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EPON Maintenance brief illustration

Version：**V0.**10

800－810－9292

Contents

1．configuration basis

EPON system is designed different configuration nodes aim to different management objects, If user want to configure or access relevant object information, should enter corresponding configuration node firstly.

The command for different node configuration: （under "config#" node）

Interface Ethernet <slot/port>	Enter "Ethernet port" node
Interface vlan <vlanname>	Enter "VLAN" configuration node (configure relevant parameters base on the name of VLAN: Add / Remove port members of the VLAN)
Pon <slot/port>	Enter "PON" node (configure uplink & downlink bandwidth of ONU. View row wrong frame count for each ONU PON link)
Onu <slot/port/onuId> Onu <onuname>	Enter "ONU" node (enter related ONU nodes according to the serial number or ONU name (configure Ethernet port model, VLAN, port limited speed beside ONU; View Ethernet port statistical information beside ONU; View downlink wrong frame count of ONU PON Link)

2．Configure work mode of OLT or ONU Ethernet port

The work mode between Ethernet interface of OLT and uplink switches, Ethernet interface of ONU and downlink user or Ethernet switch port should be consistent, that both sides should work in auto-negotiate mode, or work in mandatory mode.

Configure command of OLT Ethernet port work mode:（under "config#" node）

interface ethernet <slot/port>	Enter ethernet interface configuration mode from configuration mode
auto [enable|disable]	Configure auto-negotiate of ethernet interface
speed [10|100|1000]	Configure rate for ethernet interface
flowcontrol L2 [enable|disable]	Configure ethernet interface flow control of the second layer
duplex [full|half]	Configure ethernet interface for half-duplex / full-duplex mode
exit	Exit configure mode

show interface ethernet {<slot/port>}*1	Show configuration information of ethernet interface

Configure command of ONU ethernet port work mode:（under"config-onu Solt/Port/OnuId#"node, such as"config-onu5/1/1"）

port mode <port> [0|8|9|10|11]	Configure port work mode:
	0-auto negotiation auto negotiation
	8-100M/FD 100M full-duplex
	9-100M/HD 100M half-duplex 10-10M/FD
	      10M full-duplex 11-10M/HD
	      10M half-duplex

port mode <port>	Show ethernet port configure information
port mode show <port>	Show current operation status of ethernet interface

NOTE： Recommend Working in 100M full-duplex mode

3. Configure VLAN beside OLT or ONU

When configure VLAN, OLT and ONU can be regarded as independent ethernet switches, that OLT can be considered a switch which includes 4 uplink interfaces and 20 PON interfaces, ONU can be considered a switch which includes a number of user interfaces and a PON interface, The VLAN of OLT and ONU were configured independently and respectively. The PON interface between OLT and ONU can be regarded as VLAN Trunk Interface.

VLAN configure command in the side of OLT：（under"config#" node）

step 1	interface vlan <vlanname> {<1-4094>}*1	Create a VLAN from configure mode
step2	[add|delete] port <slot/port> [tagged|untagged]	Add or delete a ethernet port or a PON port in a VLAN，and designate its manner of accessing to VLAN
step3	ip address <A.B.C.D/M> {[secondary]}*1	Configure IP address and sub-net mask of VLAN, can configure many IP addresses and subnet mask utilize "secondary" parameters for VLAN
step4	Show	view current configuration condition in VLAN configuration mode
step5	Exit	Exit to configuration mode
step6	show interface vlan{<name>}*1	show VLAN port information in configuration mode

NOTE：PON port is tagged mode generally

VLAN configuration command beside ONU ：（ under "config-onuSolt/Port/OnuId#"node, such as "config-onu5/1/1" node）

step1	Vlan dot1q 1	enable 802.1Q Vlan mode
step2	vlan dot1q_add <vid> vlan dot1q_del <vid>	add a VLAN delete a VLAN
step3	vlan dot1q_port_add <vid> <port> [1|2] vlan dot1q_port_del <vid> <port>	add a port in VLAN [1-tagged ;2-untagged]； delete a port in VLAN；
step4	vlan pvid <port> [<pvid>]	configure PVID of port
step5	vlan dot1q_show [<vid>]	show VLAN setup information
step6	Vlan dot1q	show if 802.1Q VLAN mode enable or not

4．configure PON link bandwidth of ONU

All ONUs share 1 Gbps PON line bandwidth under the same PON port, it can configure bandwidth parameters of uplink and downlink for each ONU.

