EMS User Guide

GPON OLT P1200-08

Version: V1.0

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About This Manual

This manual is applicable to TP-Link GPON OLT products, The contents of this document include TP-Link PON Element Management System (hereinafter refer to as "EMS") software installation and operation guidelines. Users should learn this document first when beginning to operate GPON OLT device.

CONTENTS

1 Software Introduction

1.1 Software Information

The EMS software is a C/S architecture integrated device management platform, which is designed based on SNMP protocol.

The EMS need following operational environment：

OS: Windows XP/2000/Vista/7/8/10

Hardware: at least 2.4GHz CPU, 512M memory

Software: JAVA 1.5, MySQL 5.0

1.2 Functional Features

The EMS software has following main features:

➢ Based on standard SNMP protocol

➢ Support multi-user access, C/S structure

➢ Support centralization management of TP-Link GPON serial products

➢ Support discovering topology automatically, TreeView, modifying topology manually

➢ Support all functional configuration

➢ Support division of management rights

➢ Support real-time alarm and historic alarm log query

➢ Support perfect log management

➢ Use single database and Support database backup and import functions

➢ Support real-time performance collection and port traffic statistics.

➢ Use third-party open database platform

2 The EMS Software Installation

The EMS install file has integrated the database software by default, so as long as the EMS is installed, the corresponding database software is also installed simultaneously. if your computer has installed the database software already, you don't need to uninstall it, it will not disturb the EMS software installation.

It's easy to install the EMS, just need to click **'Next Step',** and you will finish it.

When you finish the installation of the EMS, you will find two Shortcuts in the installation directory

or   desktop   for   server   and
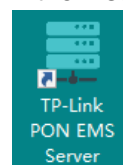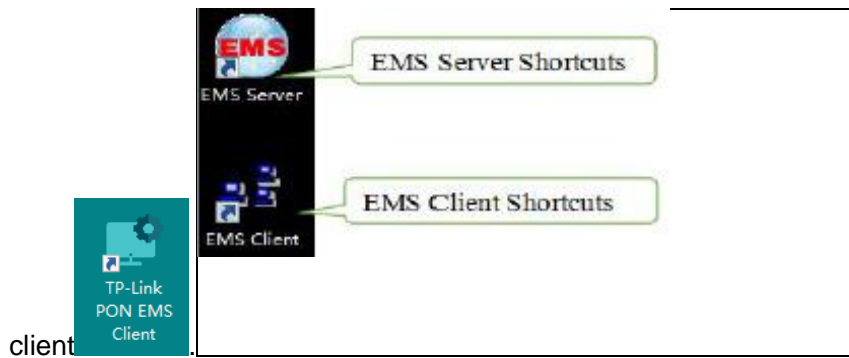
client .

Note: When the EMS installation finished successfully, you can start it directly.

3 The EMS Start-Up

The architecture of EMS is C/S (Server and Client), Server and Client. You should start Server program before start Client program.

3.1 EMS Server Start-Up

Run the TP-Link PON EMS Server (hereinafter refer to as "EMS Server") program, we will find

icon in the system tray after the Server runs successfully

Note: EMS Server start-up time is no longer than 30 seconds. If the program runs more than 30 seconds, it means the program doesn't start properly.

3.2 EMS Client Start-Up

Run the TP-Link PON EMS Client (hereinafter refer to as "EMS Client") program after the EMS Server program starts. The EMS Client and EMS Server can be run on the same computer or two independent computers with reliable intercommunication.

Note: To ensure operational performance of software, it is recommended that the EMS Server and EMS Client be installed on the same computer or different computers in the same LAN.

After the EMS Client starts successfully, the login page will appears as follows:
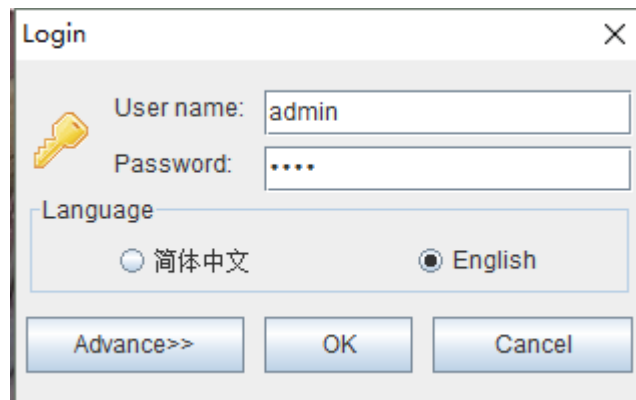
3.3 Login EMS

If the EMS Server and EMS Client are installed on the same computer, enter the user name and password and login directly. If the Server and Client are installed on different computers, you must click the **'Advance'** and configure, page appears as follows:

2
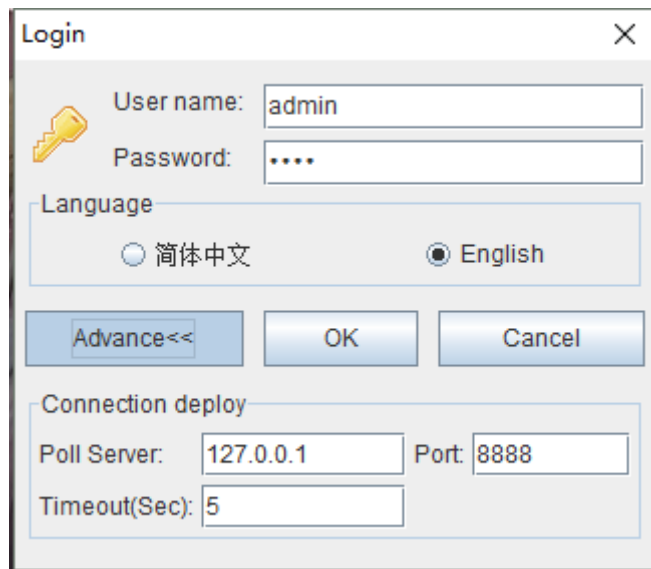
Configurations are as follows: change poll server's IP to the server's IP which EMS server runs on, port and Timeout Keep the default.

Note: The default user is **"admin"**, password is **"1234"**for client to login.

After login the EMS Client successfully, you will see the main page. The typical page appears as follows:
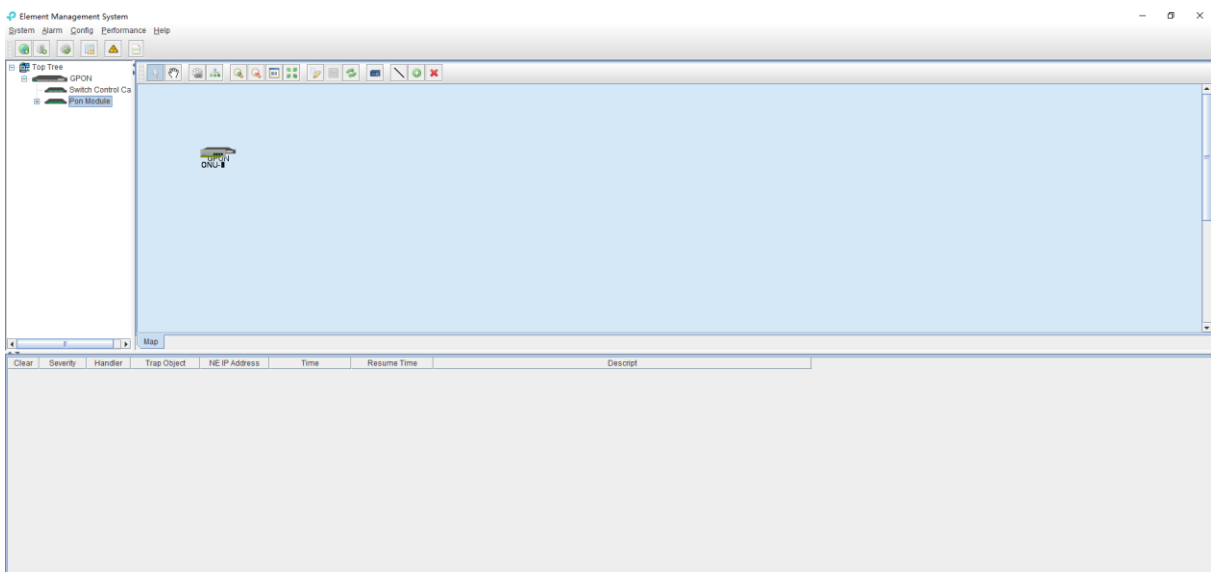
At this point, The EMS Server and EMS Client programs have been started successfully.

4 EMS Software Framework Introduction

4.1　Main Window Introduction

After login successfully, system will enter main window management page.
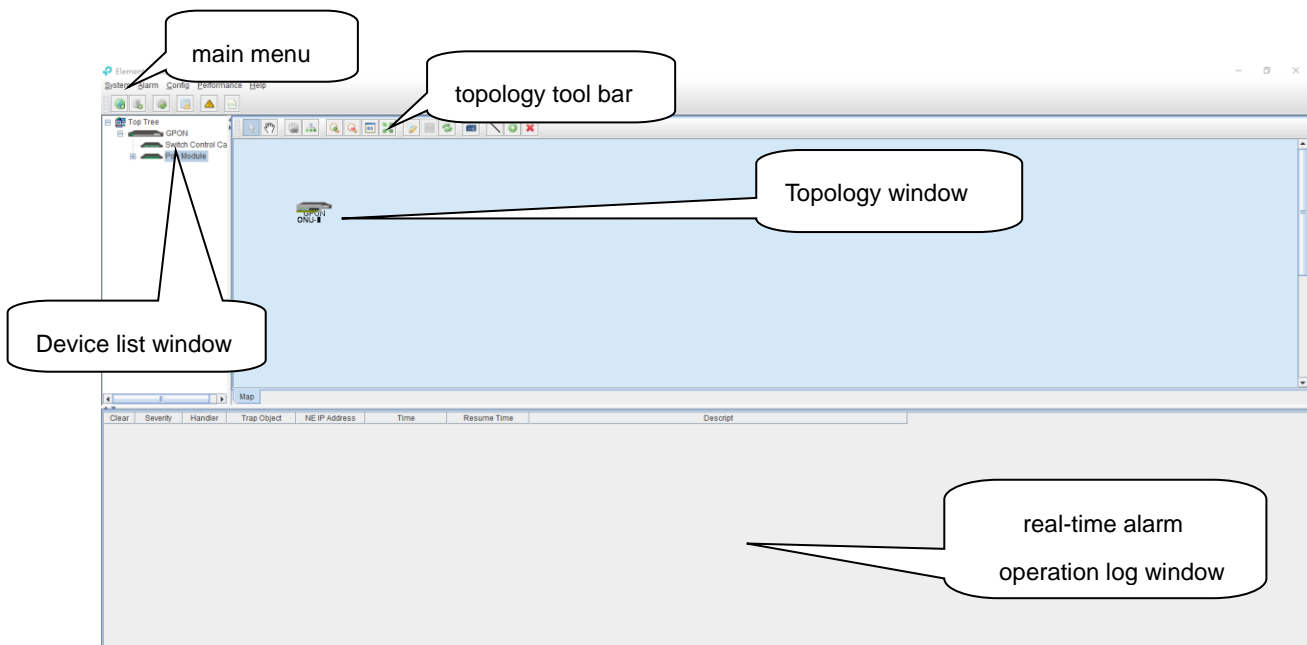
As shown above, the EMS Client main window is divided into the following sections:

Main menu:

Main menu contains System, Alarm, Configure, Performance and Help parts. Their main features are as follows:

➢ Main Menu

Including System Configuration, MIB Browser, Database Maintenance and User Manage, etc.

➢ Alarm Menu

Alarm Query, Configure Trap Rule and System Log are within this menu.

➢ Configuration Menu

Top-tree update, device add/delete, device configuration, map update and device upgrade features are located in this menu.

➢ Performance Menu

Including performance monitor and alarm threshold configuration.

➢ Help menu

Change software skin, language and about information.

Device list window:

The device list window shows all the devices under management currently. The device list can directly observe whether the device is online, whether there is an alarm. You can enter into the management window of the device by double click the device.

The OLT device has 5 level management object in the device list window, the machine box, exchange control module, PON module, PON port and ONU level.

Topology window:

Windows of topology is the main display area of the EMS software, according to the management device, user can move device to right position on regional background map for visual management. Double click the device object on the topology diagram, you can enter the device management window to perform various operations on the device.

The administrator can add or modify the passive network part of the topology diagram manually,

such as the optical splitters in PON network, to make the topology same to the actual network layout.

Real-time alarm and Operational log:

The real-time alarm window shows the abnormal alarm information of the current management device, such as alarm object, alarm time, alarm content, etc.

The operation log window records all the operations of the EMS, so it's convenient to trace who has operated it.

4.2 Device Management Window

For device management, EMS is mainly through the corresponding device management window to operate. Through the Configuration menu or double click the device icons located on Top-tree or topology map, manager can open the device management windows. Following are several typical examples:
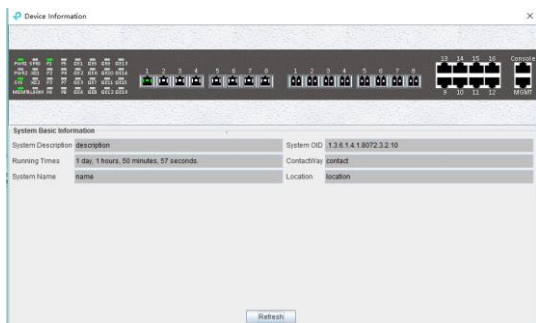
System Management Window   PON Card Management

Switch and Control Card Window   ONU management window
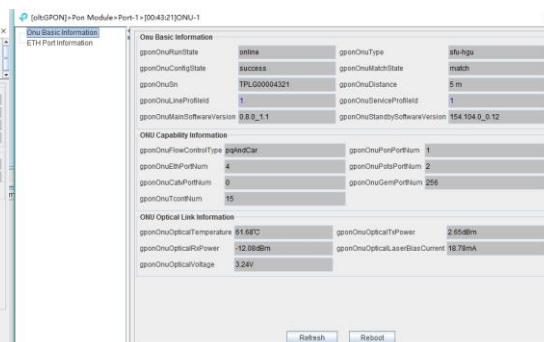
5 Add and Delete Management Object

5.1 Add and Delete Location

For convenience of managing numerous devices, divide them in different regions according to

their deployed locations is normally needed. According to following steps to divide management regions:

1) Add a Location node on the Top-tree list. Showing as follows:
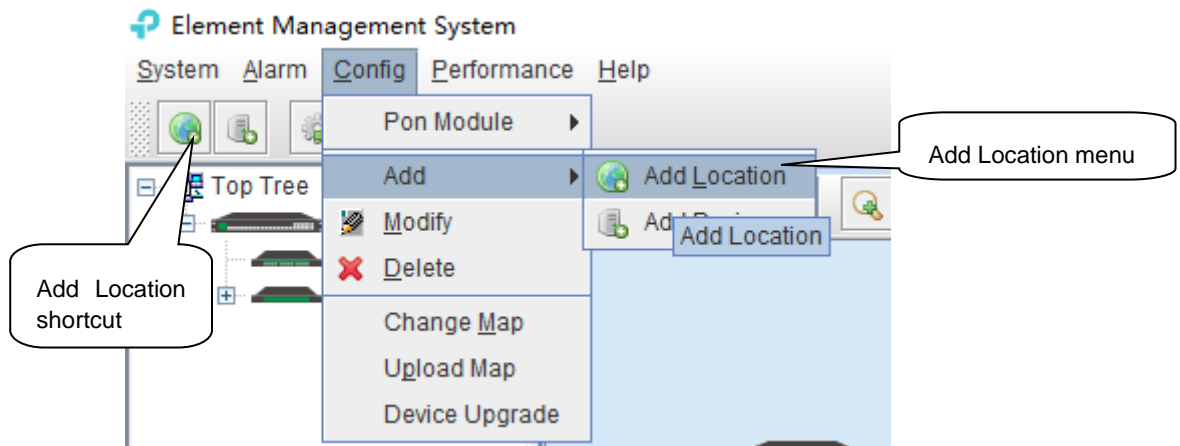
As above figure, through **'Add Location'** menu or its shortcut, open add location operate window, as following:
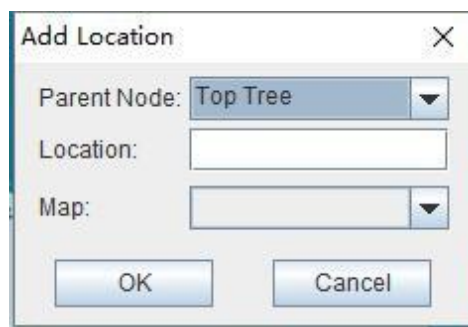
Operation steps:

i. Select the parent node for new added node;

ii. Input the name of new node;

iii. Select map for the new location node (The map should be upload first), when select this node on top-tree, the topology area will apply this map;

2) Location node delete
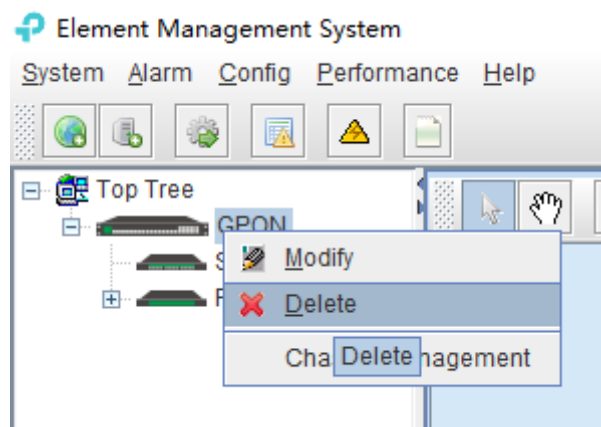
As above figure, right click the selected location node and delete it.

5.2 Add and Delete Device

Note: Before using EMS to manage an EPON device, you need to login OLT system to enable SNMP functions and to configure the read-write community. The read the community is public, and write community is private by default.

Configuration and view commands are as follows: (see CLI user Manual for more relevant configuration view commands).

```
OLT(config)# snmp-agent enable

OLT(config)# snmp-agent community read public

OLT(config)# snmp-agent community write private

OLT(config)# show snmp-agent status
   Snmp agent status: Enable

OLT(config)# show snmp-agent community
----------------------------------------------------------------------------
   Community-Name              VACM-Name        View-Name
----------------------------------------------------------------------------
   public                      default          all
   private                     default          all
----------------------------------------------------------------------------

OLT(config)# █
```

Next, you need to add the device to the EMS manually, and the operation of adding a GPON OLT device is as follows.

1) Add OLT
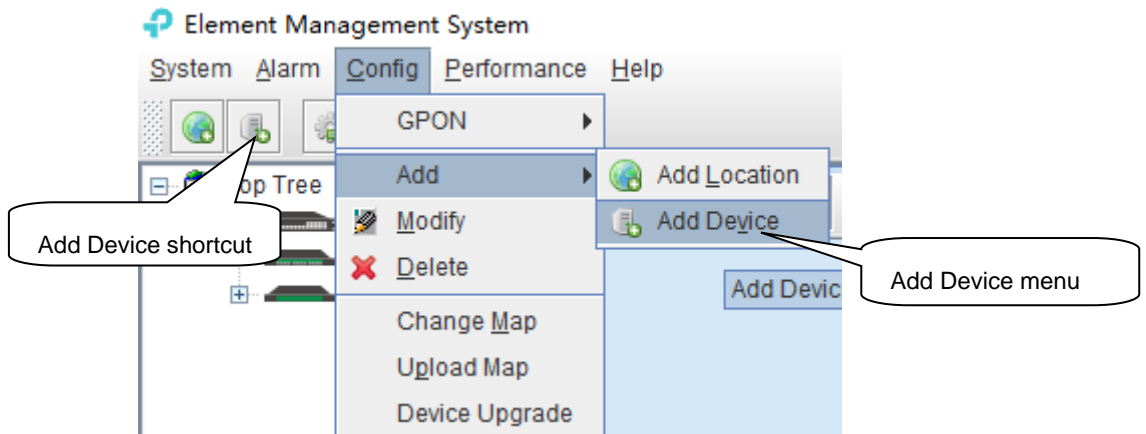
As above figure, through **'Add Device'** sub-menu or its shortcut to open the device add window and add device.

As above figure, the new added device need configure following parameters:

➢ Location

Select the location node where the added device should be located.

➢ Device Type

Select the device type for the new added device. The EMS can manage all TP-Link GPON OLT products. So, it is needed to select correct device type. Select P1200-08 for TP-Link 8-port GPON OLT device.

➢ Device Alias

In order to recognize the managed device easily, a suitable alias is normally needed instead of IP Address or MAC Address. This device alias will be displayed in the device list area.

➢ IP Address

Input the management IP Address of the new added element device, which can be in-band or out-band IP Address.

➢ Read and Write Community

EMS software is designed based on SNMP protocol to communicate with managed devices. Read and write community is used by SNMP protocol as access password. Community value inputted here should be the same with which configured in managed device, such EMS can communicate with the managed device successfully.

➢ Polling Interval and SNMP Read and Write Timeout Value

EMS software will poll the managed device periodically with a configured time interval. Normally, the poll interval can use the default value. SNMP read and write timeout values are the longest wait time for EMS to wait response from managed device. Usually, the default value is suitable. Manager can also revise these values according to the real network performance situation.

When the above parameters are configured, click OK button to finish the device add operation. When success, the new added device's icon will appear in the device list and topology area. Showing as following figure:
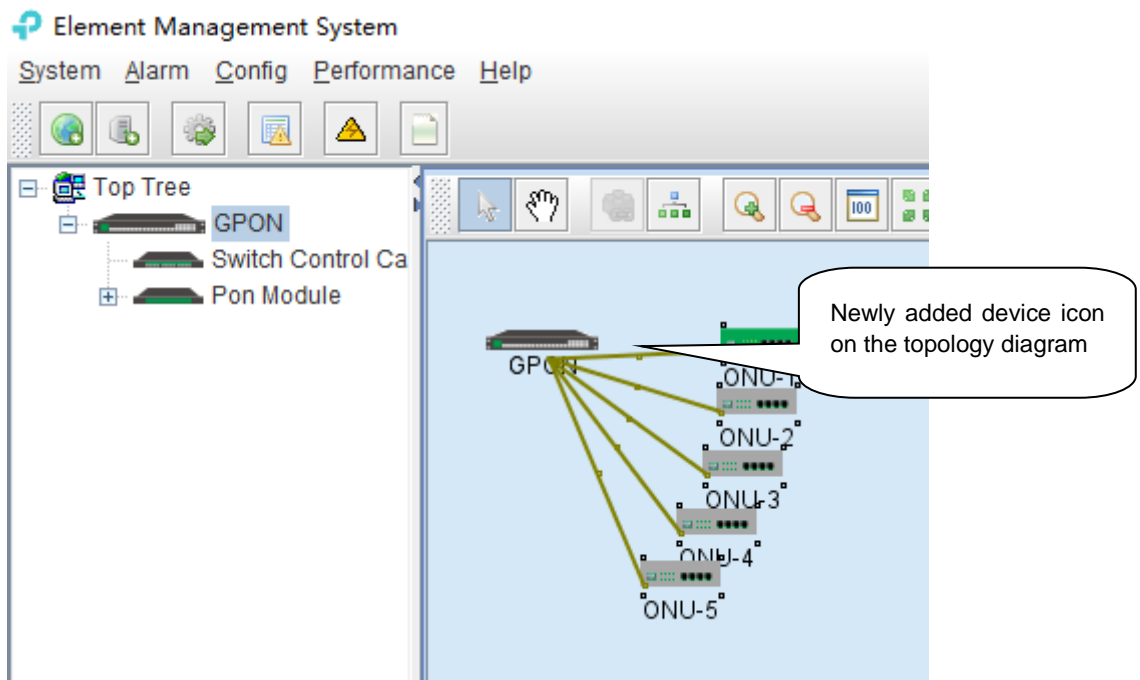
2) Delete OLT

Obsolete or unwanted device in device list can be deleted from EMS. Right click on the selected device icon and select Delete option to delete a device.

Note：

i. Deleted device can't be restored and need to be added when need.

ii. All the information of the deleted device will also be removed from EMS.

iii. None any configurations on the deleted device itself will be changed.

6 GPON OLT Management

OLT device mainly consists of OLT chassis, Switch and Control module, PON Card module and ONU Device management module. The following sections describe the management of EMS software for these parts.

