these embodiments can be combined with each other at random.

As shown in FIG. 3, an embodiment of the present invention document provides a service auto-configuration method of a DPOE system, including the following steps.

On page 12, paragraphs 1, 2 and 3 please amend as follows:

It can be seen from the above-mentioned embodiments that, compared with the related art, the present ~~invention~~ document adds the configuration information about the OLT of the DPOE system in the configuration file, and completes the automatic configuration on the OLT and the ONU at the same time; after the process of the ONU initialization is completed, the service can be opened without performing further configuration to the OLT individually. Especially, when more complex configurations are needed to be performed on

On page 4, paragraph 8, please amend as follows:

In addition, in order to solve the above-mentioned technical problem, the present ~~invention~~ document further provides an Ethernet passive optical network based on a DOCSIS Provisioning Of EPON (DPOE) system, and the system comprises an acquisition unit, an analyzing unit and a configuration unit; wherein,

Change(s) applied to document, /A.C./ 1/4/2016

On page 5, please amend paragraph ~~5~~ 4 as follows:

In addition, in order to solve the above-mentioned technical problem, the present ~~invention~~ document further provides a service auto-configuration network of a DOCSIS Provisioning Of EPON (DPOE) system, and the network comprises a DPOE system, a back-office management system and an optical network unit (ONU); wherein,

On page 6, please amend the first full paragraph as follows:

The DPOE system and the service auto-configuration method and network based on that system provided by the embodiments of the present ~~invention~~ document complete the automatic configuration of the OLT and the ONU at the same time through a configuration file including the configuration information of the ONU and the configuration information of the OLT in the DPOE system; after the process of the ONU initialization is completed, the service can be opened without performing further configuration to the OLT individually. Especially, when more complex configurations are needed to be performed on the OLT correspondingly for the key service operation on the ONU, it can improve the configuration efficiency of the whole system very well.

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/009,703	03/15/2016	9287982	95-1008	1821

36163 7590 02/24/2016

PLUMSEA LAW GROUP, LLC
6710A Rockledge Drive
SUITE 400
BETHESDA, MD 20817

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 168 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Meiyan Zang, Shenzhen City, CHINA;
Liquan Yuan, Shenzhen City, CHINA;
Chaoqin Zhang, Shenzhen City, CHINA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PTO/SB/44 (09-07)
Approved for use through 08/31/2013. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 9,287,982

APPLICATION NO.: 14/009,703

ISSUE DATE : March 15, 2016

INVENTOR(S) : Meiyan ZANG

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page, item (30) Foreign Application Priority Data:

"2011100921130" should read - - 201110092130.9 - -

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Plumsea Law Group, LLC
6710A Rockledge Drive, Suite 400
Bethesda, MD 20817

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	95-1008
	Application Number	14/009,703
Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Meiyan		ZANG	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Shenzhen City, Guangdong Province	Country of Residence	CN

Mailing Address of Inventor:

Address 1	c/o ZTE CORPORATION, ZTE Plaza, Keji Road South,		
Address 2	Hi-Tech Industrial Park, Nanshan District		
City	Shenzhen City, Guangdong Province	State/Province	
Postal Code	518057	Country	CN

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Liquan		YUAN	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Shenzhen City, Guangdong Province	Country of Residence	CN

Mailing Address of Inventor:

Address 1	c/o ZTE CORPORATION, ZTE Plaza, Keji Road South,		
Address 2	Hi-Tech Industrial Park, Nanshan District		
City	Shenzhen City, Guangdong Province	State/Province	
Postal Code	518057	Country	CN

Inventor 3 Remove

Legal Name

PTO/AIA/14 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	95-1008
	Application Number	14/009,703
Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon	

Prefix	Given Name	Middle Name	Family Name	Suffix
	Chaoqin		ZHANG	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Shenzhen City, Guangdong Province	Country of Residence	cn

Mailing Address of Inventor:

Address 1	c/o ZTE CORPORATION, ZTE Plaza, Keji Road South,		
Address 2	Hi-Tech Industrial Park, Nanshan District		
City	Shenzhen City, Guangdong Province	State/Province	
Postal Code	518057	Country	CN

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	36163		
Email Address	mail@plumsea.com	Add Email	Remove Email

Application Information:

Title of the Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon		
Attorney Docket Number	95-1008	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	3	Suggested Figure for Publication (if any)	XX

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	95-1008
	Application Number	14/009,703
Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon	