Configuration command of uplink and downlink bandwidth for PON link of ONU：（under"config-ponSlot/Port#"node，with the second OUN under 5/2 PON port as an example）

step1	Enter 5/2 PON port interface EPON V2R1(config)# pon 5/2 EPON_V2R1(epon-pon5/2)#

step2	Show link bandwidth information of current PON port(onu 2)
	EPON_V2R1(epon-pon5/2)#show bandwidth logical-link 1-4
	
	   OnuIdx direction class delay assured-bw(kbit/s) best-effort-bw(kbit/s)
	
	    1 Uplink 2 low 10000 11000
	           Downlink -- -- 10000 --
	    2 Uplink 2 low 10000 11000
	           Downlink -- -- 10000 --
	    3 Uplink 2 low 10000 11000
	           Downlink -- -- 10000 --
	    4 Uplink 2 low 10000 11000
	           Downlink -- -- 10000 --

step3	Configure bandwidth of link downlink "down" direction of No.1-4 ONU under current PON port for 10000(kbit/s)(10Mbps bandwidth) EPON_V2R1(epon-pon5/2)#bandwidth class 2 delay low assured-bw 10000 best-effort-bw 11000 down 1-4
step4	Configure bandwidth of link uplink "up" direction of No.1-4 ONU under current PON port for 10000(kbit/s)(10Mbps bandwidth) EPON_V2R1(epon-pon5/2)#bandwidth class 2 delay low assured-bw 10000 best-effort-bw 11000 up 1-4

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Among: the "**class**" related to priority level of data packets, fixed elect "**2**"; "**delay**" related to transmit delay of data, fixed elect "**low**"; "**assured - bw**" is assurance bandwidth, and assurance bandwidth which assign to the ONU can not be occupied by other ONUs; "**best-effort-bw**" is maximum bandwidth, that is, when the link possess idle bandwidth, maximum bandwidth of ONU occupied , note: the configuration should meet that the largest bandwidth >= assurance bandwidth.

Note:

1) When configure downlink bandwidth, it will be prompted as follows: "**Note : class, delay, best-offert - bw on the port is inactive.** " , It is said that the other three parameters are not supported except assurance bandwidth in downlink direction, But do not affect allocation function of fixed bandwidth (assured - bw).

2) In the case of default, uplink speed of each ONU is 15Mbps, downlink speed is not limited. If want to limit downlink speed, user should open limit speed function of downlink by adopting following command:

    EPON_V2R1(config)#onu downlink-policer

5．Configure limit speed of port beside ONU

If there are many users under an ONU, it can set different limit speed parameters for each user port.

Configuration command of Ethernet port limit speed：

（ "config-onuSolt/Port/OnuId#"　such as under"config-onu5/1/1"node）

port ingress_rate <port> [<type> <rate>]	Configure port ingress（uplink）limit speed parameters：
	Type：
	   0- limit speed for all frame
	   1-limit speed for broadcast、multicast、single-cast of unknown MAC address
	   2- limit speed for broadcast and multicast
	   3- limit speed only for broadcast frame
	Rate：
	   0-cancel limit speed
	   62-100000(Kbits/s)

port egress_rate \<port\> [\<rate\>]	Configure port egress (downlink) limit speed parameters：
	Rate：
	   0-cancel limit speed
	    62-100000(Kbits/s)

port ingress_rate \<port\>	Show configuration of Ethernet port ingress （uplink）limit speed
port egress_rate \<port\>	Show configuration of Ethernet port egress （downlink）limit speed

6. view alarm log

System alarm information is recorded in alarm log of system automatically, Regular view alarm log can find abnormal information as soon as possible, and eliminate potential accidents.