6.1 OLT Chassis Management

Double click the OLT chassis icon to open the chassis management window. Typically as following figure：
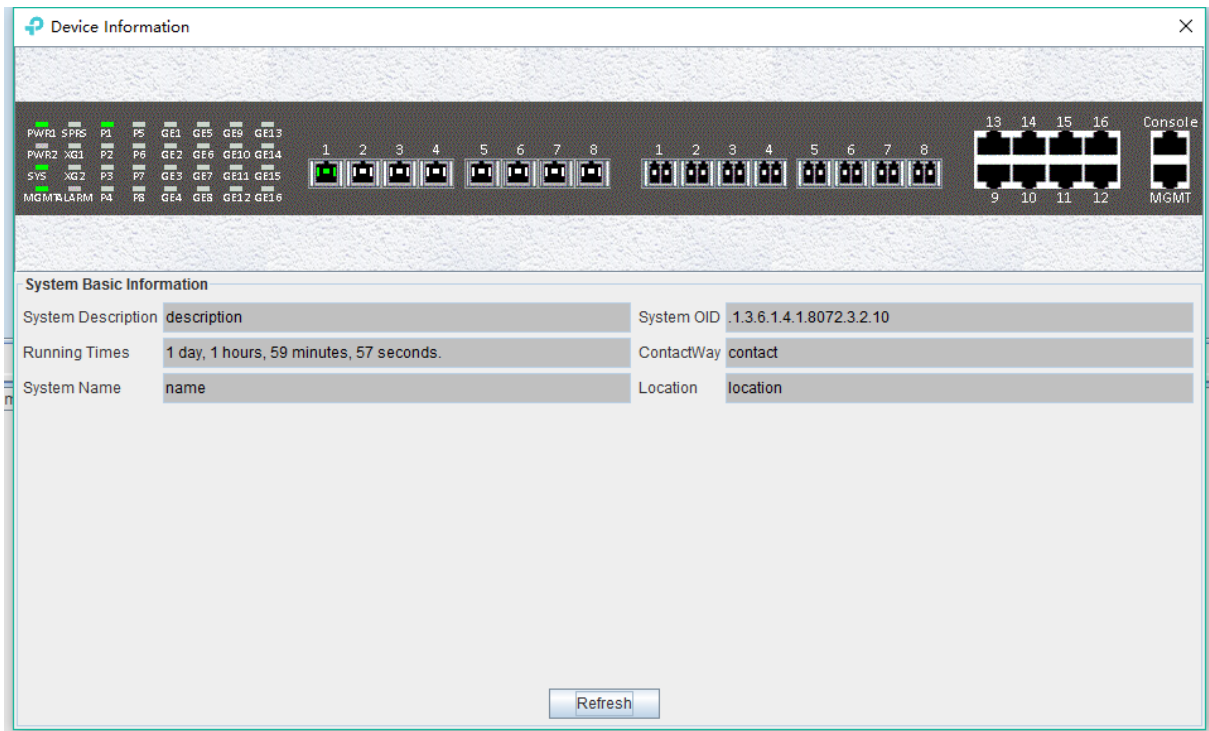
OLT chassis management includes following several parts.

Front Panel

The equipment panel parts display the power supply of the device and the status of each port indicator light in real time. The meaning of the indicator is subject to the panel label.

When EMS can't connect with the OLT this window will change to gray color.

Basic Information

This section shows the system description, system OID, running time, contact information, system name, location and other basic information. Click 'Refresh' button can refresh the above information.

6.2 Control Card Management

Double click '**Switch Control Card**' icon in device list to open the **'Control Card Management'** window. Typical as following figure:
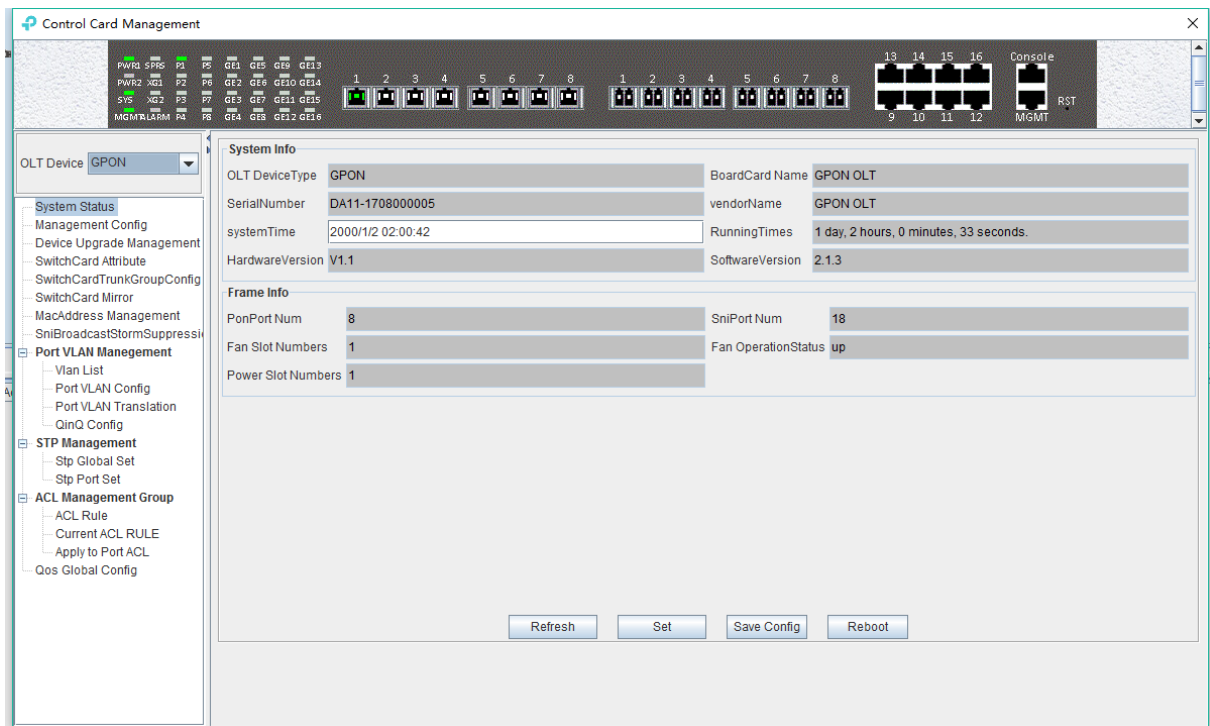
Following management features are contained on this window:

✓ view or set device basic information;

✓ view or set the IP address, the trap address, SNMP management parameters, etc;

✓ upgrade OLT device`s firmware;

✓ view and set the uplink ports, such as the admin status of port, and the port rate;

✓ Swap TRUNK functionality (link aggregation) configuration;

✓ MAC address table management;

✓ Uplink ports storm suppression management;

✓ OLT port VLAN configuration management;

✓ OLT IGMP configuration;

✓ OLT STP configuration;

✓ ACL management configuration;

✓ QoS configuration;

Following sections in this part introduce the management features contained in the control card management window.

6.2.1 View System Status

Double click the **'Switch Control Card'** icon on the left side of the main page to open the **'Control Card Management'** window and enter the **'System Status'** to view the page.
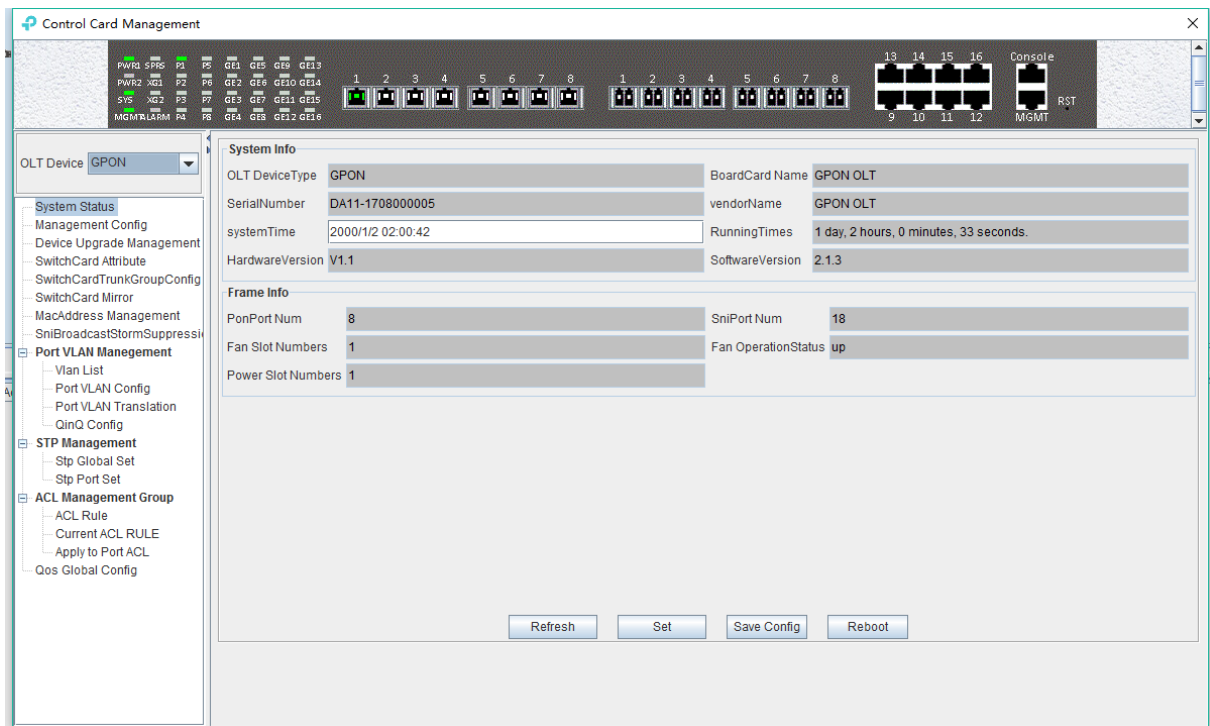
System info

Display Board card name, serial number, vendor Name, system time, software and hardware version number, device running time and other information.

Frame info

Display PON port number, GE port number, fan slot numbers, and fan operation status.

Save config

The button of **'Save Config'** is mainly for saving all configuration of OLT.

Reboot

Click **'Reboot'** button, and OLT will reboot.

Set

The button of **'Set'** is used for setting system time.

6.2.2 OLT Management Configuration

Double click the **'Switch Control Card'** icon on the left side of the main page to open the **'Control Card Management'** window and enter the '**Management Config**' page:
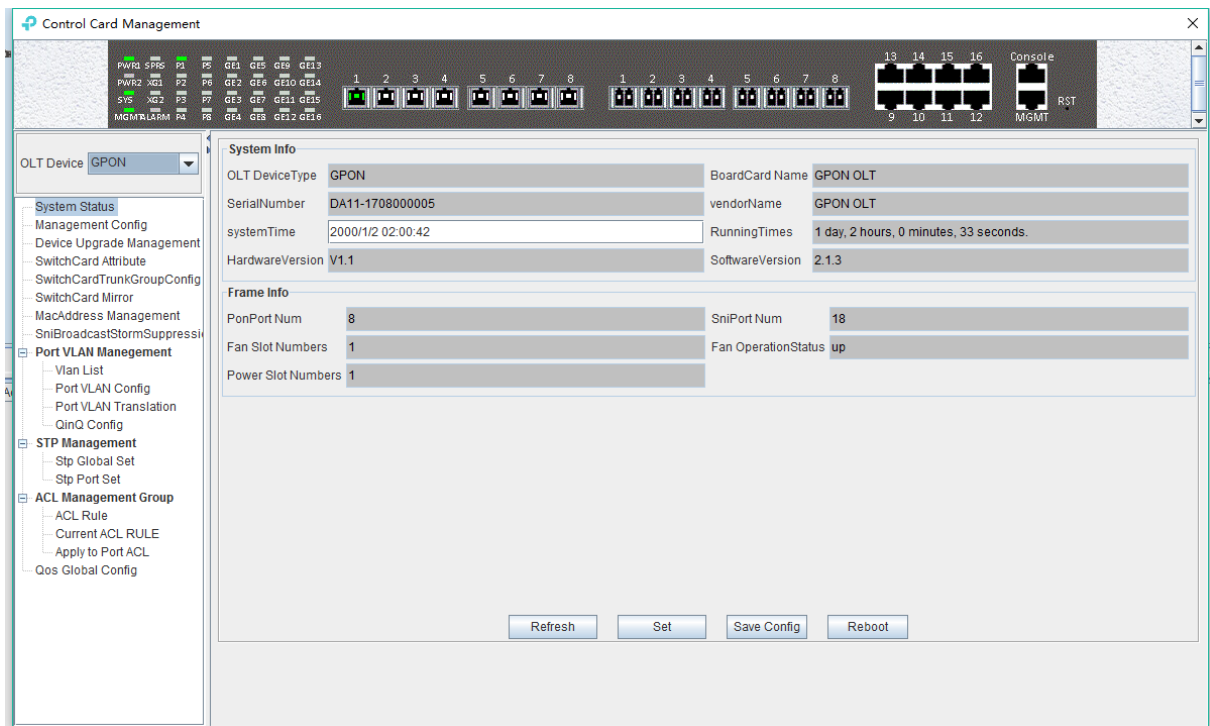
System info

View inband IP address, outband IP address, subnet mask, gateway, inband VLAN.

Instructions:

1) Inband management comes from uplink port and needs to add management VLAN for uplink port.

2) Outband management comes from MGMT port and needs to add IP for MGMT port.

3) Normally, modify the IP of management and device parameters, EMS will lose connection with device, user need to modify management IP of device in EMS, only in this way, can we connect device again.

Trap address

Alarm receiving address is the destination IP address which alarm information sent to, when the alarm occur, GPON OLT will sent Data Packet of 'SNMP TRAP' to the management PC, usually, trap address is same to the PC's IP which start EMS, Users can set four trap addresses mostly.

[Example of trap address configuration]

Example: configure trap information as follows :host name is 1234,Alarm reception address is 192.168.5.135，The alarm port is 162，community is public.
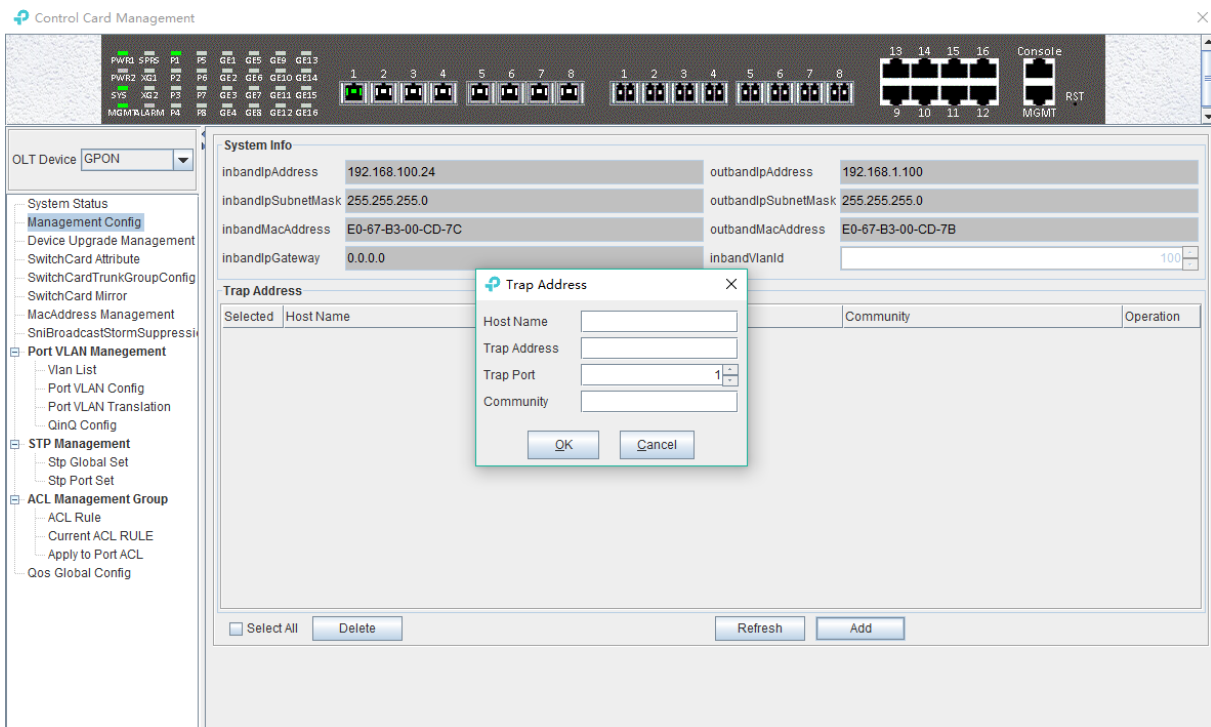
6.2.3 Device Upgrade Management

Double click the **'Switch Control Card'** icon on the left side of the main page to open the **'Control Card Management'** window and enter the **'Device Upgrade Management'** page.

The configuration management interface can upgrade the software of OLT.

Note: before upgrading, you need to ensure that there is an upgrade file. The FTP server need to connect with OLT.

[Example of device upgrade configuration]

Example: Upgrade firmware via FTP server which IP is 192.168.5.153.

6.2.4 OLT Uplink Port Attribute Configuration

Double click the **'Switch Control Card'** icon on the left side of the main page to open the **'Control Card Management'** window and enter the **'Switch Card Attribute'** page.
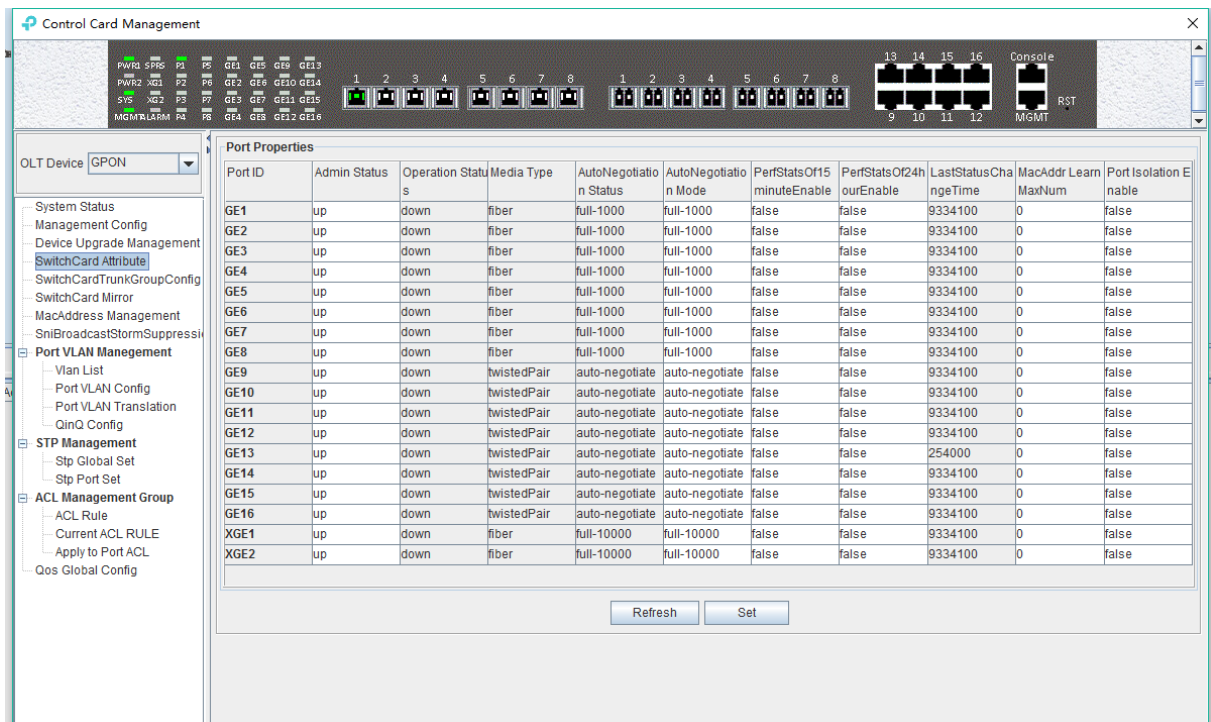
The '**Switch Card Attribute**' management page is mainly used to configure and view the attribute parameters of OLT 's uplink port (GE photoelectric port and 10GE uplink port). The parameters are described as follows:

➢ Admin Status

Set the uplink port state to enable or disable. When the port is set to **'Up'**, the port is opened and

when the port is set to **'Down'**, the port is closed, 'testing' status is not available currently.

➤ Operation Status

Displays the current link state of the uplink port, when the uplink port connects with the end devices, the operation state is displayed as **'Up '**; when the uplink port does not connect with any end devices, the operation state is displayed as **'Down '**, and the running state only shows but can't be configured.

➤ Media Type

Show the media type of the uplink port, the default interface of GE1-GE8 is the optical interface, and the media type is shown as **'Fiber'.** the default interface of GE9-GE16 is the electrical interface, and the media type is shown as **'Twisted Pair '**; XGE1 and XGE2 are uplink port of 10GE.

➤ Auto Negotiation Status

Display the uplink port rate and duplex mode, 1000M full duplex, 100M full duplex, 10M full duplex and auto negotiation status.

Auto Negotiation Mode

Configure the uplink port rate and duplex mode, 1000M full duplex, 100M full duplex, 10M full duplex and auto negotiation mode.

➤ PerfStats Of 15 minute Enable

Configure PerfStats Of 15 minute Enable of uplink port, **'False'** means stop performance statistics of every fifteen minutes on uplink port. **'True'** means start performance statistics of Every fifteen minutes on uplink port.

➤ PerfStats Of 24 hour Enable

Configure PerfStats Of 24 hours Enable of uplink port, **'False'** means stop performance statistics of every 24 hours on uplink port. **'True'** means start performance statistics of every 24 hours on uplink port.

➤ Last Status Change time

Show the change cycle of performance statistics time, and the time of performance statistics changes every 300ms.

➤ Mac Addr Learn Max Num

Limit the number of MAC addresses (0-8092) that are permitted to pass by the uplink port, set to '0' means no limit, set to **'1-8092'** to limit the number of MAC addresses which permitted to pass by the uplink port.

➤ Port Isolation Enable

Set up data isolation or not between one uplink port and others. **'False'** means uplink port can access to each other. **'True'** means uplink port can`t access to the other uplink port.

6.2.5 OLT trunk(LACP) Configuration

The device supports the link aggregation protocol LACP which conforms to the IEEE802.3 ad standard. The LACP protocol is used to bundle multiple uplink ports together to form a single logical connection to increase the bandwidth of the link and realize backup functions of uplink port, which means when a port is broken, other ports can still communicate.
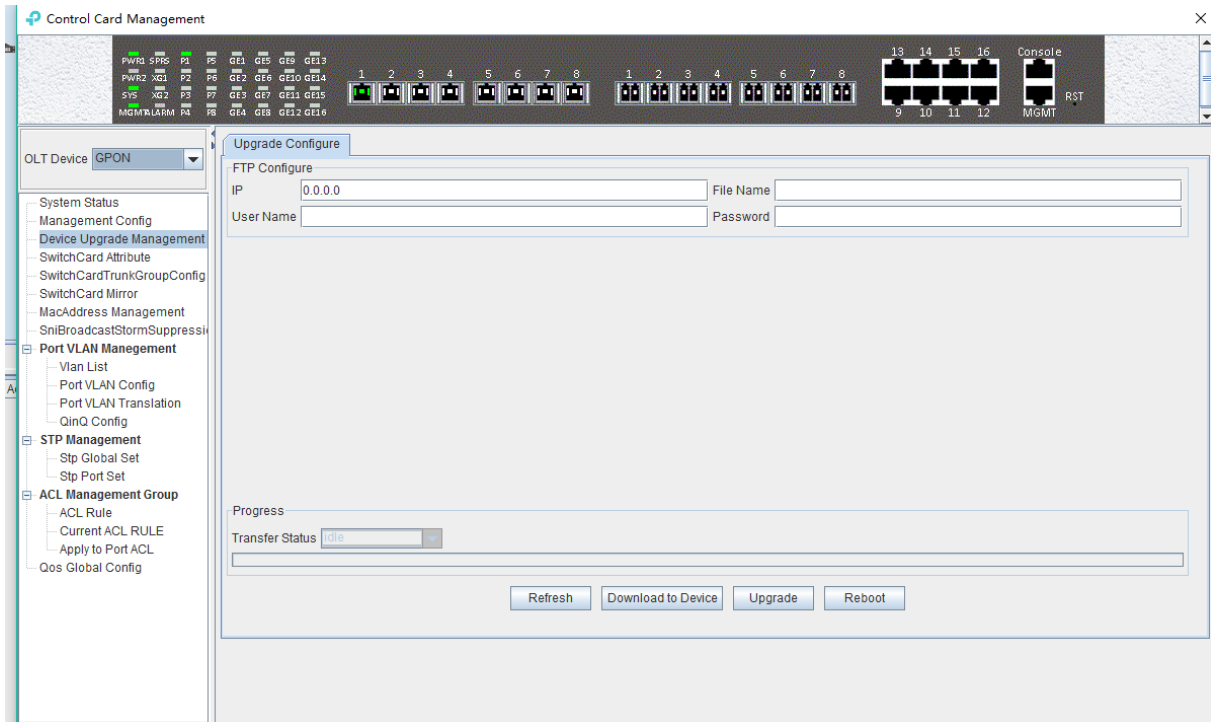
Double click the **'Switch Control Card'** icon on the left side of the main interface to open the

'Control Card Management' window and enter the **'Switch Card Trunk Group Config'** page.
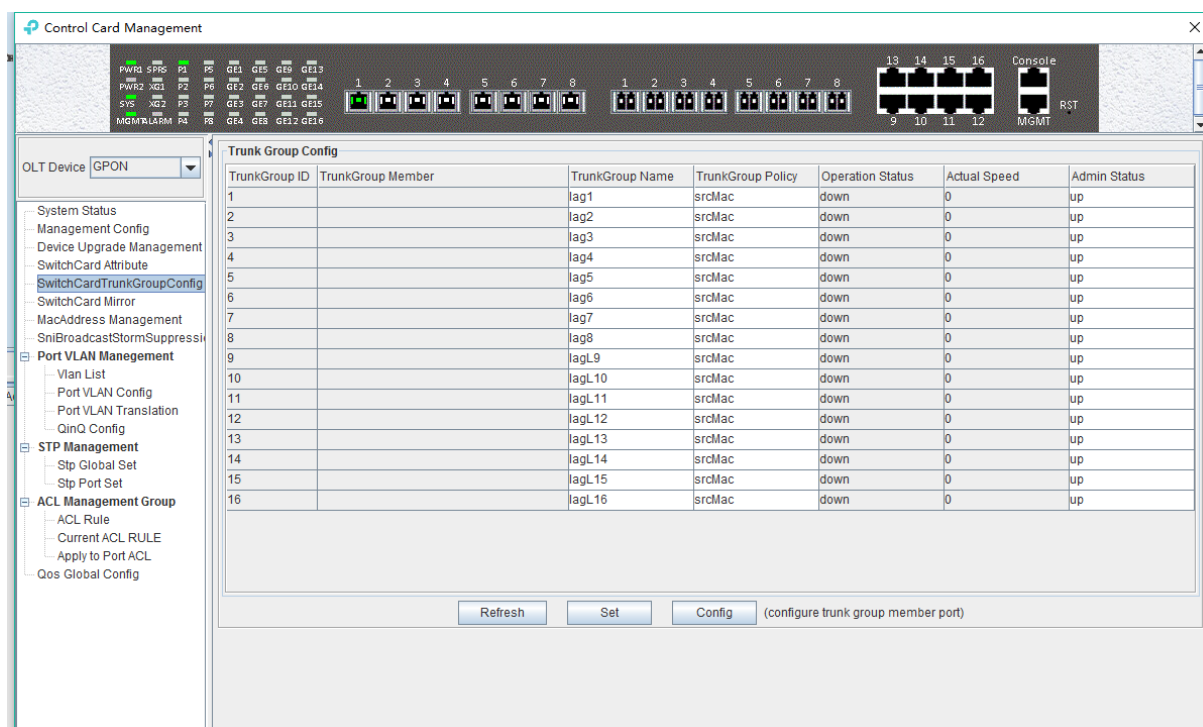
The features of OLT LACP are as follows:

- Link aggregation function is mainly applied to all uplink port;

- The default aggregation group is 16;

- All port can be added to a aggregation group;

- Support several equalization algorithms based on the source and destination MAC address, source and destination IP address;

- Each port can be assigned to only one aggregation group and cannot be assigned to multiple aggregation groups at the same time.

