

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

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(5/87)

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

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07/03/03

INVENTOR(S)						
Given Name (first and middle [if any])		Family Name or Surname		Residence (City and either State or Foreign Country)		
Alexander Ivan		Soto		San Diego, CA		
Additional inventors are being named on the _____ separately numbered sheets attached hereto						
TITLE OF THE INVENTION (500 characters max)						
System and Method for New Use of Passive Optical Networks						
Direct all correspondence to: CORRESPONDENCE ADDRESS						
☐ Customer Number: _____						
OR						
☒ Firm or Individual Name		Alexander Soto				
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Country		USA	Telephone	949	~~836~~	836-5735
ENCLOSED APPLICATION PARTS (check all that apply)						
☒ Specification Number of Pages		7		☐ CD(s), Number _____		
☒ Drawing(s) Number of Sheets		3		☒ Other (specify) Return Receipt Postcard		
☐ Application Date Sheet. See 37 CFR 1.76						
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT						
☒ Applicant claims small entity status. See 37 CFR 1.27.				FILING FEE Amount (\$)		
☒ A check or money order is enclosed to cover the filing fees.				80.00		
☐ The Director is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: _____						
☐ Payment by credit card. Form PTO-2038 is attached.						
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.						
☒ No.						
☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____						

[Page 1 of 2]

Respectfully submitted,

SIGNATURE

Alexander Soto

TYPED or PRINTED NAME

Alexander Soto

TELEPHONE

949-836-5735

Date

7/3/03

REGISTRATION NO.

(if appropriate)

Docket Number:

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. 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 8 hours 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: Mail Stop Provisional Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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FEE TRANSMITTAL for FY 2003

Effective 01/01/2003. Patent fees are subject to annual revision.

☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$)
80.00

Complete if Known

Application Number

Filing Date

First Named Inventor

Examiner Name

Art Unit

Attorney Docket No.

METHOD OF PAYMENT (check all that apply)

☒ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☐ Deposit Account:

Deposit
Account
Number
Deposit
Account
Name

The Commissioner is authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Credit any overpayments

☐ Charge any additional fee(s) during the pendency of this application

☐ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
1001 750	2001 375	Utility filing fee	
1002 330	2002 165	Design filing fee	
1003 520	2003 260	Plant filing fee	
1004 750	2004 375	Reissue filing fee	
1005 160	2005 80	Provisional filing fee	80.00

SUBTOTAL (1) (\$)
80.00

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims	Extra Claims	Fee from below	Fee Paid
Independent Claims	-20** =	X	
Multiple Dependent	-3** =	X	

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description
1202 18	2202 9	Claims in excess of 20
1201 84	2201 42	Independent claims in excess of 3
1203 280	2203 140	Multiple dependent claim, if not paid
1204 84	2204 42	** Reissue independent claims over original patent
1205 18	2205 9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) (\$)

**or number previously paid, if greater. For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Small Entity

Fee Code (\$)	Fee Code (\$)	Fee Description	Fee Paid
1051 130	2051 65	Surcharge - late filing fee or oath	
1052 50	2052 25	Surcharge - late provisional filing fee or cover sheet	
1053 130	1053 130	Non-English specification	
1812 2,520	1812 2,520	For filing a request for ex parte reexamination	
1804 920*	1804 920*	Requesting publication of SIR prior to Examiner action	
1805 1,840*	1805 1,840*	Requesting publication of SIR after Examiner action	
1251 110	2251 55	Extension for reply within first month	
1252 410	2252 205	Extension for reply within second month	
1253 930	2253 465	Extension for reply within third month	
1254 1,450	2254 725	Extension for reply within fourth month	
1255 1,970	2255 985	Extension for reply within fifth month	
1401 320	2401 160	Notice of Appeal	
1402 320	2402 160	Filing a brief in support of an appeal	
1403 280	2403 140	Request for oral hearing	
1451 1,510	1451 1,510	Petition to institute a public use proceeding	
1452 110	2452 55	Petition to revive - unavoidable	
1453 1,300	2453 650	Petition to revive - unintentional	
1501 1,300	2501 650	Utility issue fee (or reissue)	
1502 470	2502 235	Design issue fee	
1503 630	2503 315	Plant issue fee	
1460 130	1460 130	Petitions to the Commissioner	
1807 50	1807 50	Processing fee under 37 CFR 1.17(q)	
1806 180	1806 180	Submission of Information Disclosure Stmt	
8021 40	8021 40	Recording each patent assignment per property (times number of properties)	
1809 750	2809 375	Filing a submission after final rejection (37 CFR 1.129(a))	
1810 750	2810 375	For each additional invention to be examined (37 CFR 1.129(b))	
1801 750	2801 375	Request for Continued Examination (RCE)	
1802 900	1802 900	Request for expedited examination of a design application	