The command of viewing alarm log beside OLT：（under the node "config#"）

Show alarm log	Show all alarm information
Show alarm log today	Show alarm information of today
Show alarm log yesterday	Show alarm information of tomorrow

7. view current configuration information

All the current configuration statuses were saved in the current configuration (running config) document. We can analyze the problem of system configuration aspects through viewing "running config" file

Command of viewing current configuration information beside OLT：（under the node "config#"）

Show running config	Show all configuration information

8. view statistics information

If user complaint service quality decrease, we can position fault point which occur packet loss through viewing the statistics information of each point in Link

The command of viewing statistics information of ONU Ethernet port：（under "config-onuSolt/Port/OnuId#", such as "config-onu5/1/1"node）

stat port_show <port>	Show Ethernet port statistics information

NOTE：The statistic information as follows:

[InGoodOctetsLo] = 0   the count of input byte（low 4 byte）

[InGoodOctetsHi] = 0   the count of input byte（high 4 byte）

[InBadOctets] = 0   the count of input error byte

[OutFCSErr] = 0   the count of output error frame

[InUnicasts] = 0   the count of input single-cast frame

[Deferred] = 0   the count of output delay frame (valid in the half-duplex mode)

[InBroadcasts] = 0   the count of input broadcast frame

[InMulticasts] = 0   the count of input multicast frame

[64Octets] = 0   the count of input 64 byte frame

[127Octets] = 0   the count of input 65~127 byte frame

[255Octets] = 0   the count of input 128～255 byte frame

[511Octets] = 0   the count of input 256～5115 byte frame

[1023Octets] = 0   the count of input 512～1023 byte frame

[MaxOctets] = 0   the count of input1024～1518   byte frame

[OutOctetsLo] = 0   the count of output byte（low 4 byte）

[OutOctetsHi] = 0   the count of output byte（high 4 byte）

[OutUnicasts] = 0   the count of output single-cast frame

[Excessive] = 0   the count of failure frame which try more than 16 times

                            (valid in half-duplex mode)

[OutMulticasts] = 0   the count of output multicast frame

[OutBroadcasts] = 0   the count of output broadcast frame

[Single] = 0   the count of output frame which encounter one clash

                            (valid in half-duplex mode)

[OutPause] = 0   the count of output "Pause" control frame

[InPause] = 0   the count of input "Pause" control frame

[Multiple] = 0   the count of output frame which encounter many clashes

                            (valid in half-duplex mode)

[Undersize] = 0   the count of super short frame

[Fragments] = 0   the count of fragment frame

[Oversize] = 0	the count of super long frame（FCS check error）
[Jabber] = 0	the count of super long frame（FCS check right）
[InMACRcvErr] = 0	**the count of input wiring error**
[InFCSErr] = 0	**the count of input error frame**
[Collisions] = 0	the count of clash (valid in half-duplex mode)
[Late] = 0	the count of delay frame (valid in half-duplex mode)

The command of viewing statistics information of uplink Ethernet port：
（under"config-Solt/Port #",such as"config-ethernet1/1"node）

show statistic	show statistics information of Ethernet port

If consecutive execute statistics command twice and the count of wrong frame continued massive increase, all of that indicate the decline of user service quality. If the counts of input wrong frame increase, then need to examine network or opposite end user equipment. If the counts of output wrong frame increase, it indicates ONU or OLT equipment abnormal, need to restart or replacement equipment.

The command of viewing statistics information of PON port：（under "config-Solt/Port #",such as"config-ethernet1/1"node）

show onu-uplink fer <onuID>	Show ONU Packet loss rate of uplink

If the count of wrong frame massive increase, it indicates that optical path has a problem, please check optical insertion loss whether in the normal range ([15, 24] dB), or Connector whether firm and reliable, and if there is micro-bend whose bending radius too small on channel.