LACP Function parameter on EMS are as follows:

Trunk Group ID

Show number of link aggregation groups available by default on OLT, default number is 1-16, link aggregation groups can't be added, only can be modified and configured.

Trunk Group Member

Show which uplink port members are already in the link aggregation group.

Trunk Group Name

Name of the link aggregation group.

Trunk Group Policy

Select a strategy of link aggregation negotiation, which can be negotiated in several ways, such as the source and destination MAC address, source, and destination IP address.

Operation Status

Show the configuration state of the link aggregation group, the 'Up' indicates that the configured link aggregation group is successful and has taken effect, **'Down'** indicates that the configured link

aggregation group is unsuccessful and hasn't taken effect.

Actual Speed

Shows the current negotiation rate of the link aggregation group.

Admin Status

Configure the management status of the link aggregation group, **'Up'** to enable the link aggregation group and **'Down'** to disable the link aggregation group.

[Example of link aggregation configuration]

Example: Add GE1 and GE3 to link aggregation group 1, named 1234, with source MAC and destination MAC negotiation.
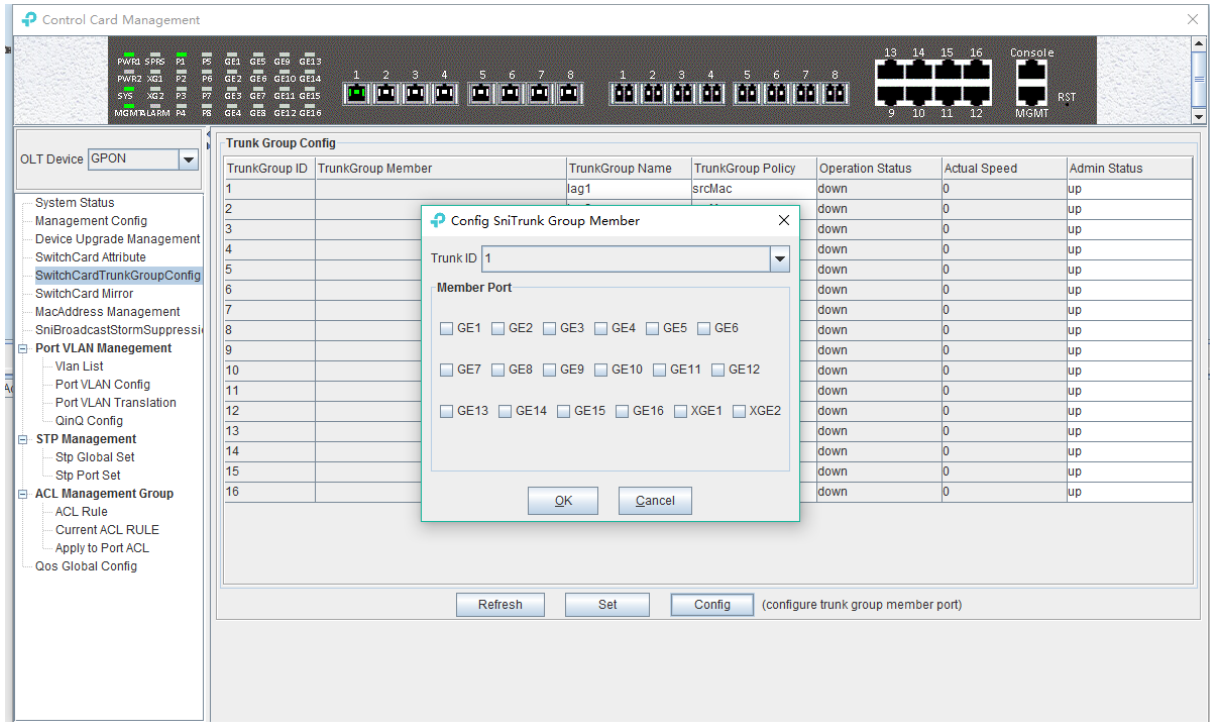
6.2.6 OLT Port Mirror Configuration

Port mirror function is used to copy the packets of Source port to other port (destination port), the user can monitor the packets which copy to the destination port to monitor network and debug. All uplink port and PON port can be set to source or destination ports.

Double click the **'Switch Control Card'** icon on the left side of the main page to open the **'Control Card Management'** window and enter the **'Switch Card Mirror'** page.
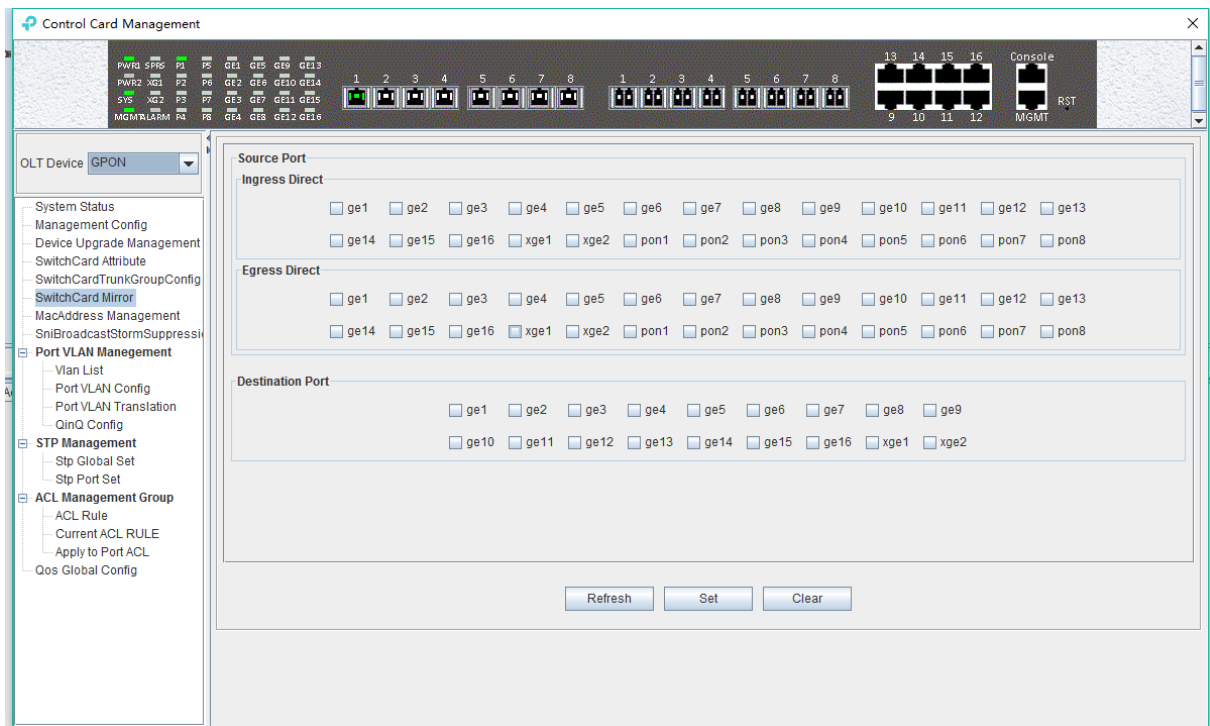
Source port

Specify the source port that needs to be captured and analyzed. User should know the concepts of **'Ingress Direct'** and **'Egress Direct'** first:

'Egress Direct' means the direction of the packets leave the port; **'Ingress Direct'** means the direction the packets enter the port.

When only one direction is checked, OLT will copy packets of one direction to the destination port. When both directions are selected, all packets are mirrored to the destination port.

Destination port

The port that receives packets of the source port.

The configuration of the ports is as follows:

1) **select the source port**. All ports can be selected as the source port, each port has **'Ingress Direct'** and **'Egress Direct'**.

2) **specify the destination port**. You can specify one of the ports as the destination port, and all source port packets will be forwarded to the specified destination port.

[Example of port mirror configuration]

Example: check ge2 in the **'Ingress Direct'** and **'Egress Direct'** and select ge8 in **'Destination port'** then click **'Set'** button. All traffic of ge2 are mirrored to ge8 port.
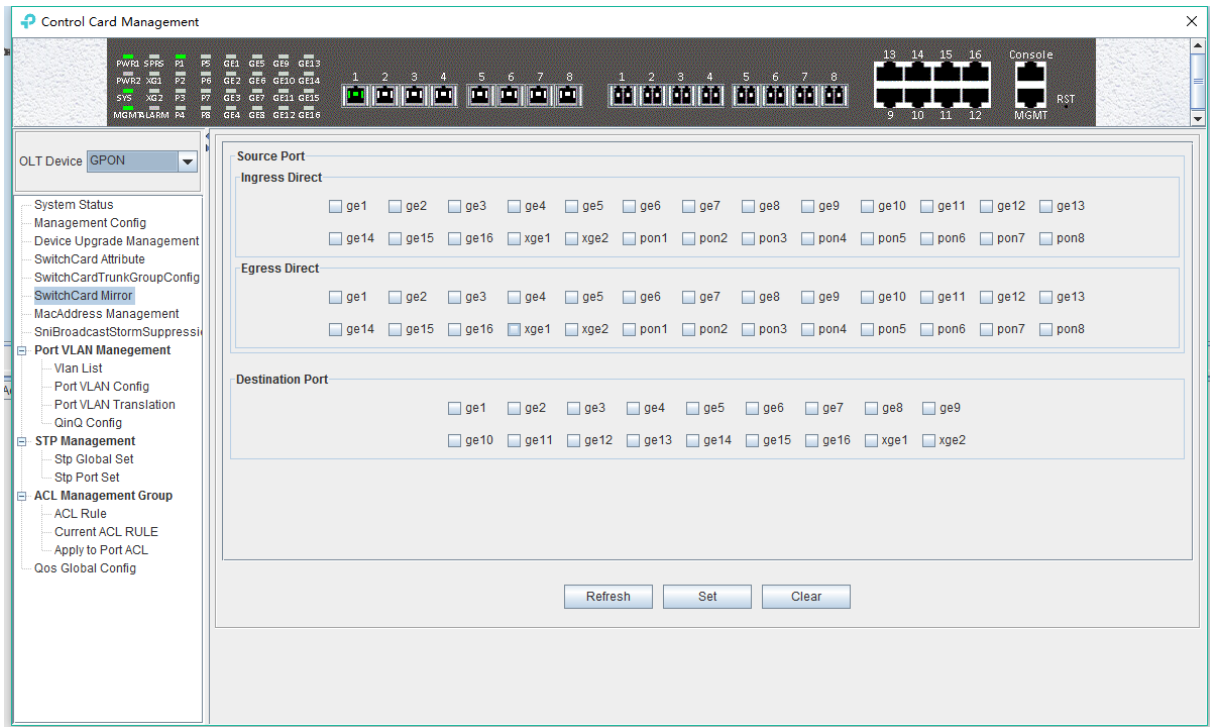
6.2.7 OLT MAC Address Management

Double click the **'Switch Control Card'** icon on the left side of the main page to open the **'Control Card Management'** window and enter the '**Mac Address Management**' page.
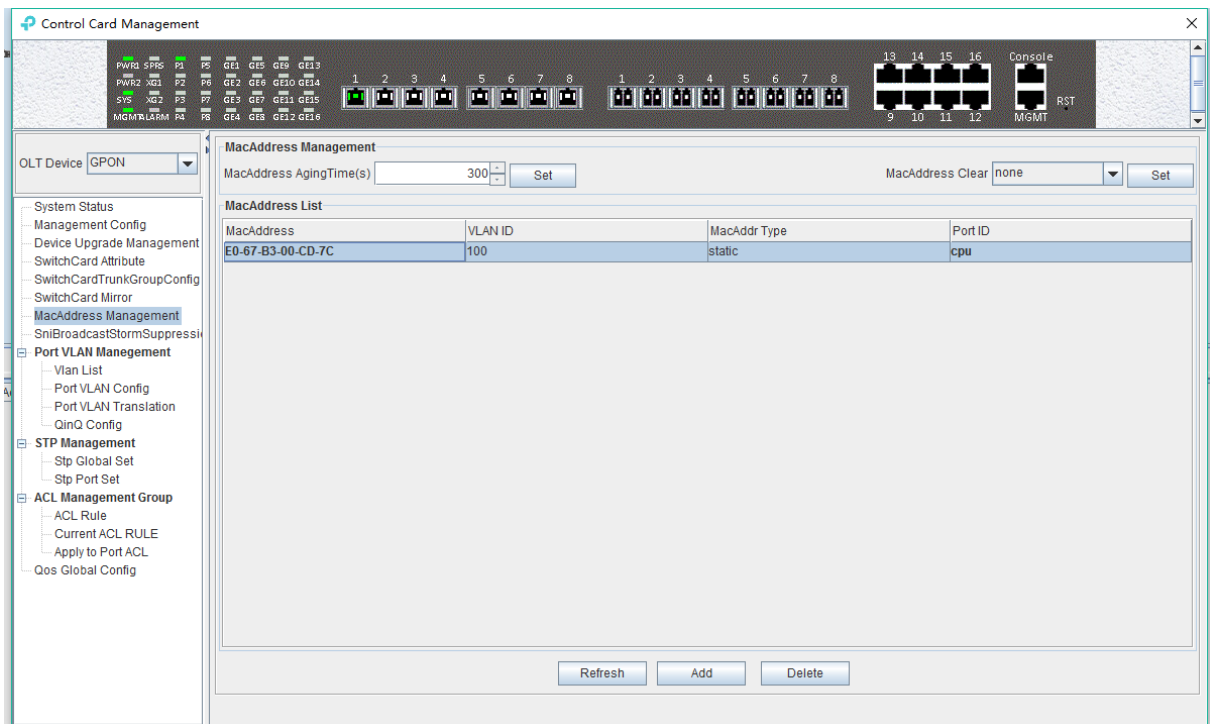
MAC Address Management

MAC address management window is used to configure OLT's mac address aging time and clear MAC address, view the MAC address information which OLT has learnt, including MAC address, VLAN ID, type of MAC address, port ID, parameters are as follows:

➢ Mac address aging time

Set OLT's MAC address aging time. The MAC address that OLT learned will be cleaned automatically after this time.

➢ Mac address clear

Choose a type of mac address in **'Mac Address Clear'** then click the **'Set'** button, the MAC address of the specified type will be cleaned.

➢ Mac Address List

The MAC address list mainly displays the MAC address that have learned by OLT, including the VLAN of the MAC address, the type and the port where the MAC address is learnt. The parameters we can view or configured in the MAC address list are as follows:

- Mac Address

    Specified mac address, format as: xx-xx-xx-xx-xx-xx or xx:xx:xx:xx:xx:xx.

- VLAN ID

    Display the vlan of mac address which from uplink port or pon port and the the vlan which we set for static mac address.

- Mac Addr Type

    There are three options, static, blackhole, and dynamic.

        Static represents a static MAC address. When the source MAC address of the packet matches this static MAC address, it will be forwarded. The static MAC address will not be cleaned after the aging time.
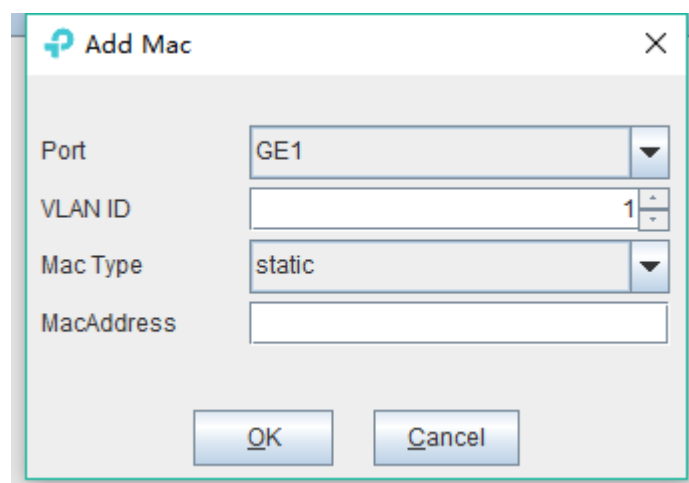
        Blackhole represents the black hole of the MAC address. If the source MAC address of the message is matched with this MAC address, it is discarded and not allowed to be circulated.

        Dynamic represents a MAC address automatically learnt by OLT, it will be cleaned after the aging time.

- Port ID

    Show the port which MAC address learned from.

Click the **'Add'** button to bring up a window of **'Add MAC'**. We can add a static MAC address to the MAC address table.

After finishing configuration, click **'Confirm'** button, at the same time, MAC address list will show

this new added mac-address entry.

'**Delete**' button: Choose a specified mac-address entry in MAC address list, clicking '**Delete**' button can delete this entry.
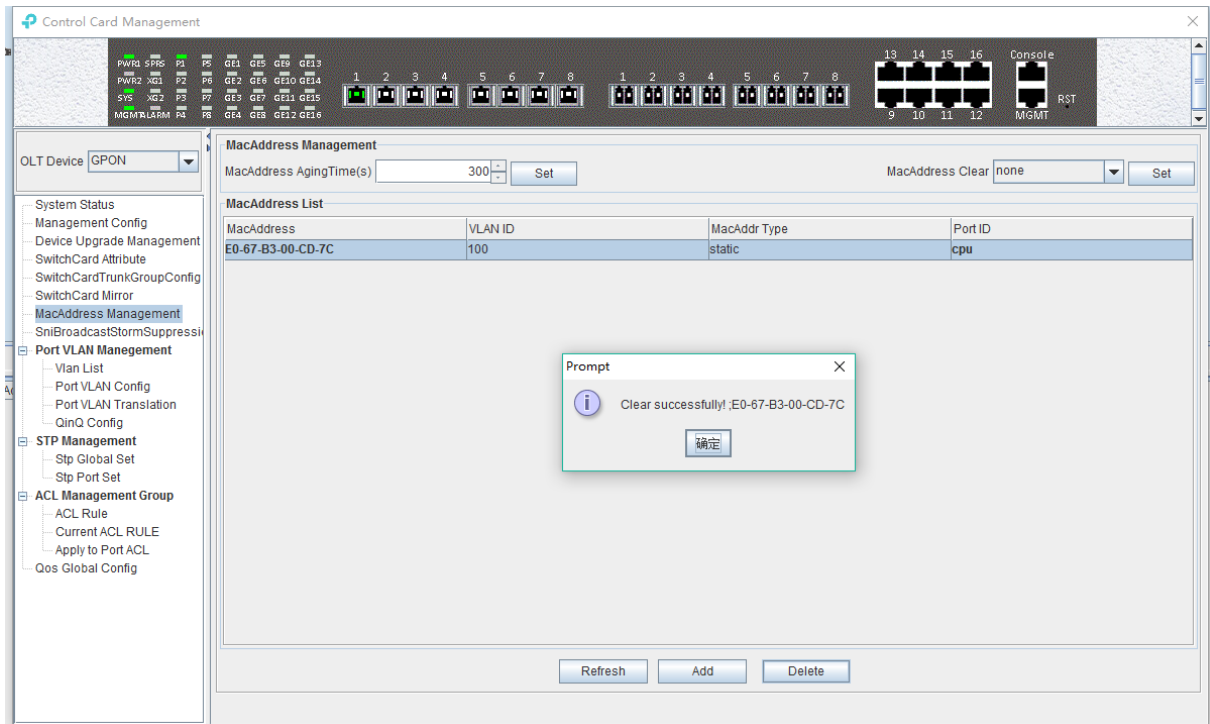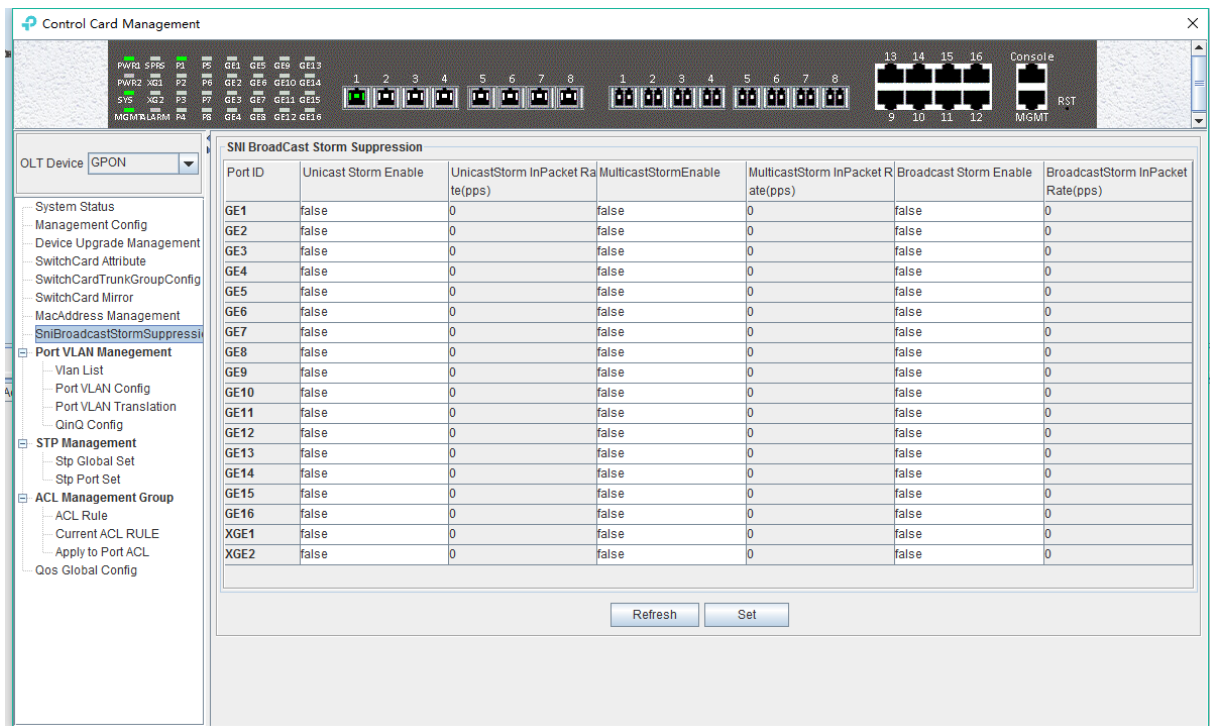
Click '**Refresh**' button to update MAC address list.

6.2.8 Uplink Port Broadcast Storm Suppression Configuration

Storm suppression function is used to let the uplink port suppress the unicast storms, multicast storms and broadcast storms to prevent these storms from adversely impacting the network performance.

Double click the '**Switch Control Card**' icon on the left side of the main page, open the '**Control Card Management**' window, enter the '**SNI Broadcast Storm Suppression**' management page configuration.

✓ Unicast / multicast / broadcast storm suppression enabled

When **'True'** is selected, the unicast / multicast / broadcast storm suppression function of the port is enabled.

When **'False'** is selected, the unicast / multicast / broadcast storm suppression function of the port is disabled.

✓ Unicast / multicast / broadcast inpacket rate

This parameter is used to configure the packet rate limitation, when the unicast/multicast/broadcast packet rate is higher than the limitation, the storm suppression function will be enabled, and the corresponding traffic will be suppressed. The limitation value should be between 1-1488100 pps.

[Example of storm suppression configuration]

Example: The unicast storm suppression function is set to **True** and the unicast inpacket rate is 5000 pps. The multicast storm suppression function is set to **True** and the multicast inpacket rate to 5000 pps. The broadcast storm suppression function is set to **True** and the broadcast inpacket rate to 5000 pps. Click **'Set'** button after the configuration, a prompt window will pop up and click the **'OK'** button to complete the configuration.

Control Card Management

SNI BroadCast Storm Suppression

Port ID	Unicast Storm Enable	UnicastStorm InPacket Rate(pps)	MulticastStormEnable	MulticastStorm InPacket Rate(pps)	Broadcast Storm Enable	BroadcastStorm InPacket Rate(pps)
GE1	false	0	false	0	false	0
GE2	false	0	false	0	false	0
GE3	false	0	false	0	false	0
GE4	false	0	false	0	false	0
GE5	false	0	false	0	false	0
GE6	false	0	false	0	false	0
GE7	false	0	false	0	false	0
GE8	false	0	false	0	false	0
GE9	false	0	false	0	false	0
GE10	false	0	false	0	false	0
GE11	false	0	false	0	false	0
GE12	false	0	false	0	false	0
GE13	false	0	false	0	false	0
GE14	false	0	false	0	false	0
GE15	false	0	false	0	false	0
GE16	false	0	false	0	false	0
XGE1	false	0	false	0	false	0
XGE2	false	0	false	0	false	0

Refresh   Set

OLT Device: GPON

System Status
Management Config
Device Upgrade Management
SwitchCard Attribute
SwitchCardTrunkGroupConfig
SwitchCard Mirror
MacAddress Management
SniBroadcastStormSuppressi
Port VLAN Management
  Vlan List
  Port VLAN Config
  Port VLAN Translation
  QinQ Config
STP Management
  Stp Global Set
  Stp Port Set
ACL Management Group
  ACL Rule
  Current ACL RULE
  Apply to Port ACL
Qos Global Config

6.2.9 OLT Port VLAN Management

VLAN (Virtual Local Area Network), is a kind of technology that logically divided the LAN into multiple segments based on user demand (functions, departments or applications, etc.) without considering the physical location of the virtual network. VLAN technology allows a network administrator to divide a physical network into different logical segments (VLAN), each containing a set of devices with the same requirements.