Other fee (specify)

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$)

SUBMITTED BY

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Date

7/2/2003

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This collection of information is required by 37 CFR 1.17 and 1.27. 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, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Washington, DC 20231.

Alexander and Walter Soto, Ex. 2022

Nokia of America Corporation v. Alexander and Walter Soto, IPR2023-00960

SYSTEM AND METHOD FOR NEW USE OF PASSIVE OPTICAL NETWORKS**FIELD OF THE INVENTION**

[0001] The present invention relates to optical fiber networks generally, and more specifically to a new use for passive optical networks.

BACKGROUND OF THE INVENTION

[0002] From the beginning the development of optical networks has striven for as few transitions from optical to electrical signals and vice versa as possible. Therefore systems such as optical repeaters, switches, cross-connects and similar systems have been developed for long-distance networks. For local distribution networks optical splitters offer low-maintenance and unpowered distribution points. They are small and can be placed in manholes, pedestals, closets, poles and therefore require no additional housing. The passive optical network concepts (Passive Optical Networking – PON) were developed from that perspective for the telecom market.

[0003] A number of PON solutions were developed at the end of the eighties (in Amsterdam-Sloten, among others). Since then work has been done on standards and new technological solutions. A number of small-scale trials were set up within the context of EU ACTS (Advanced Communications Technology and Services) and in the US, mainly to elaborate on the technological solutions, such as laser technology. The ATM PON solution has now been standardized. At present the most important stimulus for PON development is the interest of operators in the US in multi-service access networks, in which video distribution plays an important role. The current developments are called BPON for Broadband PON, and GPON for Gigabit PON. All current and past developments for PON have been and are in Wide Area Networks (WAN) applications.

[0004] The purchasers of networking equipment are very cautious in their spending for local area networks (LAN) deployed that support Gigabit rates within the Ethernet Switch market. System vendors supplying product to these purchasers of networking equipment are forced to gain more market share by more aggressively pricing Ethernet Switch per port while increasing functionality and intelligence such as Security and Quality of Service (QoS) being offered for free, especially true in wiring closet

applications that are dominated by Layer 2 switching elements. This ongoing drive of free functionality cannot be sustained due to the large development expense, which is not recoverable as per port sales prices erode. Thus many system vendors are maintaining higher levels of functionality and intelligence at the core and aggregation layer 3 switches where expenses can be amortized over a larger number of ports, clients or subscribers. This trend of increasing intelligence at layer 3 while keeping basic functionality at Layer 2 is more noticeable as data rates increase beyond 1Gbps rates. This is especially true for small and medium size businesses, which tends to be the largest market segment for Layer 2 switches, routers, Hubs and gateway solutions.

[0005] As a result of the evaporation of Service Provider (SP) demand and a general reluctance on the part of Enterprise and Storage Area Networks (SAN) customers to pay a hefty price premium for newer technologies without a compelling return on investment (ROI), 10Gbps Ethernet, SONET and even Fiber channel products sales may prevent the market growth needed to recover system vendor's and component supplier's investments. In addition, if previous trends in the 10/100 Fast Ethernet market are to hold true for 10Gbps or higher rate solutions, the average sale prices must decline sharply for the first few years before volumes can sustain system vendor and component supplier's business cases and expect ROIs. This trend has proven itself over the past 20 years and current analyst reports show the overall total market size for shared Hub, Routers, Switches and Gateway products may double in the next five years from today's \$12 Billion dollar level if the price-performance advantage of 10Gbps or faster fiber solutions materializes during the next few years. It is this price-performance advantage or value threshold for new 10Gbps plus systems that cause Analyst and equipment buyers in all market segments to question the cost and performance effectiveness of very high speed solutions above 1Gbps rates.