9. configure IP address of OLT， enable user manage OLT by adopting telnet

When system operation normal, adopting in- band channel manage OLT, that is, adopt port (on uplink board) to access. The setup method has two steps:

1).Create a management VLAN, add uplink port, configure IP address of VLAN.

2). configure default routing, the equivalent is a PC Gateway, then we

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can access OLT from other network segment.

Command:**EPON_V2R1(config)#interface vlan manage**

     EPON_V2R1(vlan-manage)#add port 1/1 tagged

     EPON_V2R1(vlan-manage)#ip address 221.2.1.10/24

     EPON_V2R1(vlan-manage)#exit

     EPON_V2R1(config)#ip route 0.0.0.0/0 221.2.1.254

10．configure GFA6700 support DA Network management

Adopt DA network management GFA6700 need following steps:

  1) Install DA platform software and EPON V2R1 mould on the equipment with Network Management;

  2) Open SNMP services of GFA6700:

    EPON_V2R1(config)#service snmp enable

    EPON_V2R1(config)#service snmp trap enable

  3) configure "trap server" addresses of alarm report on GFA6700, Otherwise, no alarm report when GFA6700 happens alarm :

    EPON_V2R1(config)#config snmp trapreceiver

    add 192.168.7.61 version v2c community public

    Among: 192.168.7.61 is IP address of DA server.

  4) Adopt "save" command save configuration.

  5) We can also conduct the above operations by adopting graphics interface of DA Network Management, GFA6700 interface in the "Trap attribute" page of "equipment attribute" page. Specific setting please reference to <<Network help documentation>>

11．ONU un-register or frequently occur "offline-register - offline" phenomenon

If system shows the following alarm message, indicate the ONU offline

28: 2007-07-08,16:27:33 V2R1-ONU-51002 not present: REPORT TIMEOUT

29: 2007-07-08,16:27:33 V2R1-ONU-51001 not present: REPORT TIMEOUT

30: 2007-07-08,16:27:34 V2R1-ONU-51003 not present: REPORT TIMEOUT

31: 2007-07-08,16:27:34 V2R1-ONU-51004 not present: REPORT TIMEOUT

If system shows the following alarm message, indicate the ONU re-register：

36：2007-07-08,16:30:46 xingzhengzhongxi re-register

37：2007-07-08,16:30:46 liangshiju re-register

38：2007-07-08,16:30:46 zonggonghui re-register

39：2007-07-08,16:30:46 waijingwei re-register

Such problems are generally due to line insertion loss too high or too low. In this case, the first, measure transmit optical power of PON interfaces of OLT (normal range is 2dBm ---7dBm), then measure receive power of ONU, the difference between the two should among [15,24] dB.

EPON system adopts Single Fiber Wavelength Division Multiplex transmit uplink and downlink data, it utilizes 1310 nm wavelength transmit data in upstream (ONU - "OLT), and utilizes 1490 nm wavelength transmit data in downstream (OLT - "ONU). ONU can stable and continuous online work only when line insertion loss in a certain range ([15,24] dB). When line insertion loss too high, it cause receive power of ONU or OLT   too low; or line insertion loss too low cause receive power of ONU or OLT too high, ONU will frequent occur "offline-registration - offline" phenomenon.

Attention!   According to the objective of present optical devices, adopt 1 : 16 splitter, If the total attenuation value of other optical path nodes less than 2 dBm (include 2), propose add 5 dB attenuator in trunk.

Attention!   Prohibit direct connection between ONU and OLT utilize fiber (without optical splitter, without attenuation), That will result in optical power overload of ONU or OLT , and damage optical devices of ONU or OLT.

12．   How to calculate the optical insertion loss (insertion loss)

The optical insertion loss from OLT to one ONU includes the following parts:

1). Fiber insertion loss: The insertion loss objective of general fiber is 0.45dB/km, total insertion loss equal to 0.45 × fiber length.