The advantage of VLAN technology is that the traffic within a VLAN will not be forwarded to other VLANs, thus helping to control network traffic, simplify network management and improve network security.

The VLAN configuration of the GPON system is divided into the VLAN configuration of the OLT and the VLAN configuration of the ONU part. The VLAN management of the **'Switch Control Card'** section refers to the VLAN configuration of the OLT part.

The VLAN function of the OLT part of the TP-Link GPON system is as follows:

✓ Support Port-based VLAN and IEEE802.1Q VLAN.

✓ Support full 4K VLAN group, VID range 1~4094.

✓ VLAN 1 is the system reserved VLAN, it includes all switch ports, all ports are UNTAG mode.

✓ All switch ports, including uplink ports and downlink ports support VLAN Partition.

6.2.9.1 OLT Port VLAN Management

Double click the **'Switch Control Card'** icon on the left side of the main page, open the **'Control Card Management'** window, and enter the '**VLAN List**' page. Typical page is as follows:
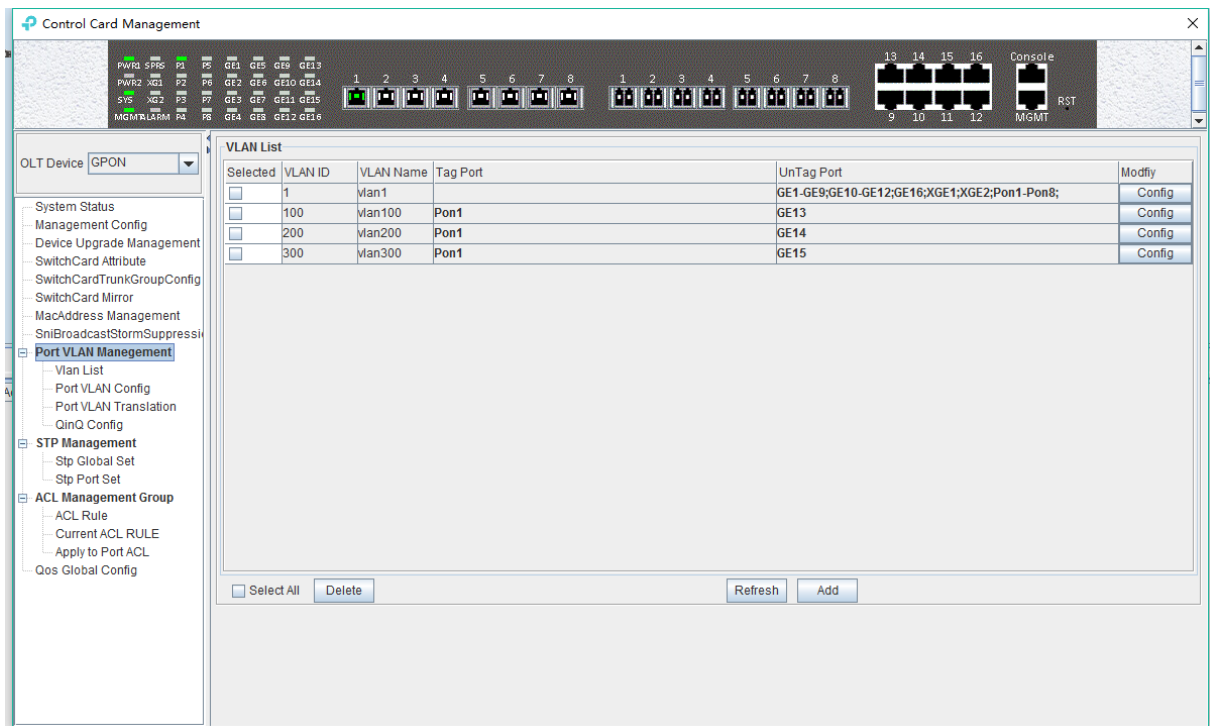
The VLAN list has **'Selected'**, **'VLAN ID'**, **'VLAN Name'**, **'Tag Port'**, **'Untag Port'**, **'Modify'** items. Here's a brief introduction to these projects:

Select

Use to select a VLAN entry.

VLAN ID / VLAN Name

VLAN ID displays all the VLAN ID that are available on the current OLT. VLAN Name displays the name of the current existing VLAN.

Tag Port / Untag Port

In the Port of Tag Port, the egress packets will be tagged with a VLAN Tag. In the Port of Untag Port, the VLAN tag of the egress packets will be stripped off.
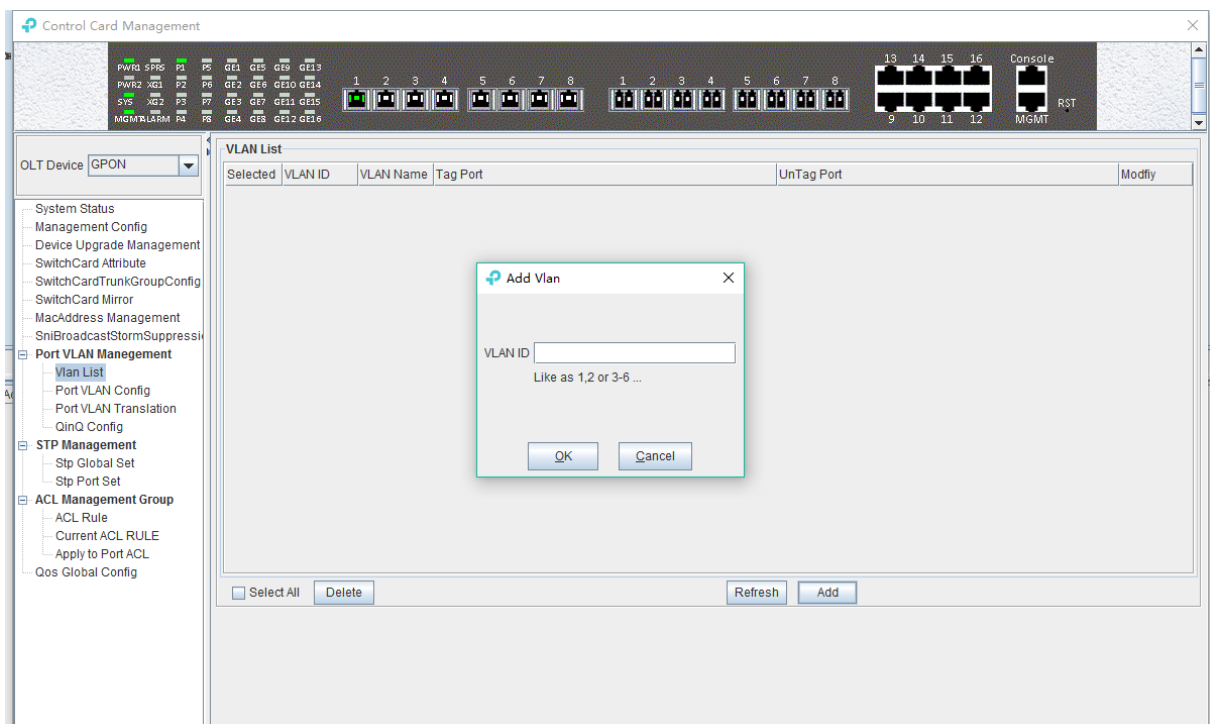
6.2.9.2 Modify OLT VLAN

Each VLAN entry has a 'Config' button, which is used to modify the VLAN's 'Tag Mode' and 'Member Port' as shown below, click 'Confirm' button to complete the configuration after setting up.
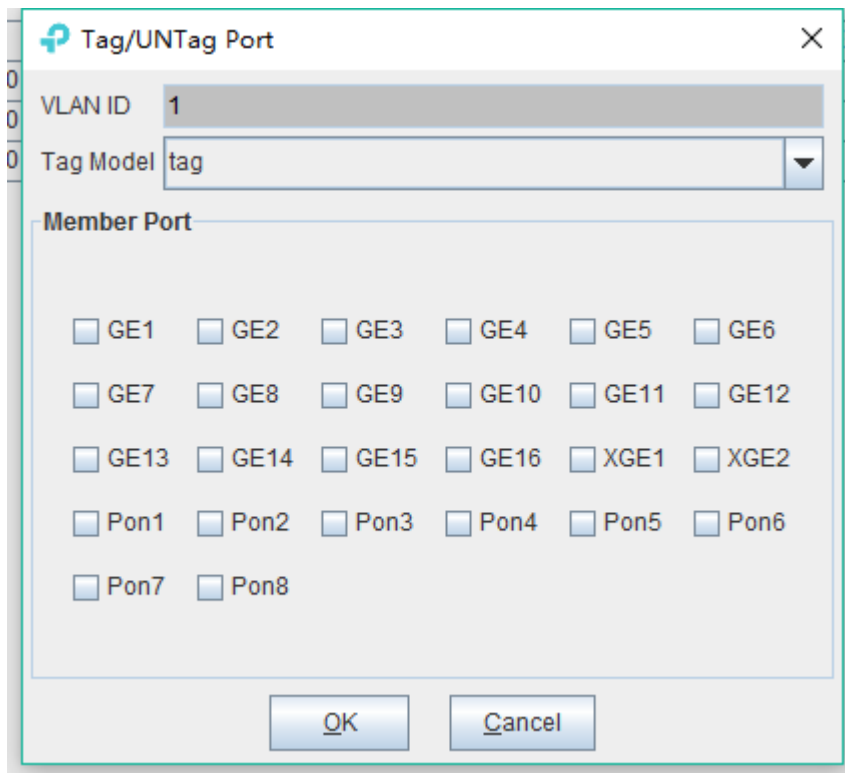
6.2.9.3 Add OLT VLAN

Here is a **'Add'** button in the **'VLAN List'** page. Click the button to add a VLAN ID to the OLT, and the configuration completes after click **'OK'** button.

6.2.9.4 OLT Port VLAN Configuration

Double click the **'Switch Control Card'** icon on the left side of the main page, open the **'Control Card Management'** window, and enter the port **'VLAN Configuration'** page. Typical page is as follows.
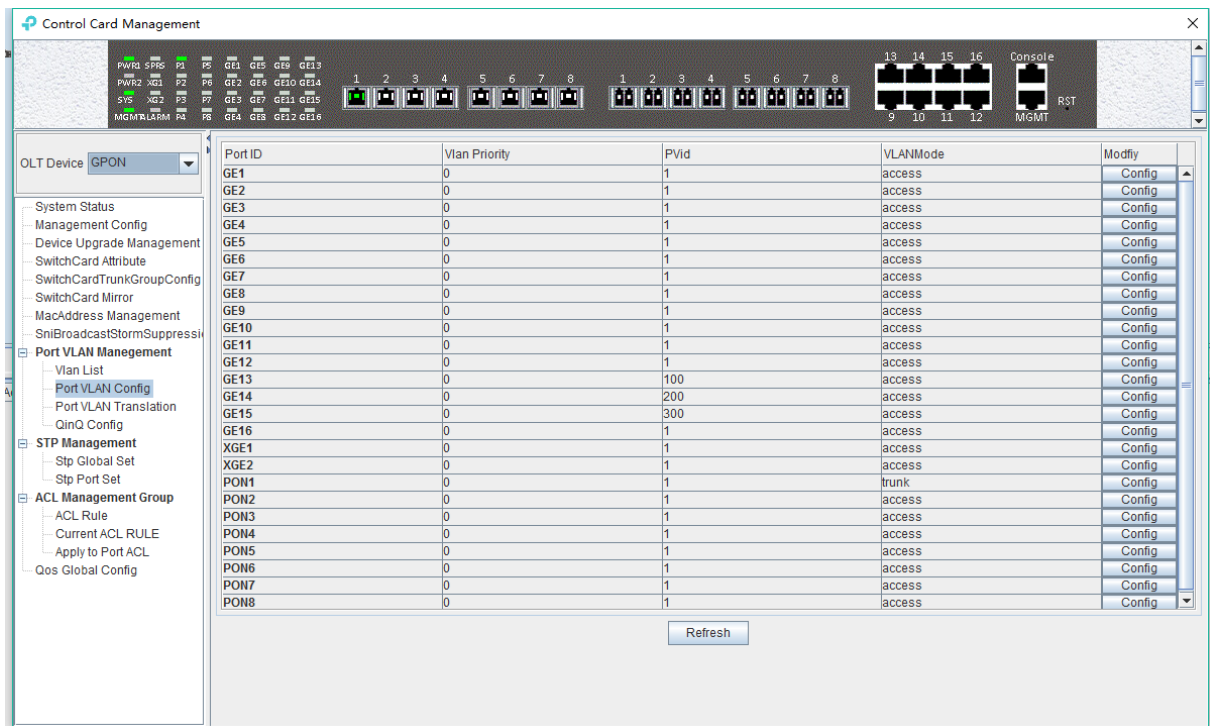
Port ID

Displays the corresponding port number, GE represents the uplink port, XGE represents the Gigabit port, PON represents the PON interface.

VLAN Priority

Displays the priority of the current port VLAN, which shows the value of 0-7, the minimum priority of 0, and the highest priority of 7.

Port VLAN（PVID）

Displays the default VLAN for the current port, which shows the value of 1-4094. If you want to configure the VLAN of a port to a new one, you need to make sure the new VLAN is added to the OLT already.

VLAN Mode

Displays the VLAN mode of the current port, where the modes that can be displayed are: access, hybrid, trunk.

Modify

Double click the **'Config'** button to configure the VLAN priority, port VLAN ID(PVID), and VLAN mode of the corresponding port. Click the **'Set'** button to complete the configuration. As shown in the following figure.
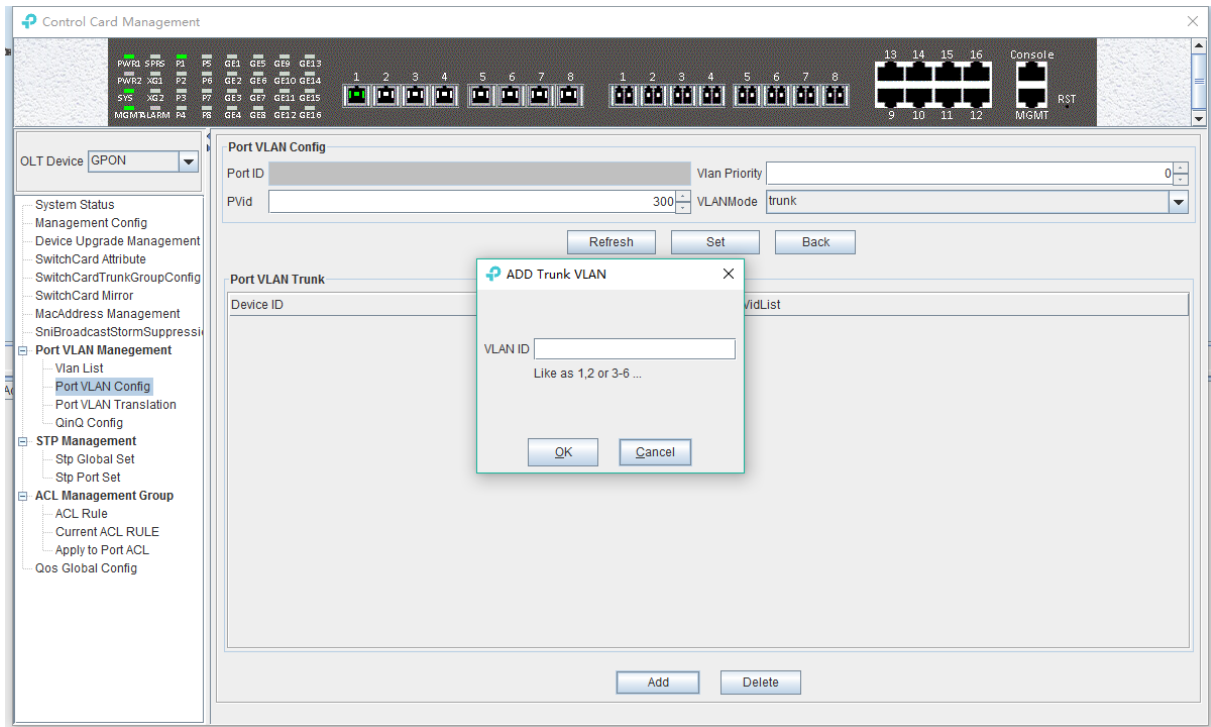
The packets in different VLAN modes are handled as follows:

| VLAN mode	Actions (in the ingress direction)		Actions (in the egress direction)
	Untagged packet	Tagged packet	
Access	Tag the packet with the PVID.	• If the VLAN ID of received packet is the same as the PVID. • Drop the packet if its VLAN ID is different from the PVID.	Remove the VLAN ID and tag and send out the packet.
Trunk	Tag the packet with the PVID.	• Receive the packet if its VLAN is carried on the port. • Drop the packet if its VLAN is not carried on the port.	• Removing the tag and send out the packet if its VLAN ID is the same as the PVID of this port. • Send out the packet without removing the tag if its VLAN is carried on the port but is different from the PVID.
Hybrid			• Drop the packet if its VLAN is not carried on the port.

			• If the VLAN of the packet is carried on the port, send the packet out. The VLAN tag of the packet will be removed if the port is configured as UNTAG in this VLAN. And the VLAN tag will be kept if the port is configured as TAG in this VLAN.

6.2.9.4.1 OLT Port Access Mode VLAN Configuration

Example: Configure GE1 port as access mode, priority is 2, PVID is 100. The steps are as follows: (PON port configuration is the same)
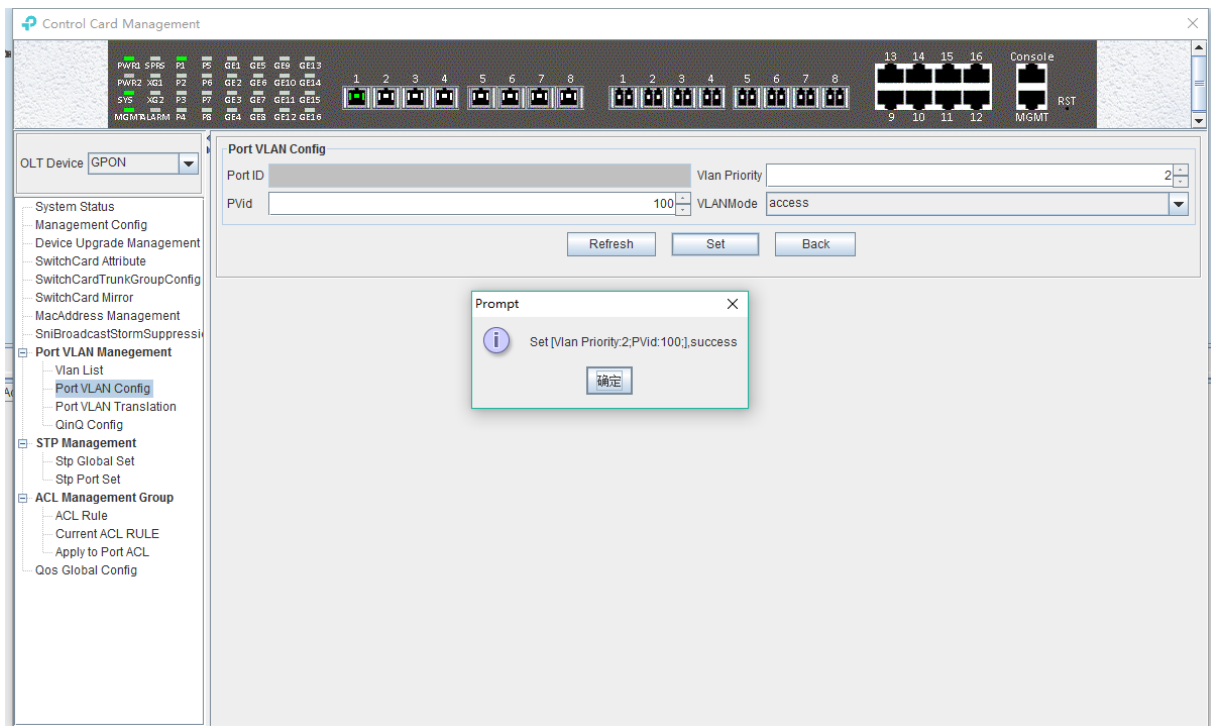
Step 1:

Double click the **'Config'** button in the column of GE1 in the port VLAN configuration page.
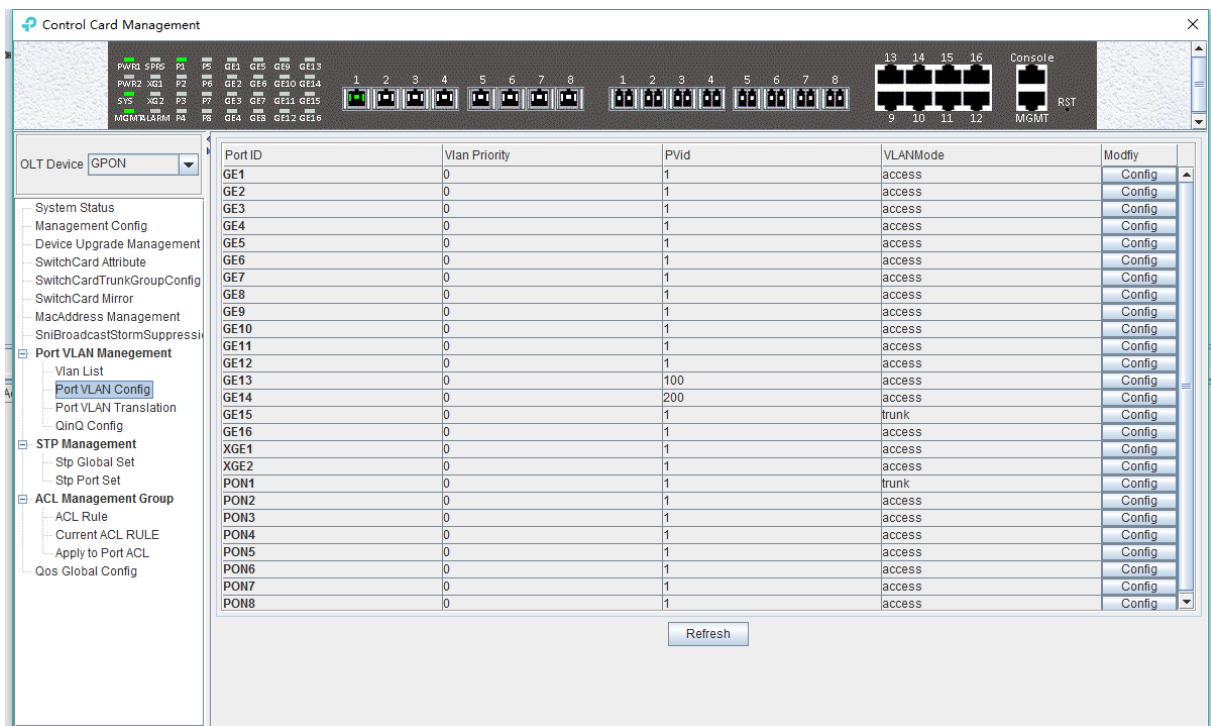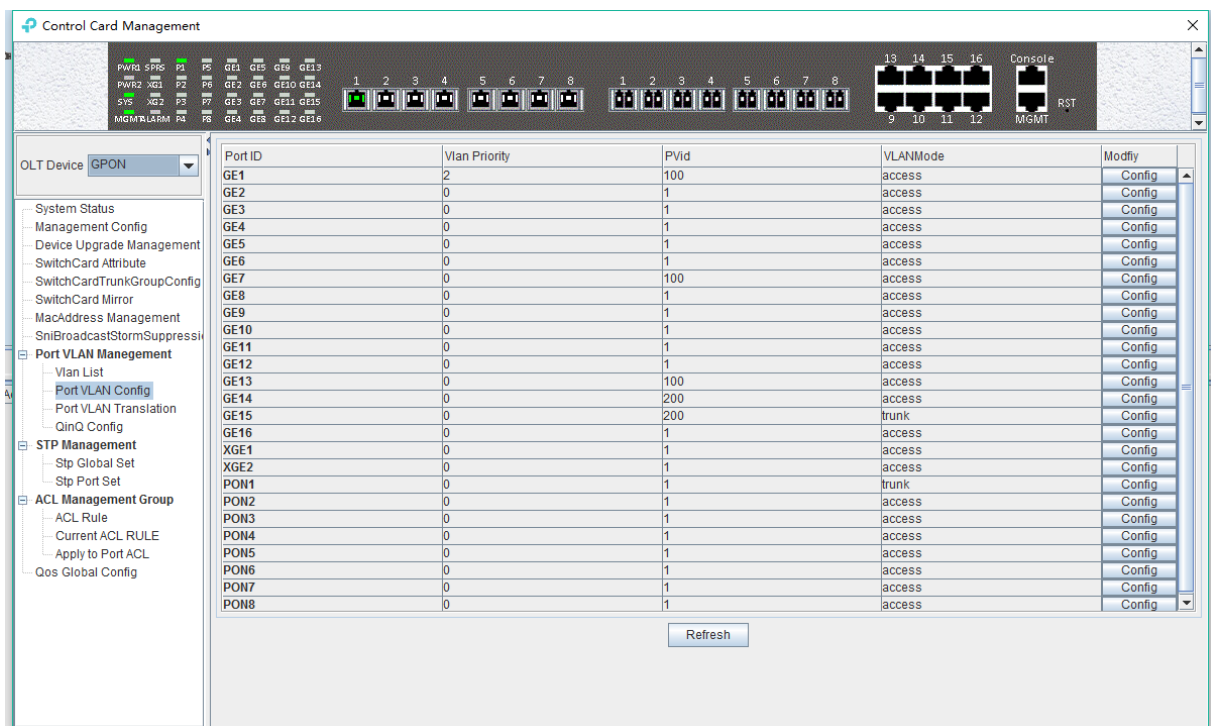

Step 2：

At this point, the Port VLAN Config page will appear as follows. Set the VLAN priority to 2, the PVID to 100, and the VLAN mode select to access. Then click the **'Set'** button and click the **'OK'** button to complete the configuration.