[0006] This skepticism is due to several reasons. First, 10Gbps fiber solutions are extremely expensive compared to 1Gbps solutions. Second, even though cost deltas between 1Gbps and 10Gbps networking solutions are expected to drop over the next 5 years from 80 times down to 7 times, cost deltas are still too high. 10Gbps fiber solutions are still expected to be 5 to 7 times that of 1Gbps solutions over the next 5 years. Since most industry experts agree that purchasers of network equipment will not buy new

equipment unless these relative price-performance delta alternatives approached are at a 2 times or less level. And third, purchasers of new network elements (like PC Desktop, Servers, Compute Farms and Data Centers) will continue to base the their decision to buy new equipment on both the incremental investment expectation which a 2 times delta enables and also on the performance capability of these new network elements to match a new higher performing gigabits network. This again is the price-performance advantage of new purchases, which rationalizes buyer's ROI decision and ultimately is the reason why a new network is purchased along with the installation of new network elements.

[0007] Billions of dollars are at risk for System vendors and Component suppliers who fail to address this price-performance advantage. Solving how to provide optimal performance at the lowest cost in these new 10Gbps or higher networks is the key to component suppliers and system vendors gaining the most percentage amount of market share while enabling the end buyer to realize an expected ROI. This invention solves this optimal price-performance advantage problem in a novel way for very high-speed 10Gbps or higher networks.

SUMMARY OF THE INVENTION

[0008] A system and method for a new use of passive optical networks performing LAN functions of a hub, switch or router.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is a block diagram of a Passive Optical Network (PON) Hub according to an exemplary embodiment of the invention.

[0010] FIG. 2 is a block diagram of a Passive Optical Network (PON) Switch according to an exemplary embodiment of the invention.

[0011] FIG. 3 is a block diagram of a Passive Optical Network (PON) Router according to an exemplary embodiment of the invention.

DETAILED DESCRIPTION

[0012] The invention is a new use for Passive Optical Networks (PONs). PONs are a high bandwidth point to multipoint optical fiber network based on the asynchronous

transfer mode protocol (ATM), Ethernet or some form of time division multiplexing (TDM) scheme. Depending on where the PON terminates, the system can be described as fiber-to-the-curb (FTTC), fiber-to-the-building (FTTB), or fiber-to-the-home (FTTH). A PON consists of an Optical Line Termination (OLT) at the communication company's central office and a number of Optical Network Units (ONUs) near end users or subscribers. Typically, up to 32 ONUs can be connected to an OLT. The passive simply describes the fact that optical transmission has no power requirements or active electronic parts once the optical signal is going through the Optical Distribution Network (ODN). A PON could also serve as a trunk or aggregation function between a larger system, such as a CATV system, and a neighborhood, building, or home Ethernet network on coaxial cable. A PON is used to provide a wide area network. A wide area network (WAN) is a geographically dispersed telecommunications network. The term distinguishes a broader telecommunication structure from a local area network. A local area network (LAN) is a group of computers and associated devices that share a common communications line or wireless link and typically share the resources of a single processor or server within a small geographic area (for example, within an office building).