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	36163		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	a 371 of international	PCT/CN2012/072633	2012-03-20

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
201110092130.9	CN	2011-04-13	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Correct

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	95-1008
	Application Number	14/009,703
Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date o f filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	95-1008
	Application Number	14/009,703
Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	ZTE CORPORATION

Mailing Address Information For Applicant:

Address 1	ZTE Plaza, Keji Road South,		
Address 2	Hi-Tech Industrial Park, Nanshan District		
City	Shenzhen City, Guangdong Province	**State/Province**	
Country	CN	Postal Code	518057
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section only if non-applicant assignee information is desired to be included on the patent application publication in accordance with 37 CFR 1.215(b). Do not include in this section an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest), as the patent application publication will include the name of the applicant(s).

If the Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	95-1008
	Application Number	14/009,703
Title of Invention	DPOE System And Service Auto-Configuration Method And Network Based Thereon	

Mailing Address Information For Non-Applicant Assignee:			
Address 1			
Address 2			
City		**State/Province**	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Signature	/ Patricia E. Hong /			Date (YYYY-MM-DD)	2013-10-03
First Name	Patricia E.	Last Name	Hong	Registration Number	34373

Additional Signature may be generated within this form by selecting the Add button.

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE RECD	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/009,703 ✓	10/03/2013 ✓	1480		95-1008	13 ✓	3 ✓

CONFIRMATION NO. 1821

FILING RECEIPT

36163
PLUMSEA LAW GROUP, LLC
10411 MOTOR CITY DRIVE
SUITE 320
BETHESDA, MD 20817

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PDF VMYGA
OCT 27 2013
Correspondence Due

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OCT 18 2013
PLUMSEA LAW GROUP

Date Mailed: 10/16/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

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Applicant(s)

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Assignment For Published Patent Application

ZTE Corporation, Shenzhen City, Guangdong Province, CHINA ✓

Power of Attorney: The patent practitioners associated with Customer Number 36163

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/CN2012/072633 03/20/2012 ✓

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)

CHINA 201110092113O.9 04/13/2011 No Access Code Provided

Foreign Priority Application Number is correct on the OFR.

If Required, Foreign Filing License Granted: 10/11/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/009,703**

Projected Publication Date: 01/23/2014

Non-Publication Request: No

Early Publication Request: No

US009287982B2

(12) **United States Patent**
Zang et al.

(10) **Patent No.: US 9,287,982 B2**
(45) **Date of Patent: Mar. 15, 2016**

(54) **DPOE SYSTEM AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON**

(75) Inventors: **Meiyan Zang**, Shenzhen (CN); **Liquan Yuan**, Shenzhen (CN); **Chaoqin Zhang**, Shenzhen (CN)

(73) Assignee: **ZTE CORPORATION**, Shenzhen (CN)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 168 days.

(21) Appl. No.: **14/009,703**

(22) PCT Filed: **Mar. 20, 2012**

(86) PCT No.: **PCT/CN2012/072633**

§ 371 (c)(1),
(2), (4) Date: **Oct. 3, 2013**

(87) PCT Pub. No.: **WO2012/139453**

PCT Pub. Date: **Oct. 18, 2012**

(65) **Prior Publication Data**

US 2014/0023366 A1 Jan. 23, 2014

(30) **Foreign Application Priority Data**

Apr. 13, 2011 (CN) 2011 1 00921130

(51) **Int. Cl.**
H04J 14/00 (2006.01)
H04B 10/27 (2013.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H04B 10/27*** (2013.01); ***H04L 12/4641*** (2013.01); ***H04L 41/04*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04B 10/27; H04B 10/271; H04B 10/272; H04B 10/275; H04B 10/2755; H04B 10/278; H04L 12/24; H04L 12/4641; H04L 41/04; H04L 41/0806; H04L 41/0226; H04L 61/2015; H04Q 11/00; H04Q 11/0067; H04J 14/023; H04J 14/0232; H04J 14/0238; H04J 14/0239; H04J 14/0242; H04J 14/0243; H04J 14/0245; H04J 14/0246; H04J 14/0247; H04J 14/025; H04J 14/0252; H04J 14/0249
USPC 398/71, 70, 72, 66, 58
See application file for complete search history.