Step 3:

Click the **'Back'** button to view the modified configuration.
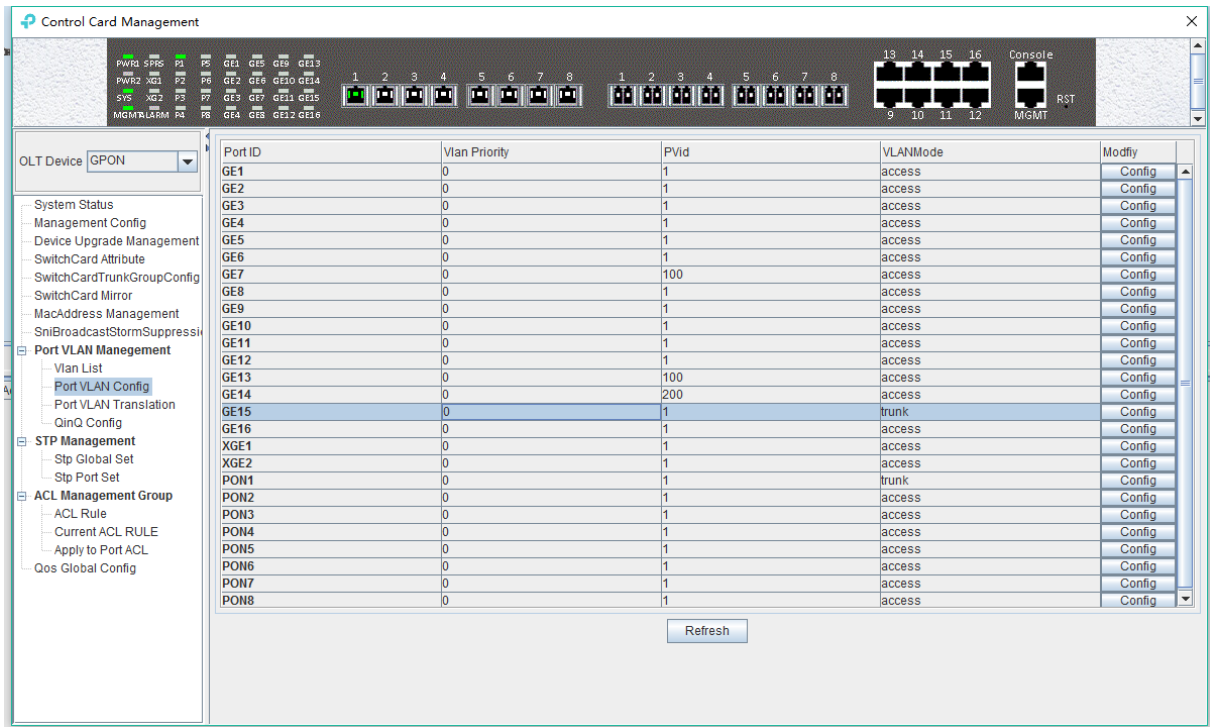

6.2.9.4.2 OLT Port Trunk Mode VLAN Configuration

Example: Configure GE3 port as trunk mode, priority is 3, PVID is 200, trunk VLAN is101-103. The steps are as follows:
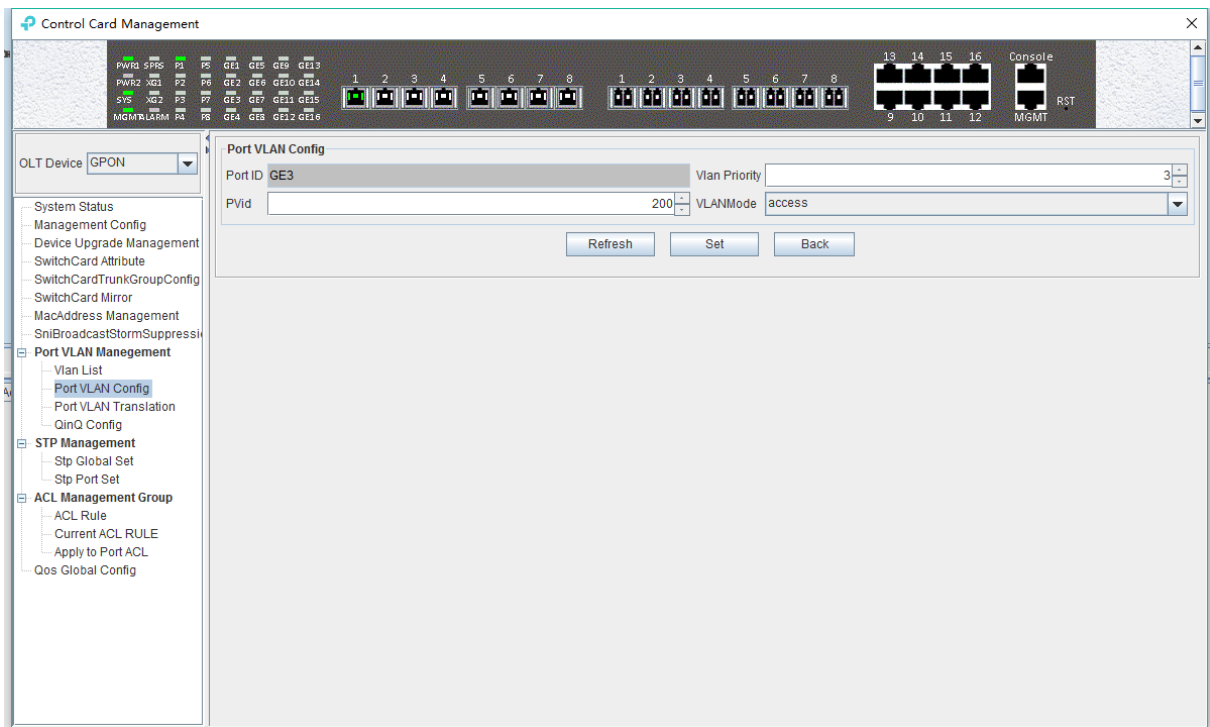
Step 1:

Double click the **'Config'** button in the column of GE3 in the port VLAN configuration page.
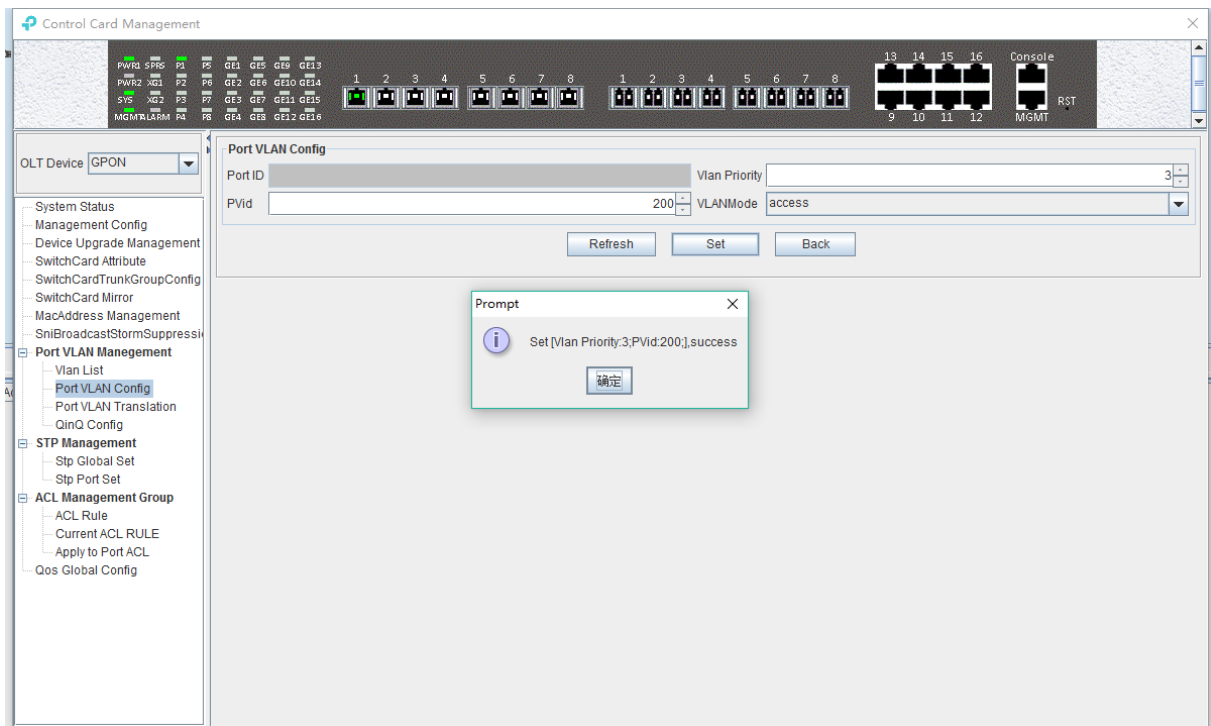
Step 2:

At this point, the following page will appear. Firstly, change the VLAN Mode to trunk in this page.

Step 3:

Then, set the VLAN priority to 3, the PVID to 200, Click the **"Set"** and then click "**OK**" in the pop-up window.

Step 4:

Click **'Add'** button, add '101-103' at the **'Add Trunk VLAN'** window and click the **'OK'** button, then click "**OK**" button in the pop-up window to complete the configuration.

Step 5:

Click **'Back'** button to view modified configurations.

6.2.9.4.3 OLT Port Hybrid Mode VLAN Configuration

Example: Configure GE4 port as hybrid mode, priority is 4, PVID is 300, The hybrid mode allows VLAN 301 with tag, VLAN 302 without tag. The steps are as follows:

Step 1:

Double click the **'Config'** button in the column of GE4 in the port VLAN configuration page.
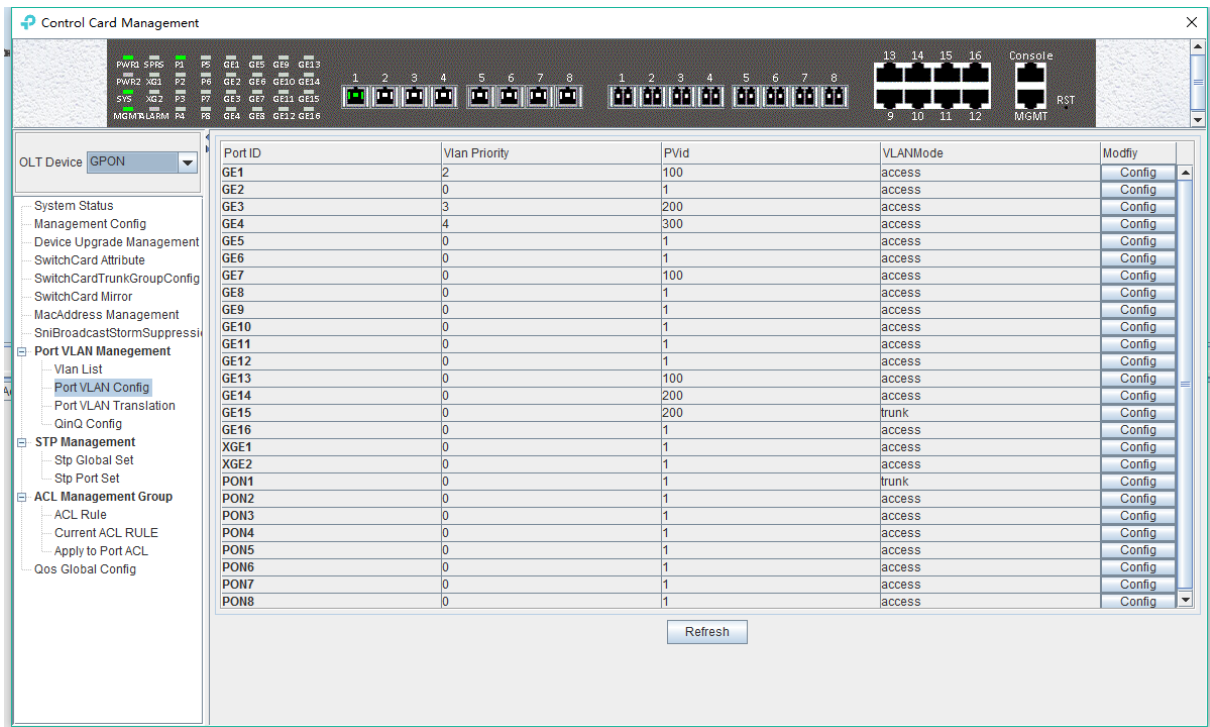
Step 2:

At this point, the following page will appear. Firstly, switch VLAN mode into hybrid mode in this page.
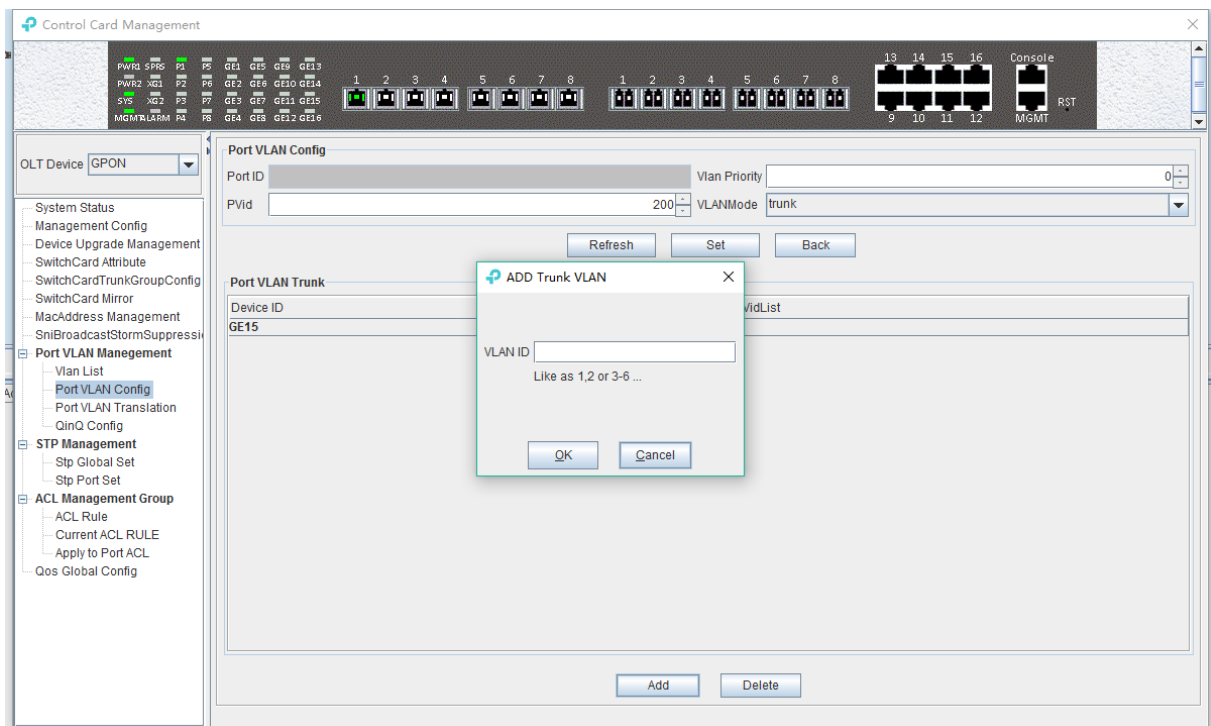

Step 3:

33
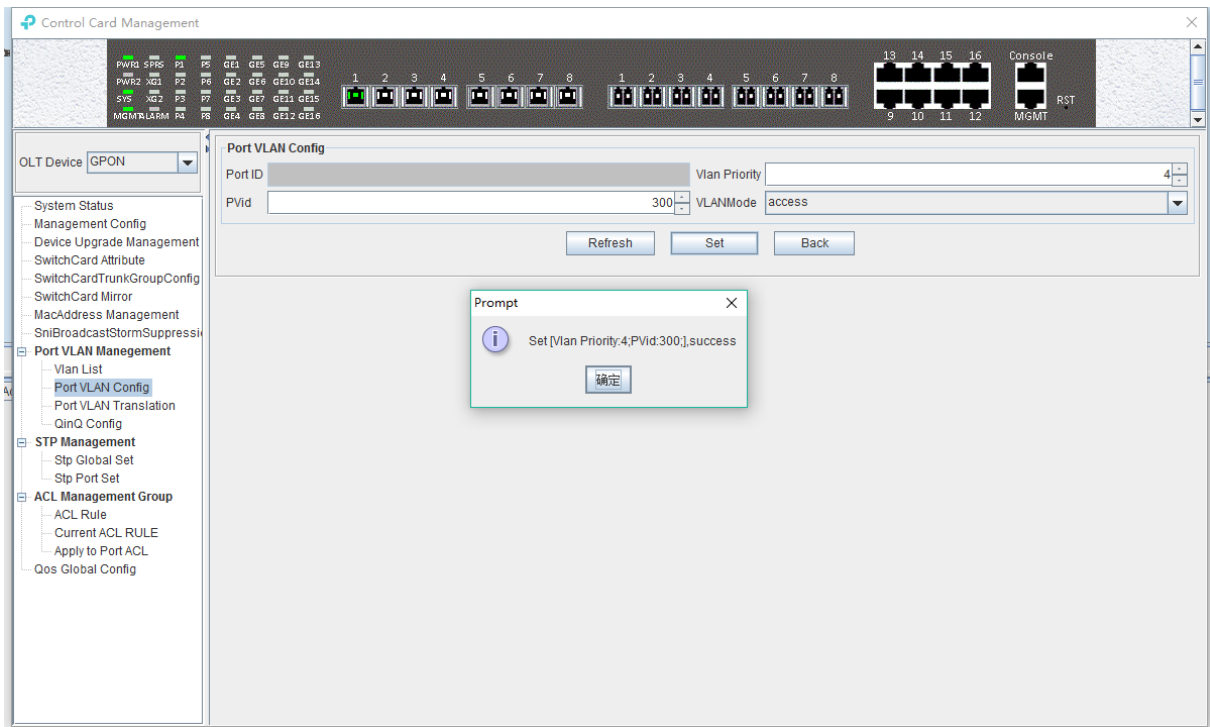
Then, set the VLAN priority to 4, the PVID to 300, Click the **"Set"** and then click "**OK**" in the pop-up window.
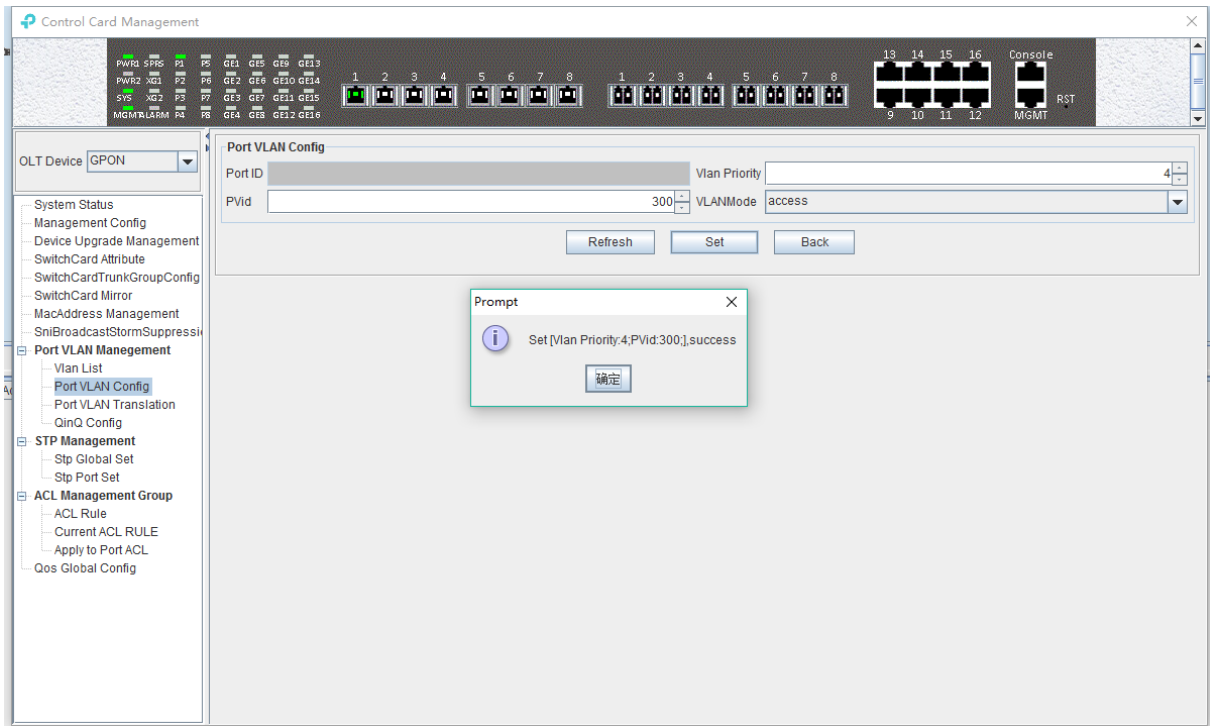
Step 4:

The allowed untag and tag VLAN of the hybrid mode need to be added in the **'VLAN List'**. You can refer to chapter 6.2.9.2 and 6.2.9.3.

Add VLAN 301 with tag:
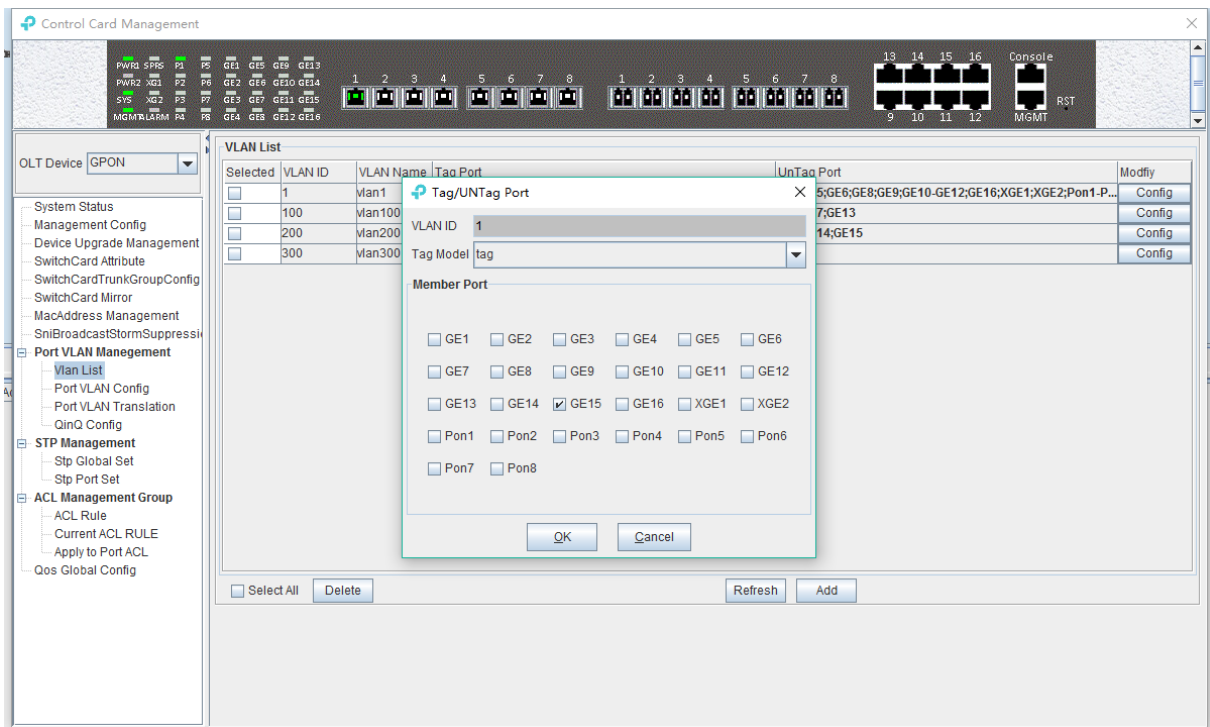
Add VLAN 302 with untag：
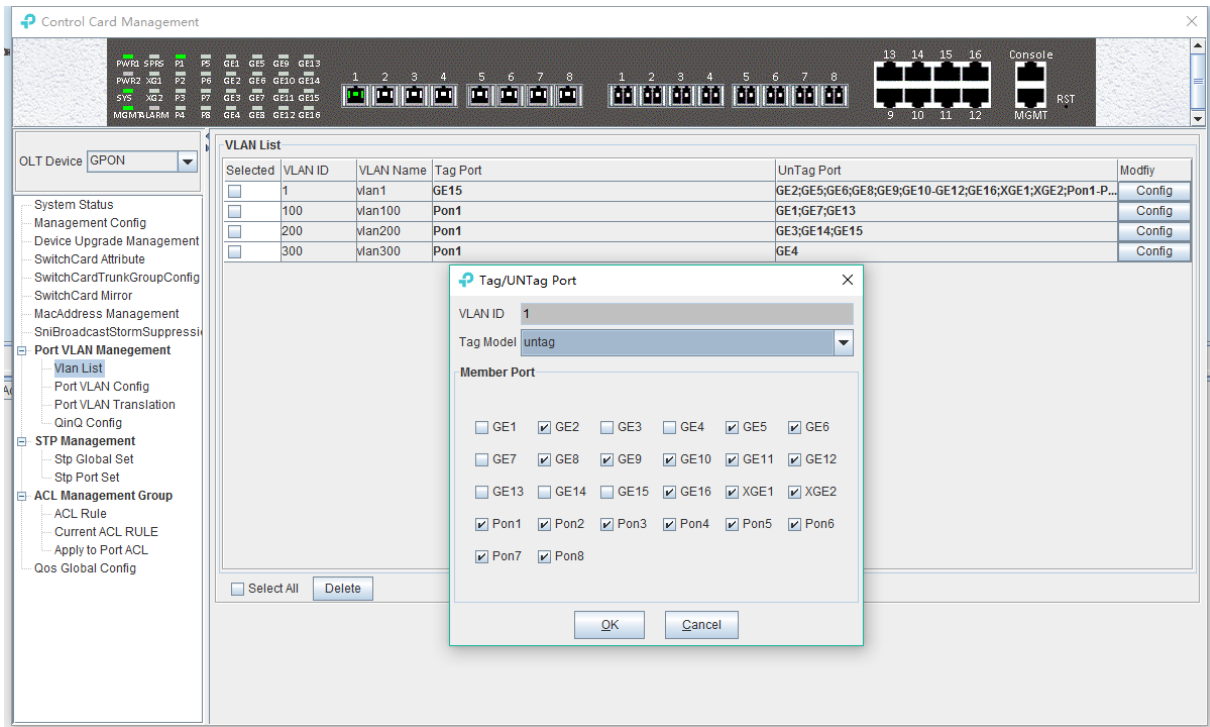
6.2.9.5 OLT Port VLAN Translation Configuration

The OLT port VLAN translation means the CVLAN from the user side (means PON ports) of the OLT is translated into the SVLAN on the network side (means uplink ports). Details are as follows.