2).Optical splitter insertion loss: first calculate branch number of optical splitter

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(take the index whose bottom count is "2"), such as a 1:4 splitter, the index is 2 (4 = 2 ^2), the index of 1:16 splitter is 4 (16 =2 ^ 4). The attenuation value of optical splitter equals to index × 3.3. For example, the attenuation value of 1:4 optical splitter equal to 2 * 3.3 = 6.6dBm (general take 6.7dBm); the 1:16 optical splitter equal to 4 * 3.3 = 13.2dBm. In rough calculation, you can also multiply in three. If there are splitters cascade on the lines between OLT and ONU, the total insertion loss is the sum of splitters loss, which lie on the channel between OLT and "this" ONU

3)．Insertion loss of optical fiber fusion splice: Under normal circumstances, OLT or ONU can not direct connect to splitter, they is connected by much optical fiber. That require different optical fiber fusion together, if fusion quality meets the requirements, fusion insertion loss will be very small, generally not more than 0.1 dB / Weld, the total fusion splice loss of optical path is 0.1 × number of fusion point.

4)．Insertion loss of Connector: Some optical fiber may be jointed adopt flange, Insertion loss of each flange is not more than 0.5 dB. If these contacts mishandled, it will cause large attenuation. Total insertion loss of Connector is 0.5 ×count of Connector.

5)．Fixed attenuator insertion loss: the insertion loss of common fixed attenuator is generally 5 dB or 10 dB. The total insertion loss of fixed attenuator is the sum of each fixed attenuator on the optical path from OLT to "this" ONU.

6)．The total insertion loss of optical path from OLT to ONU is equivalent to the sum of above insertion loss: total fiber insertion loss + total splitter insertion loss + total insertion loss of fusion point + total connector insertion loss + total insertion loss of fixed attenuator. Only when total insertion loss of each optical path from ONU to OLT between [15, 24] dB, it can assure system stable operation.

NOTE：Everyone must master calculate method of optical insertion loss according to the network topology , and it is necessary to compare actual measurement value of lines with theoretical calculation value in the project, if the difference more than 3 dB, it implies the existence of optical path problem (　optical fiber connection of

13. The speed of Internet access is very slow, and packet loss is very serious. Or port up / down frequent.

Appear alarm information as follows, indicate port frequent up/down：

```
753: 2008-01-25,11:36:34 xingzhongzhongxi interface eth1/1 linkup
754: 2008-01-25,11:36:35 xingzhongzhongxi interface eth1/1 linkdown
755: 2008-01-25,11:36:37 xingzhongzhongxi interface eth1/1 linkup
756: 2008-01-25,11:36:49 xingzhongzhongxi interface eth1/1 linkdown
757: 2008-01-25,11:36:51 xingzhongzhongxi interface eth1/1 linkup
```

1）Assure port mode between OLT and uplink equipment, ONU and downlink equipment weather match or not? If one party is half-duplex mode, the other is full-duplex mode between a channel, the packet loss will be very serious. A better approach is set the two ports of path for auto-negotiate model or compulsory mode. When one party is auto-negotiate mode, the other is half-duplex mode, there will be problems.

2) Assure uplink and downlink ports whether be configured about the speed limit.

3) Check the cables quality that was connected to the port, if the cables too long, or cables is not standard Cat 5 Cables or is not made according to standard line queue, or use inferior crystal head, they will cause connection unstable.

4) Enable port deceleration: port mode is set to 10M full-duplex or half-duplex.

14. ONU is adopted from one place change to another, service is not pass

When ONU first register on the OLT, OLT will save registration information of ONU automatically, meanwhile it will bind ONU to PON port that the first register. When ONU is changed other places, it possible register on the new PON port, Then OLT report "MAC address conflict", ONU register on the new PON is not success. The solution is to delete ONU from the original PON port, adopt the following command:

```
EPON_V2R1(config)#pon 5/1
EPON_V2R1(epon-pon5/1)#delete onu 1
```

Appendix 1：renew record

V0.10 2007.7.8，create，liudong；

V0.11 2007.7.9，add configuration basis，view alarm log，view current configuration ； revise calculation method of optical channel insertion loss，liudong；

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