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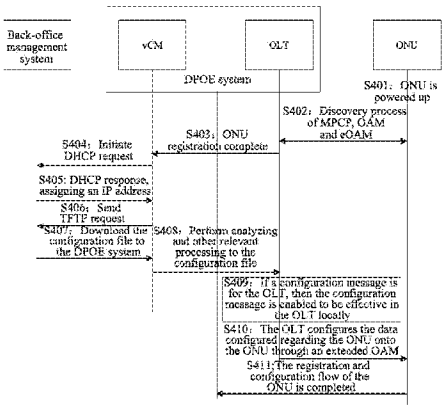
(Continued)

Primary Examiner — M. R. Sedighian
(74) *Attorney, Agent, or Firm* — Plumsea Law Group, LLC

(57) **ABSTRACT**

A DPOE system and a service auto-configuration method and network based on that system are provided, wherein, the DPOE system includes an acquisition unit, an analyzing unit and a configuration unit; the service auto-configuration network includes a DPOE system, a back-office management system and an ONU; the service auto-configuration method based on that system includes: the DPOE system acquiring a configuration file from the back-office management system, wherein the configuration file includes configuration information of the ONU and configuration information of an OLT in the DPOE system; the DPOE system analyzing the configuration file and obtaining the configuration information of the ONU and the configuration information of the OLT; configuring the OLT locally and configuring the ONU via a management channel between the OLT and the ONU. Thus the service can be opened without performing further configuration to the OLT individually after the process of the ONU initialization is completed.

11 Claims, 3 Drawing Sheets



Electronic Acknowledgement Receipt

EFS ID:	25643456
Application Number:	14009703
International Application Number:	
Confirmation Number:	1821
Title of Invention:	DPOE SYSTEM AND SERVICE AUTO-CONFIGURATION METHOD AND NETWORK BASED THEREON
First Named Inventor/Applicant Name:	Meiyan Zang
Customer Number:	36163
Filer:	Patricia E. Hong/Sandra Salmeron
Filer Authorized By:	Patricia E. Hong
Attorney Docket Number:	95-1008
Receipt Date:	29-APR-2016
Filing Date:	03-OCT-2013
Time Stamp:	17:00:34
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	2016_04_29_95-1008_Request_for_Cert_of_Correction.pdf	81983 c7feceb947c674997ffa6cd77422f539e603785c	no	2
Warnings:					
Information:					

2	Request for Certificate of Correction	2016_04_29_95-1008_Certficate_of_Correction_Form.pdf	35010 bde5af6db114f85cf8187182801aa3517380a5a6	no	1
Warnings:					
Information:					
3	Application Data Sheet	2016_04_29_95-1008_Copy_of_ADS.pdf	54720 2e74963db8d48058fb01b4f4ab62b8102e920ecd	no	6
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
4	Miscellaneous Incoming Letter	2016_04_29_95-1008_Copy_of_OFR.pdf	111730 90b7733933026245a5778a86bb98b964f9f3c743	no	1
Warnings:					
Information:					
5	Miscellaneous Incoming Letter	2016_04_29_95-1008_Copy_of_Patent_Title_Page_with_Correction.pdf	1224391 93069c5590eb4952d419b31915c65ae6dfdee3a6	no	1
Warnings:					
Information:					
		Total Files Size (in bytes):	1507834		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Appln. No.	:	14/009,703	Confirmation No. 1821
Applicant	:	Meiyan ZANG	
Filed	:	October 3, 2013	
Title	:	DPOE System And Service Auto-Configuration Method And Network Based Thereon	
Patent No.	:	9,287,982	
Issued	:	March 15, 2016	
Attorney Docket No.	:	95-1008	
Customer No.	:	36163	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CERTIFICATE OF CORRECTION UNDER 37 C.F.R. § 1.322

Sir:

Patentee hereby requests correction to the title page of the patent. On the title page, field (30) for the Foreign Priority Application Number contains a truncation in the application number. A Certificate of Correction, Form PTO/SB/44, is attached to correct this error. Patentee submits that this error occurred in the US Patent & Trademark Office and no fee is required.

The following documents are provided in support of this Request:

- A copy of the Application Data Sheet indicating the correct Foreign Priority Application Number (201110092130.9) filed on October 3, 2013.
- A copy of the OFR mailed on October 16, 2013 showing the correct Foreign Priority Application Number.

- A copy of the title page of the patent with the correction marked in red.

Please send the Certificate of Correction to Patentees' attorneys, Plumsea Law Group, LLC, 6710A Rockledge Drive, Suite 400, Bethesda, MD 20817.