Double click the **'Switch Control Card'** icon on the left side of the main page, turn on the **'Control Card Management'** window, and enter the **'Port VLAN Translation'** page. Typical page is as follows.
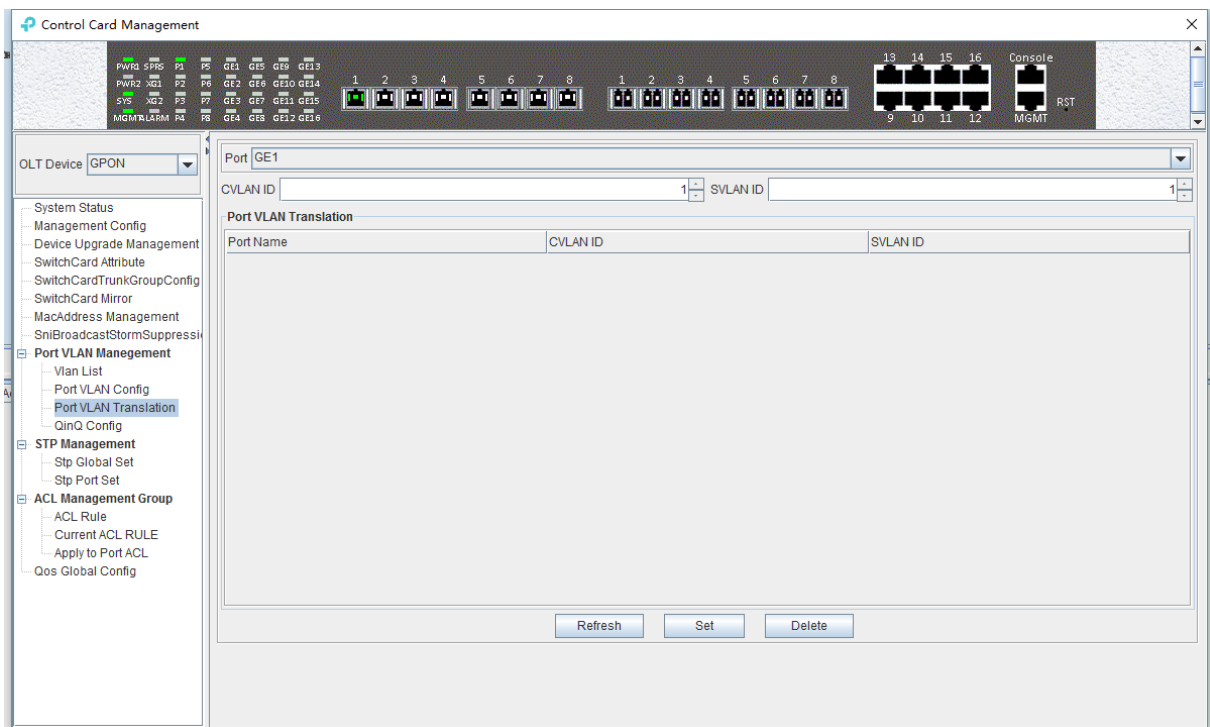
Port VLAN Translation page can be used to view and configure the port, CVLAN ID, and SVLAN ID. The following will be a brief introduction.

Port

Display the corresponding port number, GE represents the uplink port, XGE represents the 10G port, PON represents the PON interface, the serial number represents the number of ports.

CVLAN ID

Represents the VLAN before the translation (VLAN of the PON port), with a value of 1-4094.

SVLAN ID

Represents the converted VLAN (VLAN of the uplink port), with a value of 1-4094.

'Set' button

When you have configured the above items, you can click the **'Set'** button to complete the configuration. At this point, the translate item will appear in the VLAN translation list.

'Delete' button

Select the entry you want to delete in the VLAN translation list and click the **'Delete'** button to delete the specified entry.

[Example of VLAN Translation Configuration]

Example: Converts a packet with a VLAN of 100 on the user side of the GE1 port to VLAN 200 on the network side. The configuration steps are as follows.

Step 1:

Click on the **'Port VLAN Translation'**, Select GE1 in the right page, CVLAN set to 100, SVLAN set to 200, click on the following **'Set'** button, and then click the **'OK'** button in the **'Prompt'** window to complete the configuration.
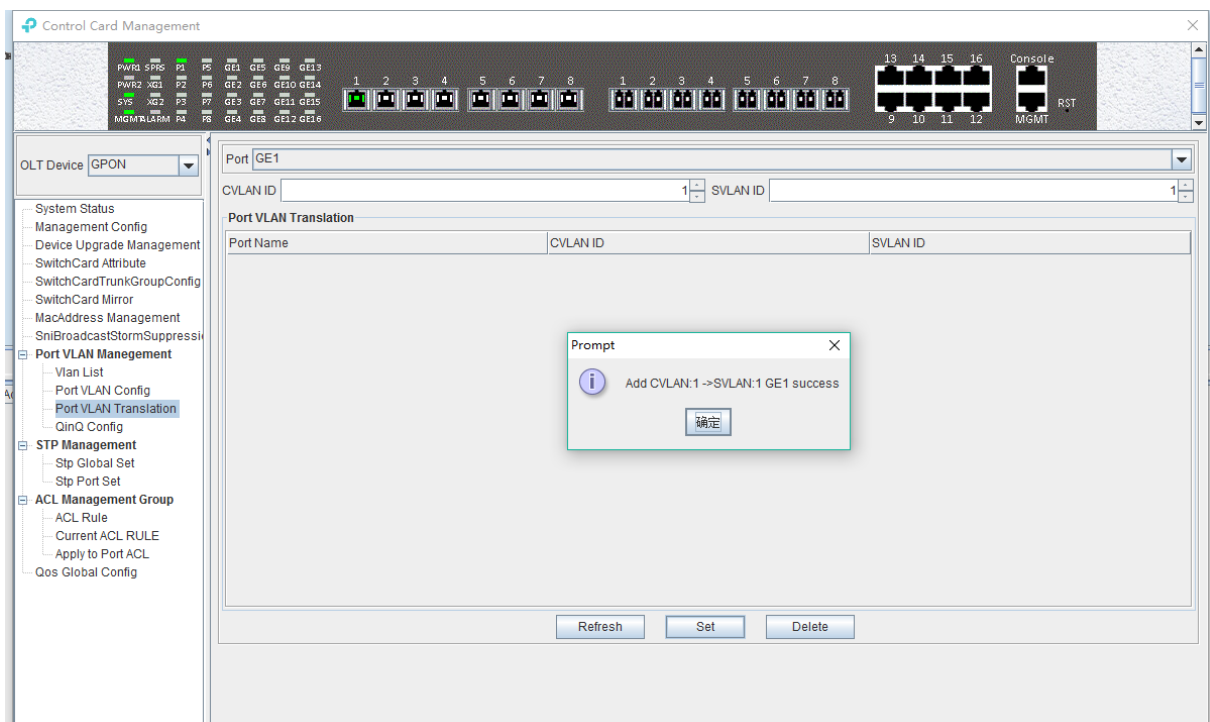
Step 2：

Click the **'Refresh'** button to view the VLAN translation list that you just configured.
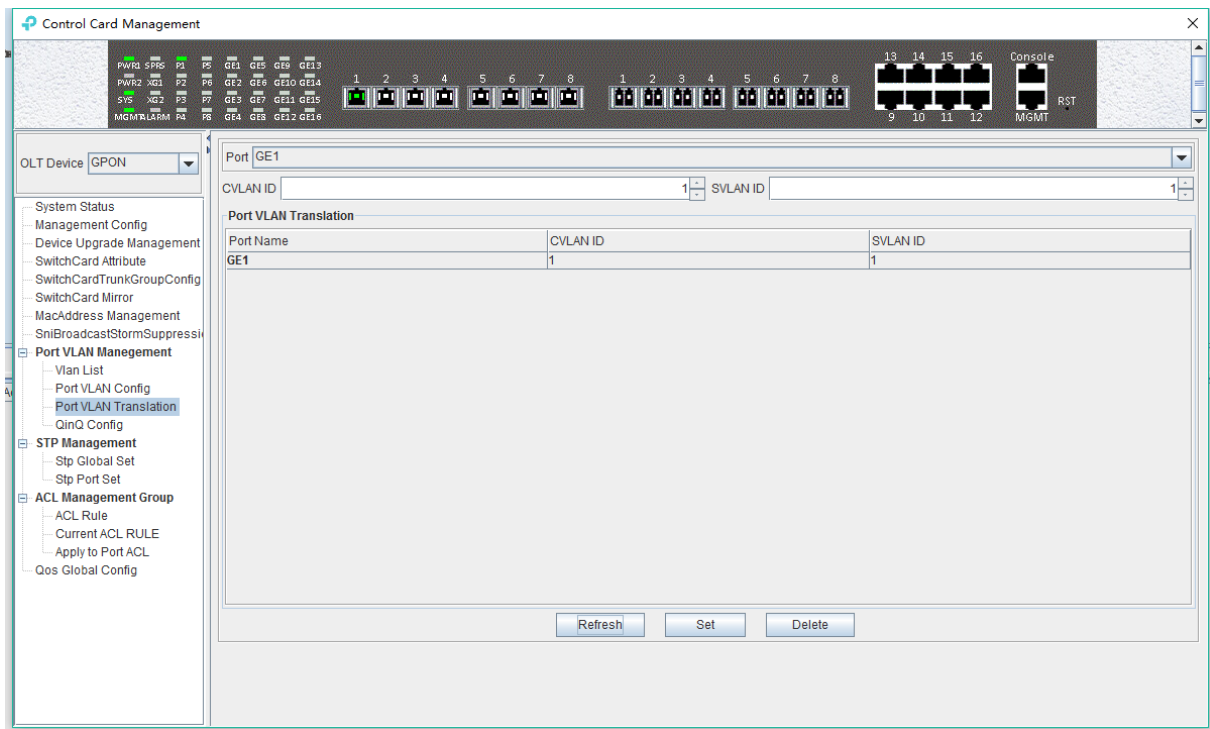
6.2.9.6 OLT Port QinQ VLAN Configuration

QinQ technology (also known as Stacked VLAN or Double VLAN). The standard is from IEEE 802.1ad, which encapsulates the user's private VLAN tag in the public VLAN tag, so that the packet carries the two-layer VLAN tag through the operator's backbone network (public network).

QinQ technology effectively extends the number of VLAN by stacking two 802.1Q headers in Ethernet frames so that the number of VLAN can be up to 4096x4096.

TP-Link GPON QinQ configurations are mainly accomplished in the PON Port.:

Double click the **'Switch Control Card'** on the left side of the main page to open the **'Control Card Management'** window and enter the **'QinQ Config'** page. The typical page is as follows.
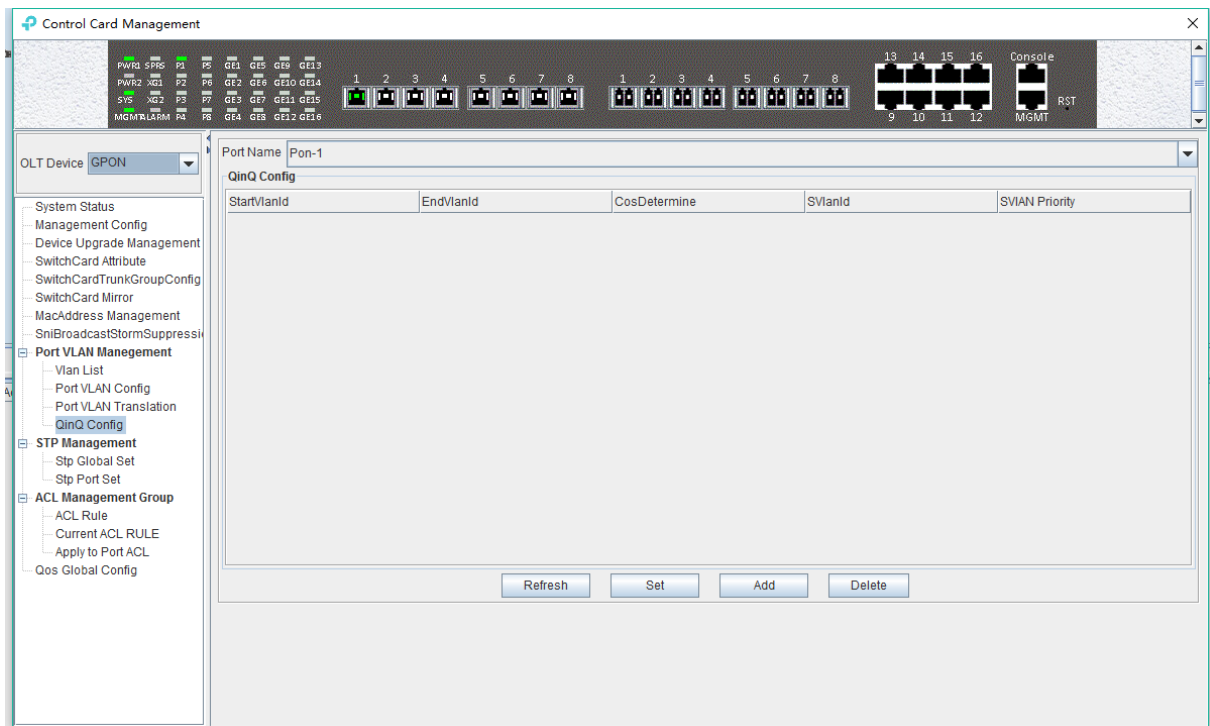
The QinQ config window can be used to view and configure the PON port ID, Start VLAN ID, End VLAN ID, Outer VLAN ID, and Outer VLAN Priority. The following will be a brief introduction.

Port Name

Displays the corresponding port number, PON represents the PON interface, the serial number followed by represents the port number.

Start VLAN ID, End VLAN ID, Outer VLAN ID

Start Customer VLAN ID (CVLAN)：Represents the initial VLAN ID (when entering the PON port) of the inner layer VLAN, with the value of 1-4094;

END Customer VLAN ID (CVLAN)：Represents the termination VLAN ID (when entering the PON port) of the inner layer VLAN, with a value of 1-4094;

Service provider VLAN (SVLAN): Represents another layer of VLAN after the inner layer VLAN, with a value of 1-4094;

When a packet enters the PON port with the VLAN ranges from the start VLAN to the end VLAN, a layer of outer VLAN (SVLAN) is added to the packet, and the packet at this time is a packet with double layer VLAN.

SVLAN Priority

Represents the priority of SVLAN, with a value of 0-7, in which 0 is the lowest priority and 7 is the highest priority.

'Add' button

Click the **'Add'** button pops up the window as shown below. In this window, you can configure the start CVLAN, end CVLAN, SVLAN, and priority. Click **'OK'** button to complete the configuration.
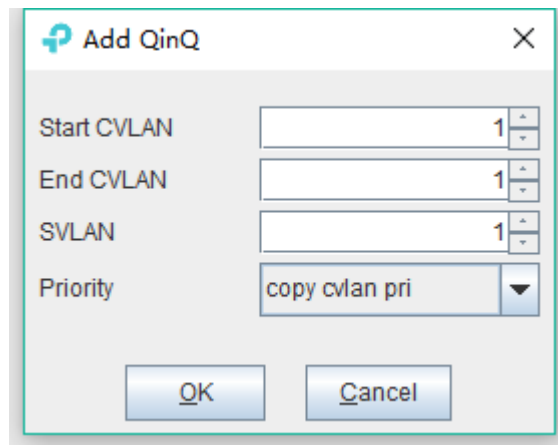
'Set' button

When you have added all the items, you can click the **'Set'** button to complete the configuration.

'Delete' button

Select the items to be deleted in the QinQ config list, and then click **'Delete'** button to delete the specified entry.

[Example of VLAN QinQ Configuration]

Example: PON 8 received VLAN100-103 packets are marked with a layer of outer VLAN 200, the priority of 0.

Step 1:

Click the **'Add'** button, pop up the **'Add QinQ'** window, configure the start VLAN to 100, end VLAN to 103, SVLAN to 200, the priority to 0. Then click **'OK'.**
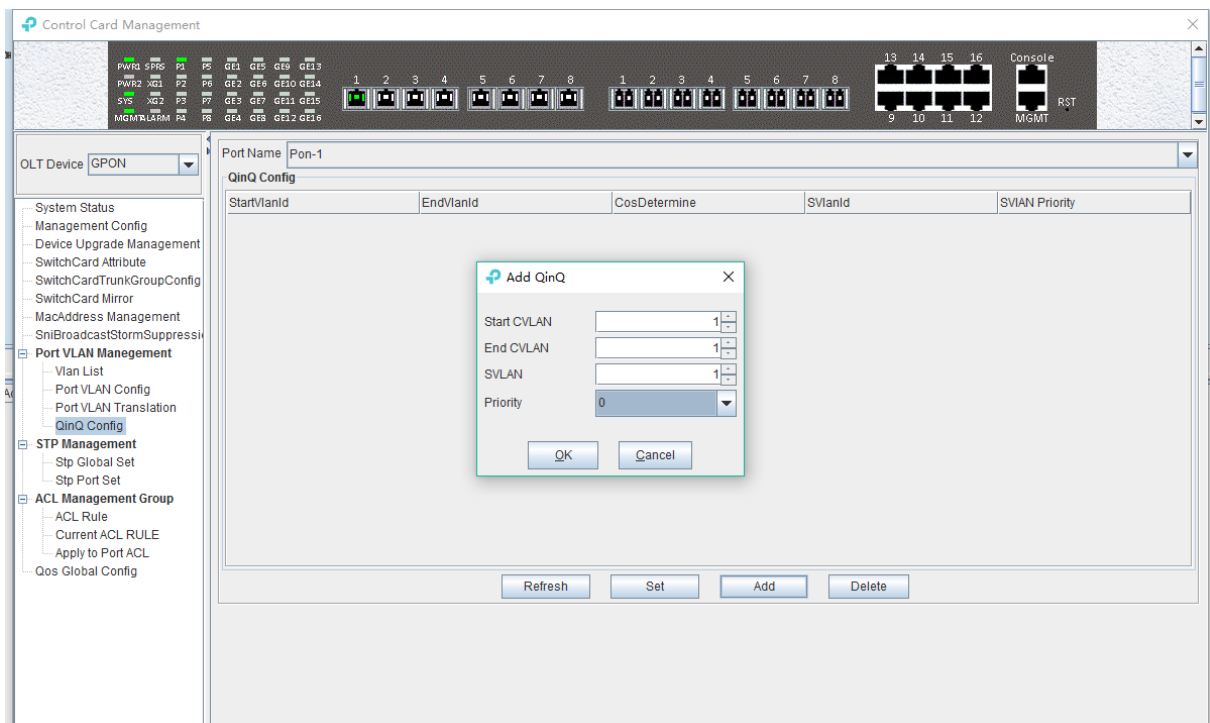
Step 2：

Click the **'OK'** button in the prompt window that appears.
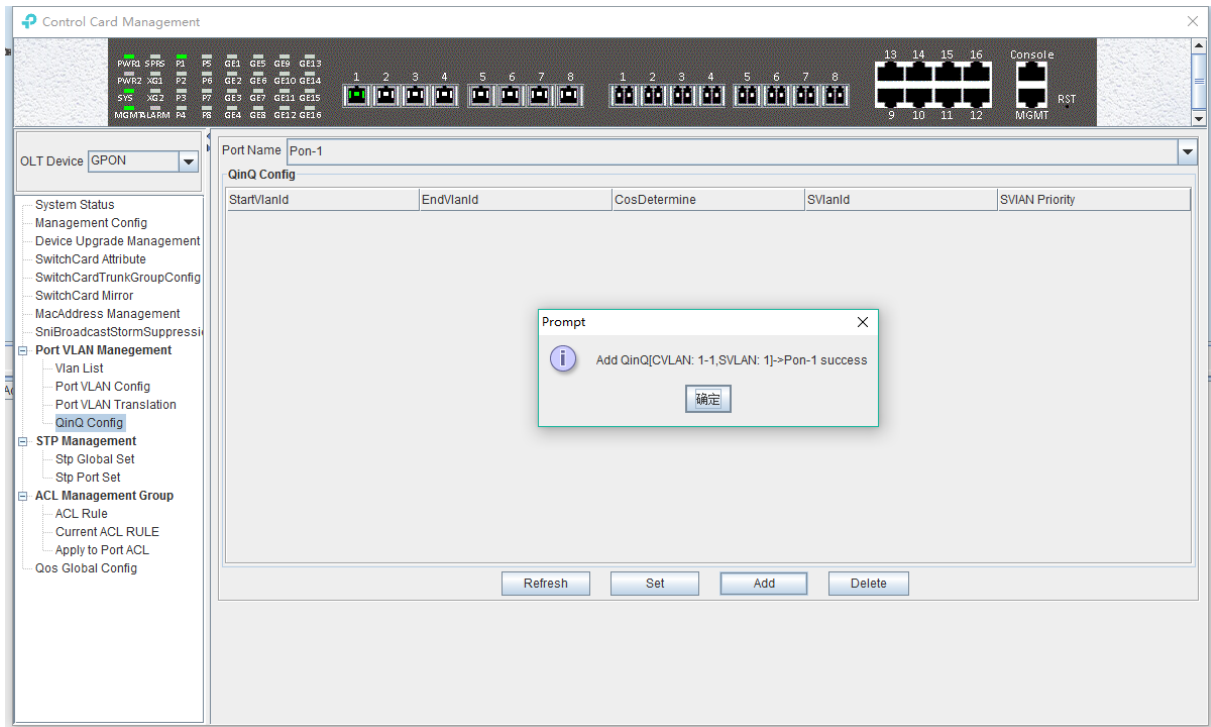
At this point, we can see our newly added QinQ entries in the QinQ config list.
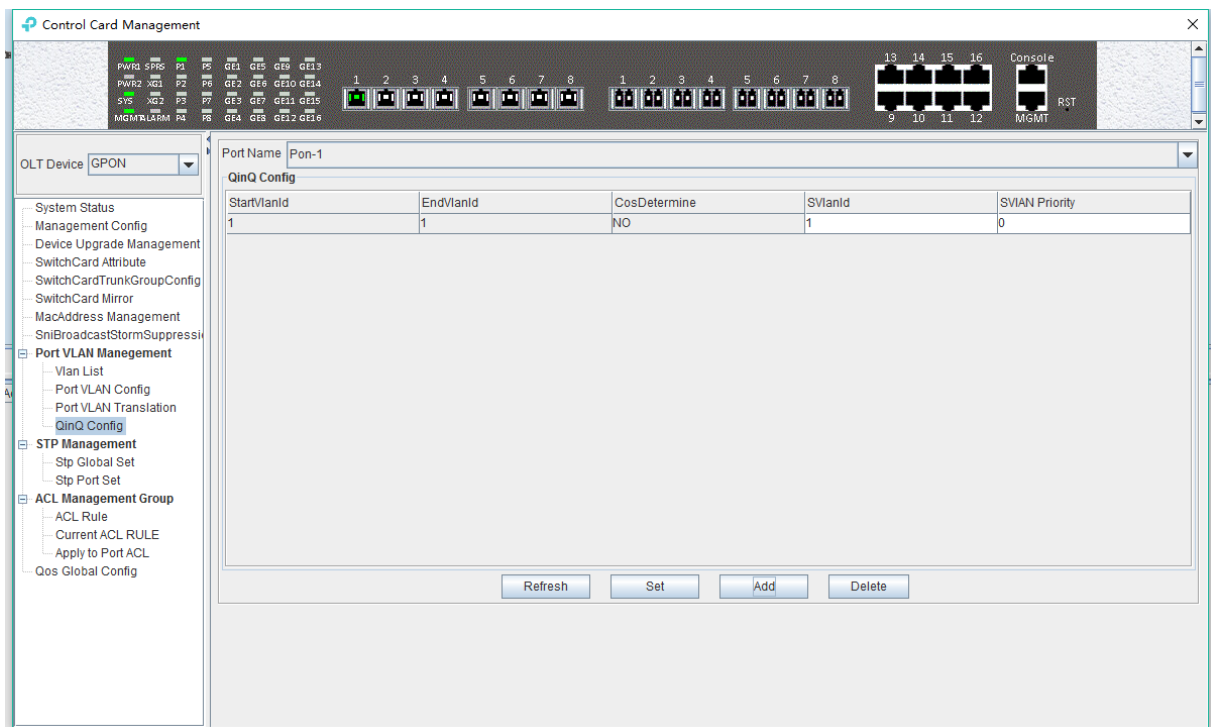
6.2.10 OLT STP Management

STP is the abbreviation of spanning tree protocol. The protocol can be applied to the loop network, through a certain algorithm to achieve path redundancy, while the loop network is trimmed into a loopless tree network.