[0013] The preferred embodiment of the invention is to use Passive Optical Networks (PONs) in local area networks (LANs) by utilizing a PON to implement a hub, switch or router. FIG. 1 shows three general LANs. Each LAN in FIG. 1 has a PON Hub 100 with several example devices connected to the network such as workstations 105, mainframes 106, disk arrays 107, and possibly other PON Hubs 100. The PON Hub 100 would contain the OLT 101, passive optical splitter 102, LAN ports 103 which would complete an entirely passive LAN port interface subsystem 108. The LAN ports 103 consisting of standard fiber connectors would be connected to the OLT 101 via a splitter and fibers which enables a completely passive LAN interface. The PON Hub 100 and devices on the LAN would be connected via fiber. The devices on the LAN would connect using a Network Interface Card (NIC) that would contain an ONT and an L2 switch in hardware or software. The Hub 100 could be stacked, or placed one on top of each other via LAN 103 port connections. The OLT 101 would manage the traffic on the network providing communication from and to each device on the LAN. LANs can be

created using the invention described in star, tree, or in hybrid network topologies. The invention as described functions as a hub in a LAN.

[0014] Some client PON ONU applications may require interfacing to legacy copper LANs 117 which might use 10BaseT-CX4 or similar derivative 10Gbps Uplink interface. For these applications user traffic is not terminated at the client PON as found in the ONT but rather terminated further behind the client as in an ONU 111. These ONUs then provide a bridge function between the primary PON LAN and the secondary legacy LAN, as shown in 112.

[0015] FIG. 2 is a block diagram of a Passive Optical Network Switch according to an exemplary embodiment of the invention. The PON Switch 200 is similar to the PON Hub 100 with the exception of the addition an OSI L2 Switch 204 function connected to the OLT 201. The L2 Switch function serves to guide traffic to specific clients on the LAN by using the OSI Station Management control plane to configure the OLT 201 and thus shape traffic to and from each PON ONT or ONU client. The PON Switch 200 can connect to other PON Hubs 100, PON Switches or PON Routers.

[0016] FIG. 3 is a block diagram of a Passive Optical Network Router according to an exemplary embodiment of the invention. The PON Router 300 is similar to the PON Switch 200 with the exception of the addition of an OSI L2/L3 Switch 304 function connected to the OLT 301 and a Wide Area Network port 318 connected to the OSI L2/L3 Switch 304. The OSI L2/L3 Switch 304 will guide traffic to specific clients on the LAN or to the WAN via the WAN port 318. The L2/L3 switch 304 uses the OSI Station Management control plane to configure the OLT 301 and thus shape the traffic to and from each PON ONU or ONT Client or to and from the WAN port 318. The PON Router can connect other PON Hubs 100, PON Switches 200 or PON Routers 300.

[0017] Although the invention has been described in terms of exemplary embodiments, it is not limited thereto. Rather, the appended claims should be construed broadly, to include other variants and embodiments of the invention, which may be made by those skilled in the art without departing from the scope and range of equivalents of the invention.

What is claimed is:

1. A system and method for new use of Passive Optical Networks (PON) comprising the steps of:
 - a. A Local Area Network (LAN).
 - b. A Hub, Switch or Router.
 - c. Network Interface Card(s) (NIC).
2. The method of claim 1, wherein step (a) contains a plurality of fibers and passive optical splitters.
3. The method of claim 1, wherein step (b) contains an OLT device.
4. The method of claim 1, wherein step (b) contains a plurality of passive optical splitter.
5. The method of claim 1, wherein step (b) contains a plurality of LAN ports connected to an OLT via a plurality of fibers and passive optical splitters.
6. The method of claim 1, wherein step (b) contains a Wide Area Network Port connected to an OLT via fiber.
7. The method of claim 1, wherein step (b) contains an OSI L2 Switch function unit that is connected to an OLT.
8. The method of claim 1, wherein step (b) contains an OSI L2/L3 Switch function unit connected to an OLT and a Wide Area Network Port.
9. The method of claim 1, wherein step (c) contains an ONT device.
10. The method of claim 9, wherein an OSI L2 Switch function is connected to the ONT device.
11. The method of claim 10, wherein the OSI L2 Switch function is implemented in hardware or software.

12. The method of claim 7, wherein the OSI L2 Switch unit configures the OLT through Station Management Control Plane to perform switching functions.
- 5 13. The method of claim 8, wherein the OSI L3 Switch unit performs the routing functions.