Respectfully submitted,

PLUMSEA LAW GROUP, LLC

Date: April 29, 2016

By: /Patricia E. Hong/
Patricia E. Hong (Reg. No. 34,373)
Telephone number: 301-365-9040

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
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www.uspto.gov

36163 e 2016-05-20

PLUMSEA LAW GROUP, LLC
6710A Rockledge Drive
SUITE 400
BETHESDA, MD 20817

Paper No.

Application No.:	**14/009,703**	**Date Mailed:**	**2016-05-20** **PAPER**
First Named Inventor:	Meiyan Zang	Examiner:	SEDIGHIAN, MOHAMMAD REZA
Attorney Docket No.:	95-1008	Art Unit:	2636
Confirmation No.:	1821	Filing Date:	10/03/2013

Please find attached an Office communication concerning this application or proceeding.

Commissioner for Patents

PTO-90c (Rev.08-06)

Response to the Request for Certificate of Correction	Patent No. 9287982	Applicant(s) ZANG ET AL.
	Issue Date 15 March, 2016	Docket No. 95-1008

This is in response to the request for a Certificate of Correction filed 29 April, 2016

☒ **Request Denied** – Consideration has been given to your request for the issuance of a Certificate of Correction under the provisions of 37 CFR 1.322 and/or 37 CFR 1.323. The Request is improper and denied for the reason(s) below:

1. ☐ Assignees' names and addresses (assignment data) printed in a patent, are based solely on information supplied in the appropriate space for identifying the assignment data on the Issue Fee Transmittal Form (PTOL-85b). Any request for a patent to be corrected to state the name of the assignee, must state that the assignment was submitted for recordation as set forth in in 37 CFR 3.11 before issuance of the patent. Petition under 3.81 is to be filed for consideration of correction to assignee. The petition fee set forth in 37 CFR 1.17(i)(1) (currently $140, $70, $35 for large, small and micro entities, respectively.

2. ☐ The alleged error in , is in fact an Amendment and/or Change made by the examiner and considered to be in accordance with the permissible amendments enumerated in the Manual of Patent Examining Procedure (MPEP) Section 1302.04. Applicant did not file objection or amendment under 37 CFR 1.312 prior to payment of the issue fee.

3. ☐ A petition under CFR 1.182 is required to correct the alleged errors in spelling or order of inventor's names, since inventor's names are printed solely in accordance with the type-written names, and in the order of the type-written names on the Application Data Sheet (ADS). The required fee currently under rule 1.17(f) (small entity $200, large entity $400, micro entity fee $100).

4. ☐ With respect to the alleged error in changing the inventor name on the patent due to clerical error in ADS/OATH of related patents. The inventor's name is printed in accordance with the OATH/ADS submitted at the time of filing the application. However, your attention is directed to C.F.R. 1.324, wherein a request is being made to change, add or delete inventor(s), after issuance of the patent.

5. ☐ With respect to the alleged error in , comparison of the printed patent with the corresponding location in the application file reveals that there is no discrepancy.

6. ☐ With respect to 37 CFR 1.72, the title should be brief but technically accurate and descriptive and should contain fewer than 500 characters. Inasmuch as the words "new," "improved," "improvement of," and "improvement in" are not considered as part of the title of an invention, these words should not be included at the beginning of the title of the invention and will be deleted when the Office enters the title into the Office's computer records, and when any patent issues.

7. ☐ The fee for correction under 37 CFR 1.323 is set forth in 37 CFR 1.20(a). ☐ Partial fee ☐ No fee was received with your request. Full fee payment is required before further action is taken on this request.

8. ☐ With respect to the request for corrected Letters Patent (Grant), corrections to the original Letters Patent are made under the provisions of Rule 1.322(b), not Rule1.323, unless a petition is granted.

9. ☒ Other Comments:
The alleged error on the Title Page in item 30, is an editing change made in accordance with the style of the Invention Patent Manual.

Further correspondence concerning this matter should be filed and directed to the Certificates of Correction Branch.

Legal Instrument Examiner: **/VIRGINIA TOLBERT/** Phone: (571)272-0460

Certificates of Correction Branch email: CustomerServiceCoC@uspto.gov CoC Central Phone Number: (703) 756-1814

If applicable, information regarding a petition under 37 CFR 1.183 should be directed to the attention of the Commissioner for Patents using the FAX number (571) 273-8300