The main application of the spanning tree protocol is to avoid the network loopback in the LAN and solve the "broadcast storm" problem of the ring-to-ring Ethernet network. In a sense, it is a kind of network protection technology that can eliminate the loop connection caused by mistake or accident.

6.2.10.1 STP Global Config

Double click the **'Switch Control Card'** icon on the left side of the main page, open the '**Control Card Management**' window and enter the **'STP Global Set'** window of **'STP Management'**.
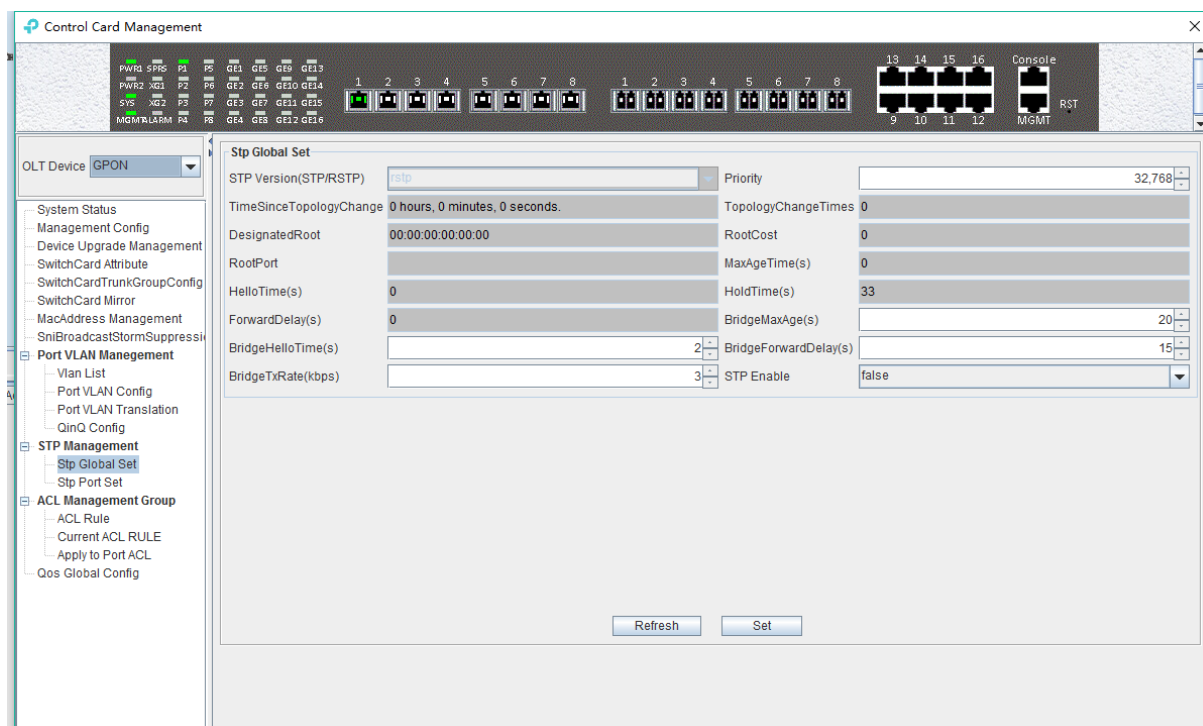
As shown above, in **'STP Global Set'** page, you can view the STP Version, Priority, Time Since Topology Change, Topology Change Times, Designate Root , Root Cost, Root Port, Max Age Time(s), Hello Time(s), Hold Time(s), Forward Delay(s), Bridge Tx Rate(kbps)and STP Enable State. Among them, Priority, Max Age Time(s) ,Hello Time(s) , Forward Delay(s), Bridge Tx Rate(kbps) and STP Enable State can be modified . Specific parameters are introduced as follows:

STP Global Set

➢ STP Version

The default setting of system is RSTP.

➢ Priority

Bridge priority is used to select the root bridges of the network. The smaller the value, the higher the priority, the greater chance of being selected as the root bridge. You can set a bridge with a priority value of 0, 4096, 8192, 12288,16384, 20480, 24576, 28672, 32768, 36864, 40960, 45056, 49152,53248, 57344 and 61440.

➢ Time Since Topology Change

The duration of switching from the previous topology state to the current state.

➢ Topology Change Times

The number of topology changes caused by the change of the port or link state in the network topology.

➢ Designate Root

You can designate root bridge through bridge priority. In case of not designating priority, the smaller the MAC address, and the greater the chance of being the designated root bridge.

➢ Root Cost

To calculate the link cost, the port with the lowest root link cost will become the forwarding port in case of forwarding the same network bridge ID. The legal range is 1 ~ 20000000.

➢ Root Port

The number of ports that are passed by the path of from non-root bridge to the root bridge.

➢ Max Age Time

The lifetime of the BPDU message received from the adjacent bridge of Designated port. The legal range is 6~40, in s.

➢ Hello Time

Set the bridge how often to send a BPDU message. The setting range time is 1~2, in s.

➢ Hold Time

When the network bridge changes in topology, maintaining the time of monitoring and learning state before sending packets.

➢ Forward Delay

With downward compatibility STP network bridge, for port of working in the STP mode, forwarding delay timer designated the port before the transition to the learning state the time of in discarding state, and before the learning state transition to the forwarding state in the time of learning state. The legal range is 4~30, in s.

➢ Bridge Tx Rate

Set the number of maximum sending BPDU messages in 1 second. The setting range of 1~10, in frame/s.

➢ STP Enable State Configuration

Open or close the RSTP function by setting the **'RSTP State'** to **'Enable'** or **'Disable'**.

Note: When you set Max Age Time, Hello Time, Forward Delay, first input setting value, then click **'Set'** button, finally click **'Refresh'** button, thus configuring successfully. And consistent with three contents shown below.

6.2.10.2 STP Port Config

Double click the **'Switch Control Card'** icon on the left side of the main page, open the **'Control Card Management'** window and enter the **'STP Port Set'** window of **'STP Management'**.

Stp Port Set

Device ID	PortStatus	PortPriority	PortPathCost	DesignatedRoot ID	ForwardTransitions	ProtocolMigrationEnable	EdgePortAdminStatus	EdgePortOperStatus	PortPointToPointAdminStatus	PortPointToPointOperStatus	Port STPEnabled
GE1	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE2	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE3	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE4	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE5	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE6	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE7	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE8	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE9	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE10	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE11	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE12	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE13	disabled	128	20000	e0:67:b3:00:...	0	false	NEdge	false	auto	true	false
GE14	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE15	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
GE16	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
XGE1	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false
XGE2	disabled	128	20000	00:00:00:00:...	0	false	NEdge	false	auto	true	false

Refresh   Set

OLT Device GPON

- System Status
- Management Config
- Device Upgrade Management
- SwitchCard Attribute
- SwitchCardTrunkGroupConfig
- SwitchCard Mirror
- MacAddress Management
- SniBroadcastStormSuppression
- Port VLAN Manegement
  - Vlan List
  - Port VLAN Config
  - Port VLAN Translation
  - QinQ Config
- STP Management
  - Stp Global Set
  - Stp Port Set
- ACL Management Group
  - ACL Rule
  - Current ACL RULE
  - Apply to Port ACL
- Qos Global Config

As shown above, in **'STP Port Set'** page, you can view Device ID, Port Status, Port Priority, Port Path Cost, Designated Root ID, Forward Transitions, Protocol Migration Enable, Edge Port Admin Status, Edge Port Oper Status, Port Point to Point Admin Status, Port Point to Port Oper Status and Port STP Enabled Status. In addition, you can modify Port Priority, Port Path Cost, Protocol Migration Enable, Edge Port Admin Status and Port Point to Point Admin Status. Specific parameters are introduced as follows:

➢ Port Status

STP Port Status has five types, including disable, learning, listening, forwarding and blocking.

Disable: In the invalid status, to be a valid port, first switch to the blocking port.

Learning: In the learning state, the port is adding addresses to its forwarding database, but does not forward packets.

Listening: In the listening state, the port is waiting to receive BPDU packet, and BPDU may tell the port to return to the blocking state.

Forwarding: In the forwarding state, the port is forwarding the packet.

Blocking: In the blocking state, the port is blocked and can not forward or receive packets.

➢ Port Priority

When the link cost and the sending network bridge ID is the same, the lowest priority port will be the forward port. The parameter value can be set to 0 ~ 440, and the step length is 16.

➢ Designated Root ID

The BID in the BPDU message consists of two parts, the bridge priority and the bridge MAC. The bridge ID is only. Switches selects the smallest BID switch as the root bridge in the network.

➢ Forward Transitions

The port consists of five status. Status transitions need to go through status transition time.

➢ Protocol Migration Enable

This means that the device supports RTSP, and if the port is enabled, the port will automatically migrate to STP compatible mode when the port is connected to the device running the STP protocol. **'True'** means opening this function, and **'False'** means closing this function.

➤ Edge Port Admin Status

You can use this option to set whether it is an edge port. **'Edge'** is an edge port, and **'NEdge'** is a non - edge port.

➤ Edge Port Oper Status

This option indicates whether the current port is in the edge port state. 'False' indicates that the port is not in an edge state, and 'Ture' indicates the status of the port on the edge. The edge port does not need to go through the 'Discarding-learning-forwarding' step and directly switch to the forwarding status.

➤ Port Point to Point Admin Status

You can use this option to set whether the port is a point-to-point port, including **'Auto'**, **'Ture'** and **'False'** three options. **'Ture'** is to set this port to point-to-point port, and 'False' is to set this port to non point-to-point port. **'Auto'** is dependent on the STP protocol itself. Point-to- point ports allow fast switching to forwarding status, and non point-to-point ports need to go through discarding-learning-forwarding step to switch to forwarding status.

➤ Port Point to Port Oper Status

The option is to specify the point-to- point port state in which the current port is actually located.

Prompt: Some of the parameter explanations are described in the previous section, which are not repeated here. You can go to the previous section to inquire.

6.2.11 ACL Management

ACL is **'Access Control List'**. Through configuring a serial of matching rules to filter specific data packets, thus identifying objects that needs to be filtered. After identifying specific objects, according to preset policy permitting or denying the corresponding data packets pass. The process of ACL filter message flow prepares for QoS.

6.2.11.1 Configuration ACL Rule

ACL has three types, including basic ACL, its Id range from 2000 to 2999, only matching source IP address; advanced ACL, its Id range from 3000 to 4999, being able to matching source IP address, destination IP address, source port, destination port, DSCP and IP message type; link ACL, its Id range from 5000 to 5999, being able to match source mac, destination mac, VLAN Id and Ethernet type.

6.2.11.1.1 Basic ACL Configuration

Double click the **'Switch Control Card'** icon on the left side of the main interface, open the **'Control Card Management'** window and enter the **'ACL Rule'** window of **'ACL Management'** page. Click the pull-down menu of ACL Type, and choose basic acl(2000-2999) option.
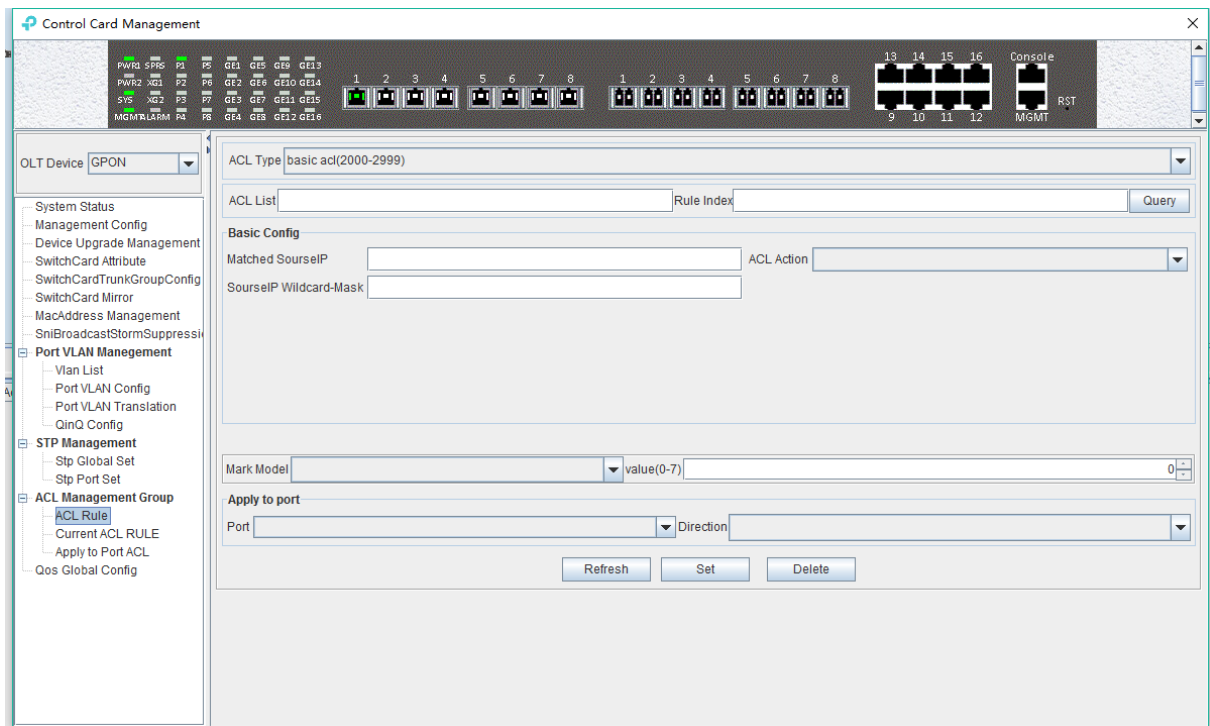
As above **'Basic ACL'** page, you can set the following configuration parameters:

ACL List

ACL List，the set of ACL entries, this can inquire one of ACL according to inputting ACL Id and rule id.

Rule Index

ACL Rule Index，also rule id, and the range of value is 1-16.

Basic configuration

➢ Matched source IP

Configure matched source IP address of ACL Rule, in this format: A.B.C.D.

ACL Action

ACL Action configuration, including **'permit'**, **'deny'** and **'mark'** three options, indicates specific parameters of permitting or denying matching.

➢ Source IP Wildcard-Mask

Configure matched source IP Wildcard-Mask address of ACL Rule. IP Wildcard-Mask address is reverse address of IP sub-net mask. Example for: IP is 192.168.5.123, and its IP Wild-Mask is 0.0.0.225.

Mark Model

This is Mark Model, only applied in when ACL Action is **'mark'**, including **'null'** , **'802.1p'** , **'VLAN id'** ,**' TOS PRECEDENCE '** and **' DSCP '** .

➢ 802.1p

For the traffic priority LAN level 2 QoS/CoS protocol, the protocol header includes a 3-bit priority field with a value range of 0-7, which supports grouping packets into various traffic types.

➢ VLAN id

VLAN identifier，with a value range of 0-4094.

➢ TOS PRECEDENCE

TOS is a field of IP Message, with indicating type of service. PRECEDENCE is a 3bit field in TOS to indicate IP priority with a value range of 0-7.

➢ DSCP

DSCP is 'Differentiated Services Code Point', Which provides the standard of differentiated service for QoS with a 6bit field, the value range is 0-63.

Apply to port

➢ Port

ACL Rule applies to ports, including uplink ports and PON ports.

➢ Direction

ACL Rule applies to direction of port, including **'ingress'** and **' egress'**.

[Example of Basic ACL configuration]

Example：Configure a basic ACL, and ID is 2001. Source IP is 192.168.5.205, and Rule Action is **'permit'**, as show below:
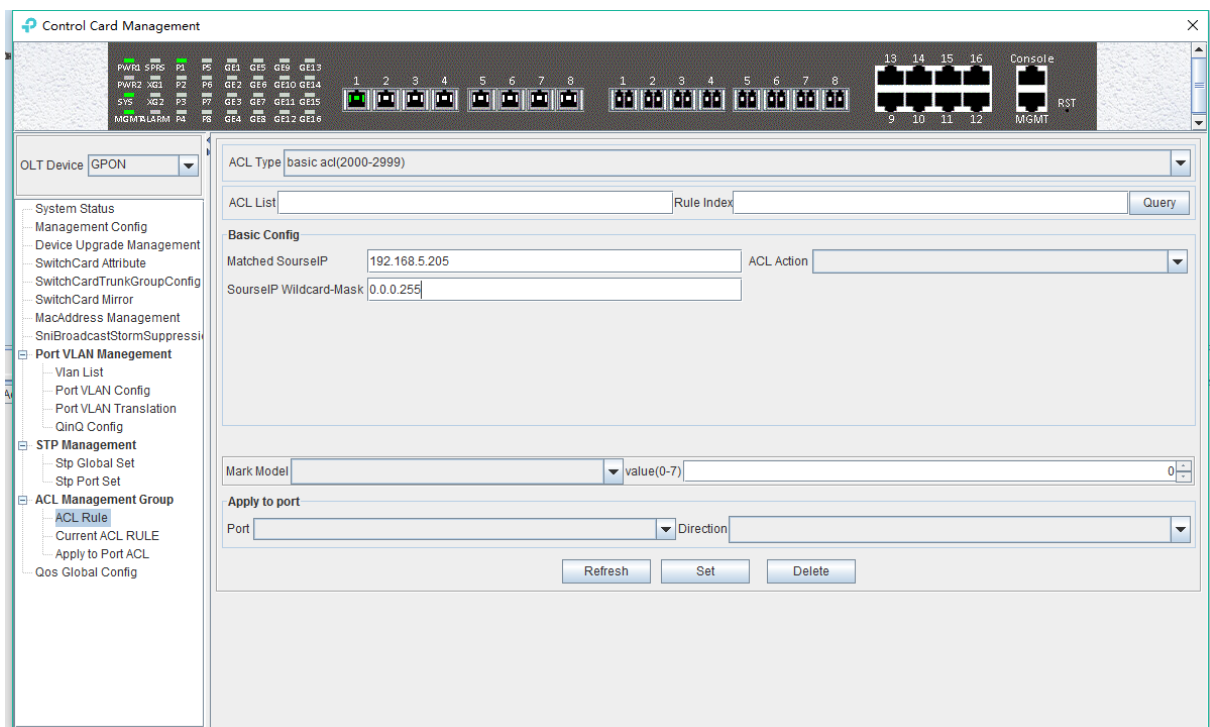
After completing those configurations, the configuration takes effect through the **'Set'** button at the bottom of page, thus creating a basic ACL Rule successfully. Deleting a ACL rule created through the **'Delete'** button. Updating a ACL Rule created through the **'Refresh'** button.

6.2.11.1.2 Advanced ACL Configuration

Double click the **'Switch Control Card'** icon on the left side of the main interface, open the **'Control Card Management'** window and enter the **'ACL Rule'** window of **'ACL Management'**. Click the pull-down menu of ACL Type, and choose advanced acl(3000-4999) option.
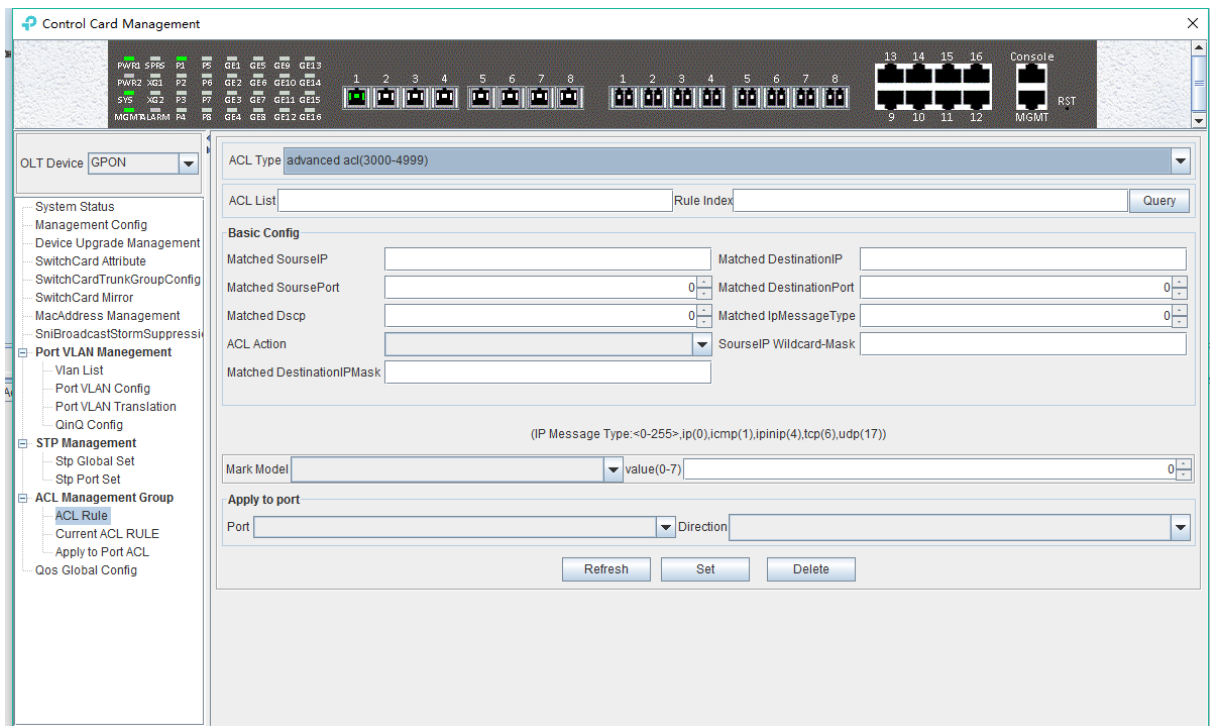
As above **'Advanced ACL Rule'** page, compared with **'Basic ACL Rule'** page, also set the following configuration parameters.

Basic configuration

➢ Matched destination IP

Configure matched destination IP address of ACL Rule, in this format: A.B.C.D.

➢ Matched source port

Configure matched source port Id of ACL Rule to match IP Protocol to TCP/UDP, ranging from 0 to 65535.

➢ Matched destination port

Configure matched destination port Id of ACL Rule to match IP Protocol to TCP/UDP, ranging from 0 to 65535.

➢ Matched DSCP

Configure matched DSCP of ACL Rule. DSCP is 'Differentiated Services Code Point'. In the TOS identification byte of each data packet IP header, taking advantage of used 6 bit and unused 2 bit to prioritize by coding value. DSCP user 6 bit, the value range of 0-63.

➢ Matched IP Message Type

Configure matched IP Message Type of ACL Rule, including IP, ICMP, IPINIP, UDP, TCP and so on, the value range of 0-255.

➢ Matched Destination IP Wildcard-Mask

Configure matched destination IP Wildcard-Mask address of ACL Rule. IP Wildcard-Mask address is reverse address of IP sub-net mask. Example for: IP is 192.168.5.205, and its IP Wild-Mask is 0.0.0.255.

[Example of Advanced ACL configuration]

Example： Configure an advanced ACL, and ID is 3001. Rule Action is **'Permit'**, as show below:
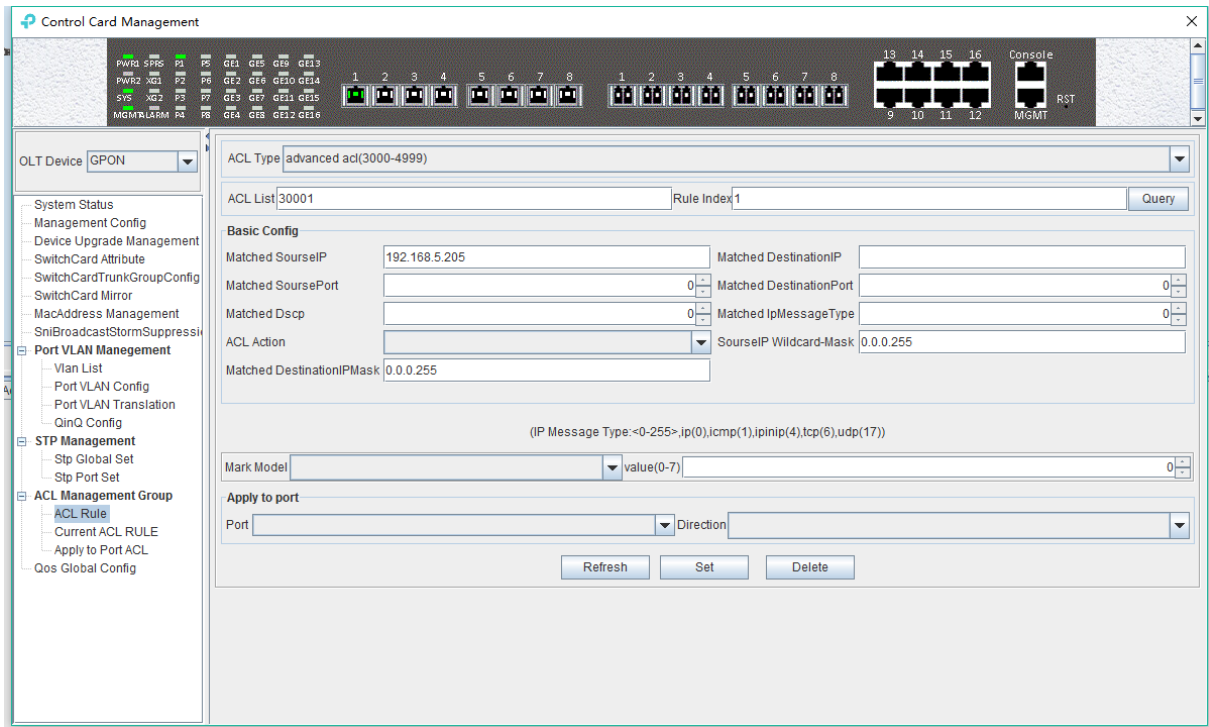
After completing those configurations, the configuration takes effect through the **'Set'** button at the bottom of page, thus creating an advanced ACL Rule successfully. Deleting a ACL rule created through the **'Delete'** button. Updating a ACL Rule created through the **'Refresh'** button.

6.2.11.1.3 Link ACL Configuration

Double click the **'Switch Control Card'** icon on the left side of the main interface, open the **'Control Card Management'** window and enter the **'ACL Rule'** window of **'ACL Management'**. Click the pull-down menu of ACL Type, and choose link acl(5000-5999) option.
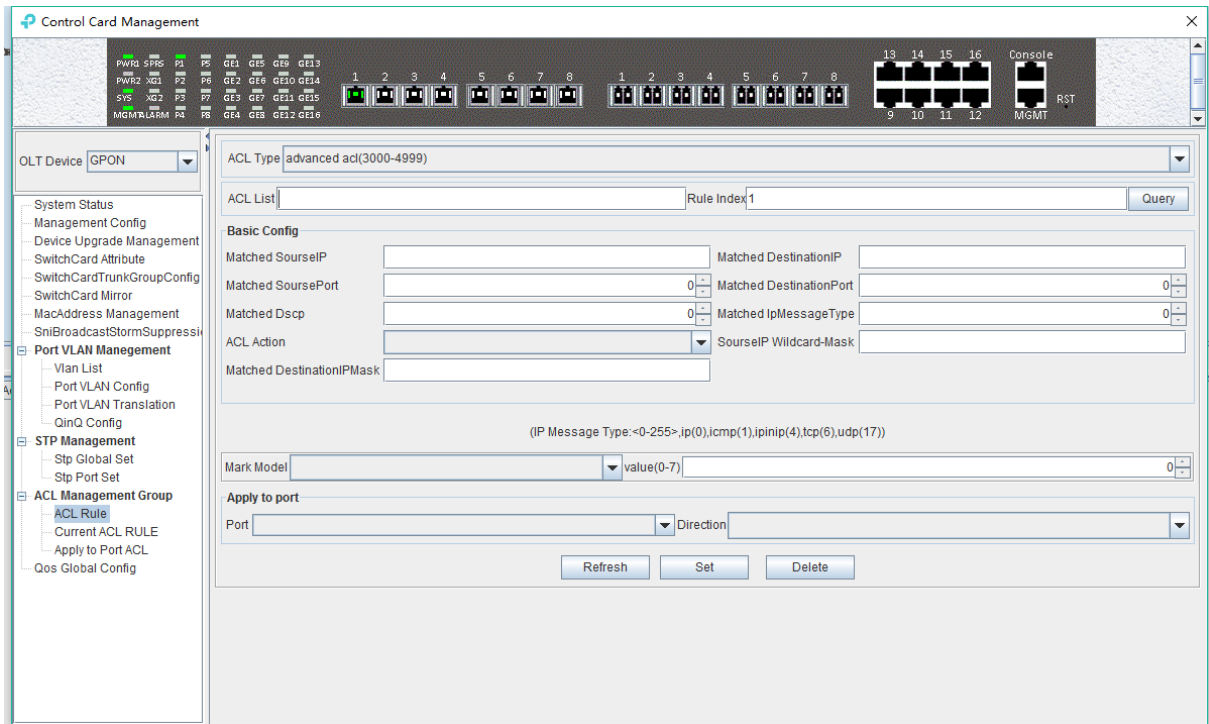
As above **'Link ACL Rule'** page, compared with **'Basic and Advanced ACL Rule'** page, also set the following configuration parameters.

Basic configuration

➢ Matched source MAC

Configure matched source MAC address of ACL Rule, only applied in link ACL Rule, in the format: AA-BB-CC-DD-EE-FF

➢ Matched destination MAC

Configure matched destination MAC address of ACL Rule, only applied in link ACL Rule, in the format: AA-BB-CC-DD-EE-FF。

➢ Match VLAN Id

Configure matched VLAN of ACL Rule, only applied in link ACL Rule. The value range of Id is 1-4094.

➢ Match Ethernet Type

Configure matched Ethernet data frame type of ACL Rule, only applied in link ACL Rule, including IP(2048), ARP(2054), SNMP(33100), mpls-unicast(34887), mpls-multicast(34888) and so on.

➢ Matched source MAC wildcard mask

Configure matched source MAC wildcard mask of ACL Rule, only applied in link ACL Rule. MAC wildcard mask of a single host is 00-00-00-00-00-00. MAC wildcard mask of any host is FF-FF-FF-FF-FF-FF.

➢ Matched destination MAC wildcard mask

Configure matched destination MAC wildcard mask of ACL Rule, only applied in link ACL Rule. MAC wildcard mask of a single host is 00-00-00-00-00-00. MAC wildcard mask of any host is FF-FF-FF-FF-FF-FF.

[Example of LINK ACL configuration]

Example：Configure a link ACL, and ID is 5001. Add outer VLAN 500 to MAC address. As shown below:
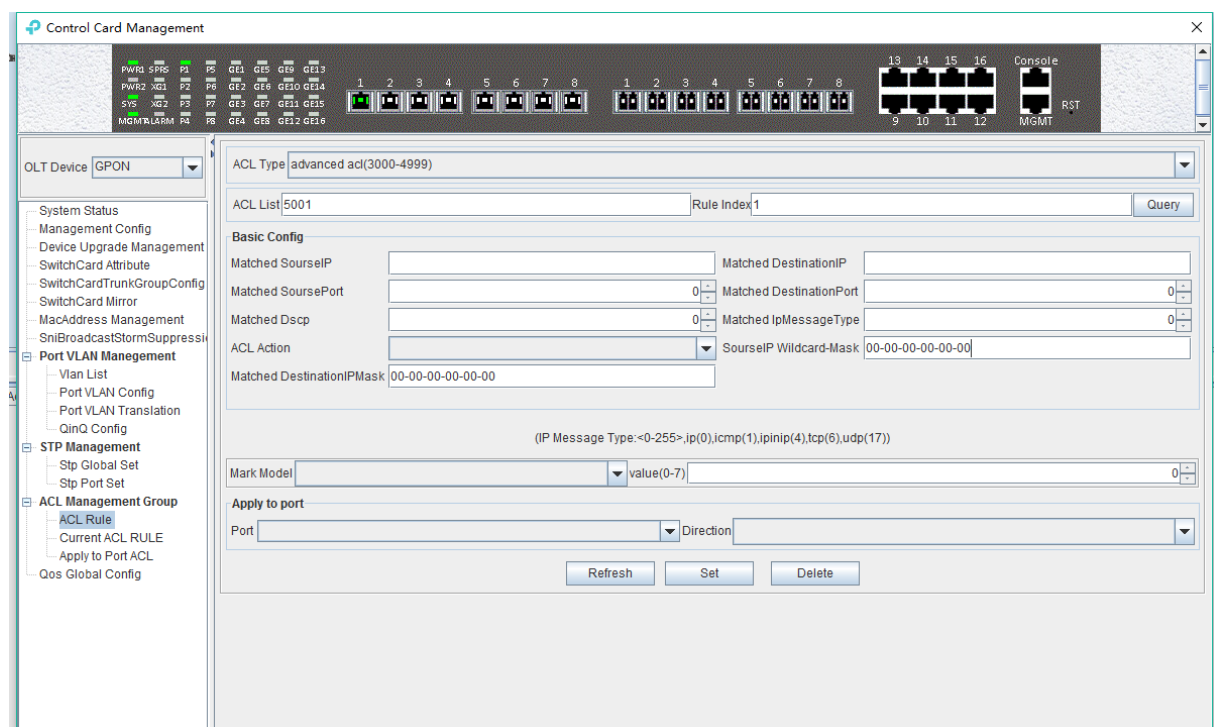
After completing those configurations, the configuration takes effect through the **'Set'** button at the bottom of page, thus creating a link ACL Rule successfully. Deleting a ACL rule created through the **'Delete'** button. Updating a ACL Rule created through the **'Refresh'** button.

6.2.11.2 View OLT ACL Rule

Double click the **'Switch Control Card'** icon on the left side of the main interface, open the **'Control Card Management'** window and enter the **' Current ACL Rule'** window of **'ACL Management'** page.
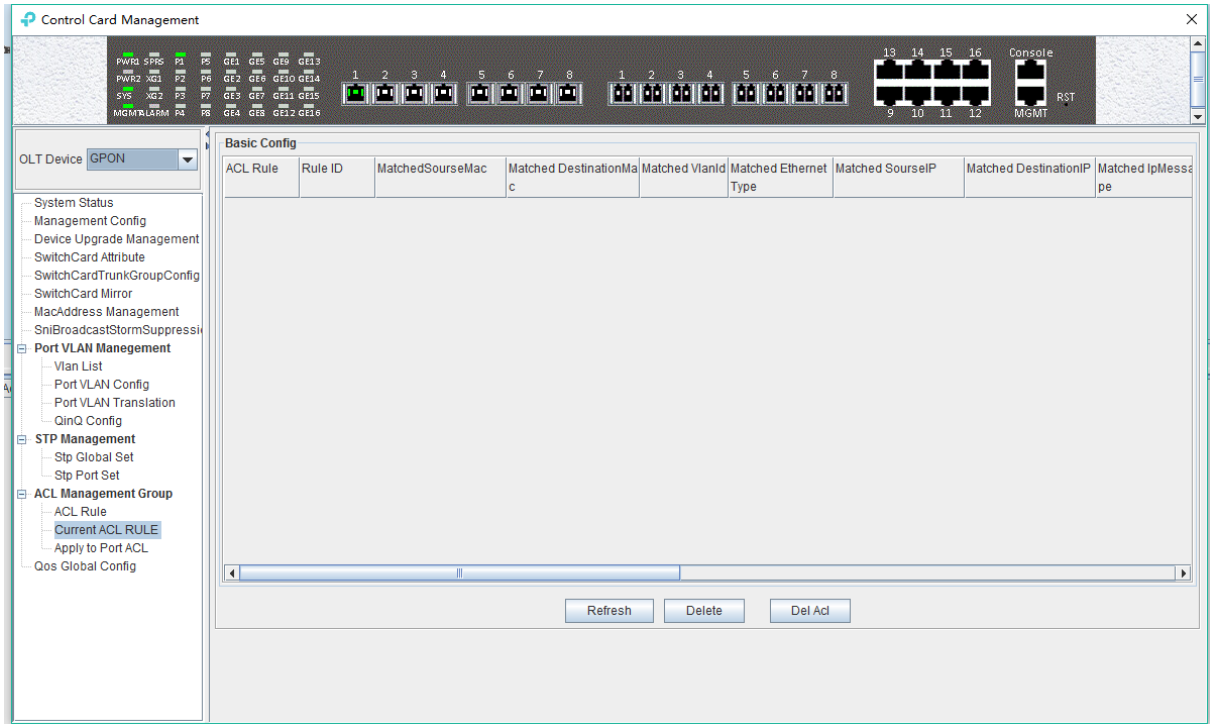
As shown in the figure above, you can view the previously created ACL rule entries on the **'Basic Configuration'** page, where the contents are set in this page. In this page can also delete a ACL, first select an ACL rules, and then click **'Delete'** or **'Delete ACL'** button to delete the ACL rules which not applied directly to the port, if you want to delete the ACL which has been applied to the port, can only remove the binding with the port, and then delete. Update the configuration rules information by the 'Refresh' button.

6.2.11.3 View OLT Port Applied ACL Rule

Double click the **'Switch Control Card'** on the left side of the main page to open the **'Control Card Management'** window and enter the **'Apply to Port ACL'** window of the **'ACL Management Group'**.
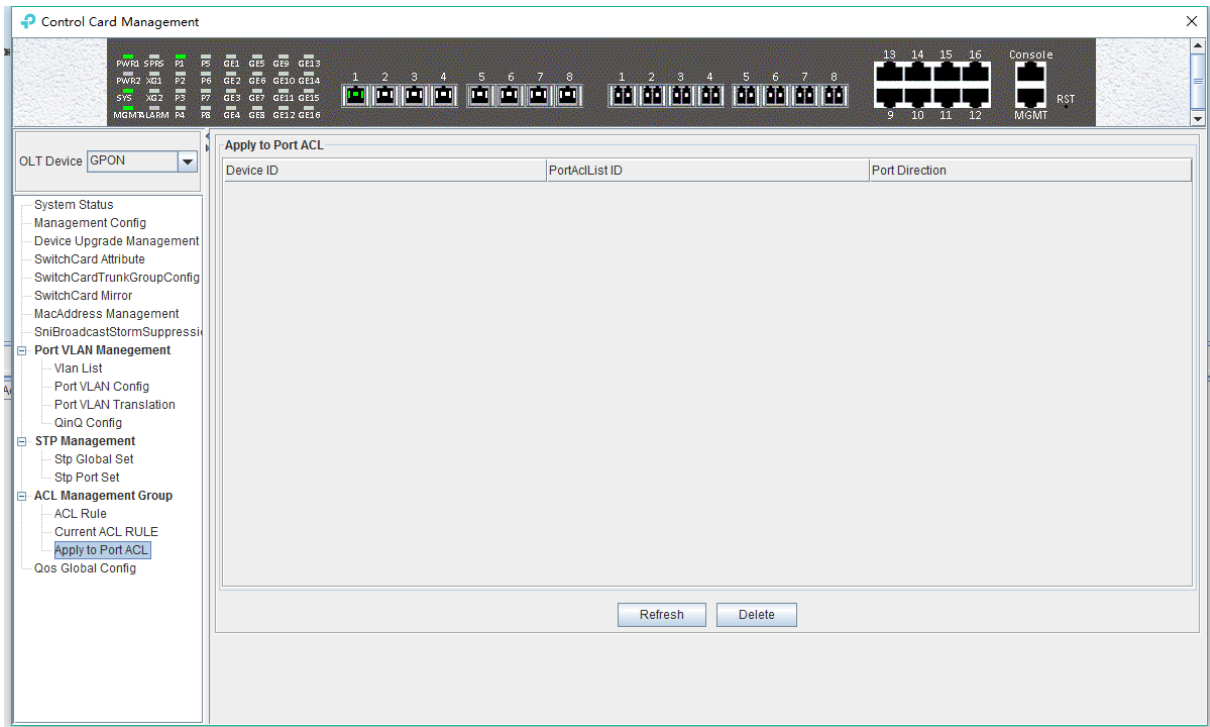
As above, you can see the ACL that you created and applied to port, including the port number, ACL ID, and the direction of the application port .Through the **'delete'** button, you can delete a ACL rule and update the rule information of the configuration through the **'Refresh'** button.

6.2.12 OLT QoS Configuration

QoS Refers to a network can use a variety of basic technology, to provide better services for the specified network application, is a kind of network optimizing mechanism, is used to solve the problem of network delay and blocking issue.

Double click the **'Switch Control Card'** icon on the left side of the main interface, open the **'Control Card Management'** window and enter the **'Qos Global Information'** page.
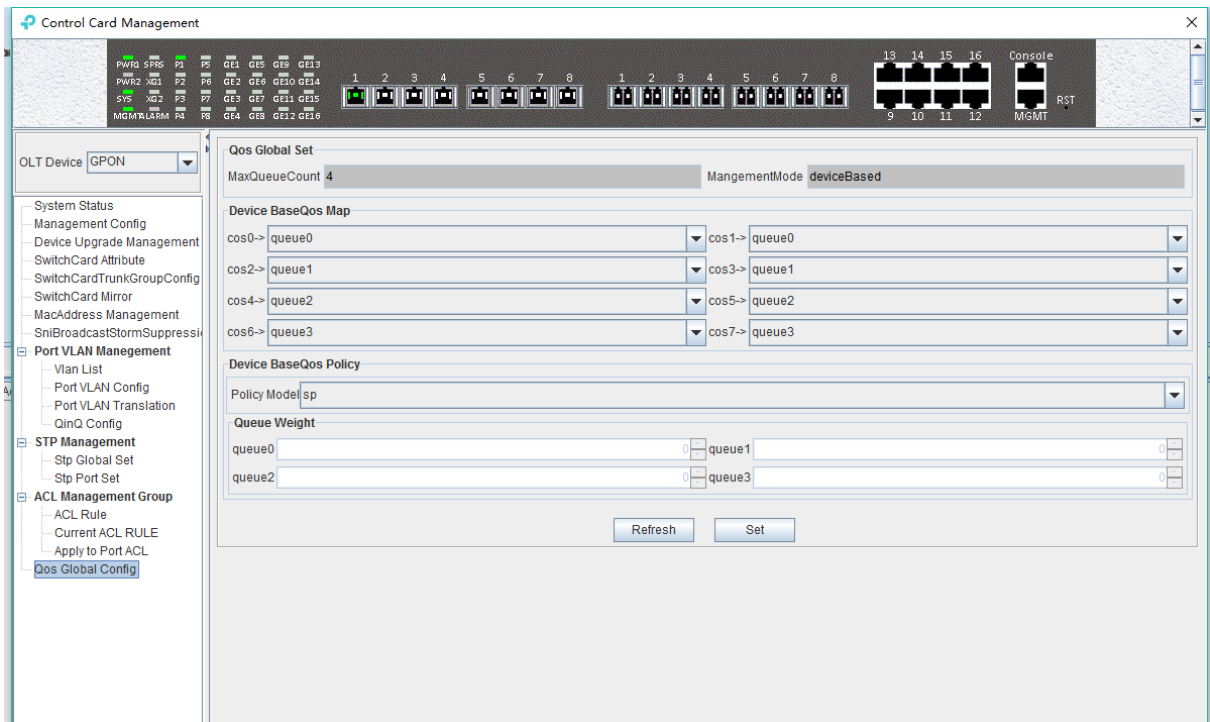
'Qos Global Information' management page mainly can configure 'Device BaseQos Map', 'Device BaseQos Policy', 'Queue Wieght' and 'Queue Bandwidth'. The parameters are described as follows：

Qos system parameter

➢ Max queue count

System sets max queue count to 4. it's range from queue 0 to queue 3.

➢ Qos management mode

System set Qos management mode to deviceBased.

Device BaseQos Map

Qos mapping table is corresponding relationship between priority and port queue. This can configure queue corresponding to the priority. The fault configuration is showing in the following table:

priority	Cos 0	Cos 1	Cos 2	Cos 3	Cos 4	Cos 5	Cos 6	Cos 7
queue	Queue 0	Queue 0	Queue 1	Queue 1	Queue 2	Queue 2	Queue 3	Queue 3

Device BaseQos Policy

Queue schedule has three modes, including sp-strict priority, WRR- Weighted Round Robin and SP+WRR. The details are follows.

➢ SP

Applying this mode, the system is scheduled to be dispatched strictly according to the priority of queue. Only when the high-priority queue is empty, the packets of the low priority queue can be dispatched.

➢ WRR

Applying this mode, it needs to configure a weight for each queue, according to the weight between the queue scheduling in turn, ensure each queue can have a certain amount of services. When the priority is the same, the weight is not the same, the larger the weight of the queue, the longer the scheduling time.

➢ SP+WRR

This mode combines the advantages of SP and WRR, and adopts SP mode when dealing with some critical business, and adopts WRR mode when dealing with some business with low real-time requirement.

Queue weight

Applying in the WRR and SP+WRR two modes, the sum of four queue weight is required to be 100. And in the WRR mode, the value of weight can`t be set to 0.

Queue bandwidth

Set the size of bandwidth occupied by each queue, its range from 0kbps to 1024000kbps.

[Example of QoS configuration]

Example：Set Qos schedule mode to SP, the specific configuration is shown below:
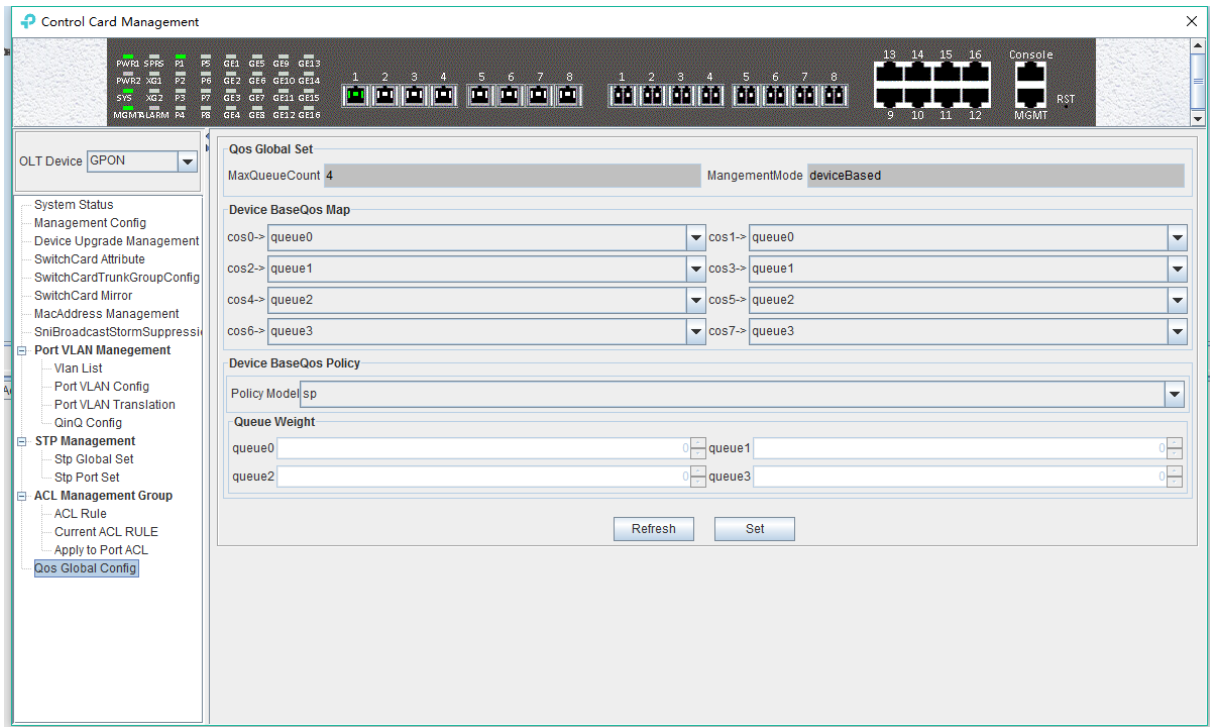
Example 2： Set Qos schedule mode to WRR, the specific configuration is shown below:
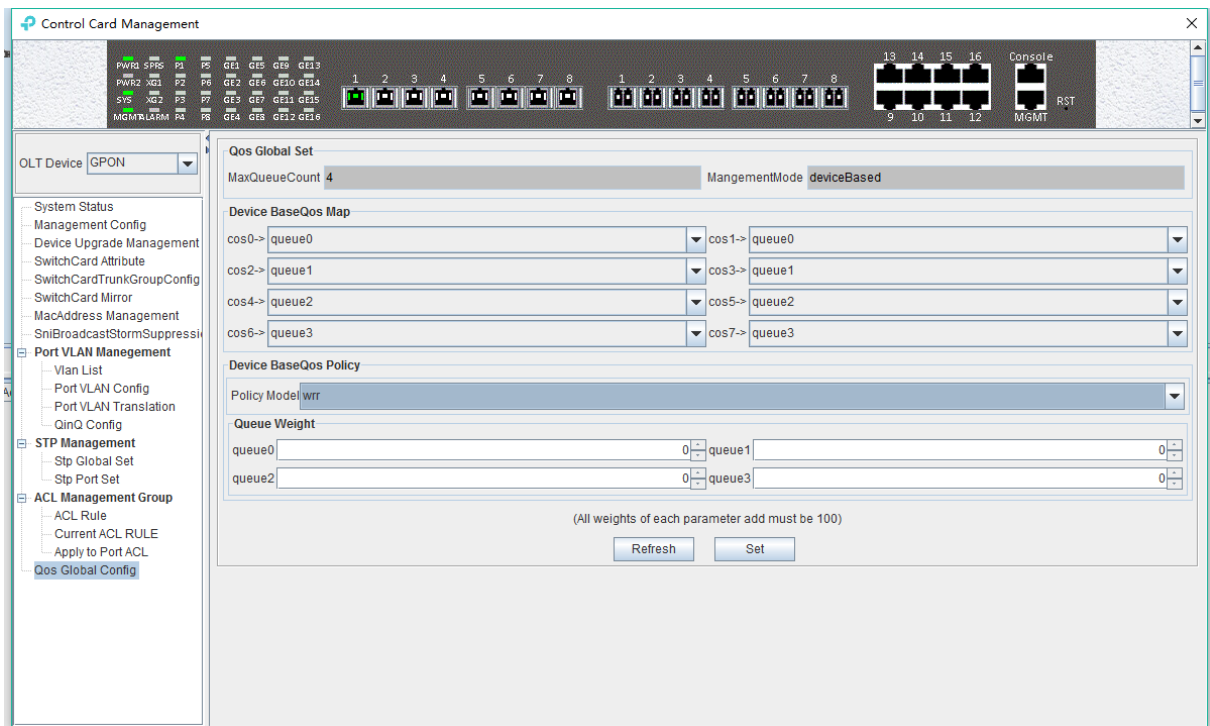
Example 3： Set Qos schedule mode to SP+WRR, the specific configuration is shown below:
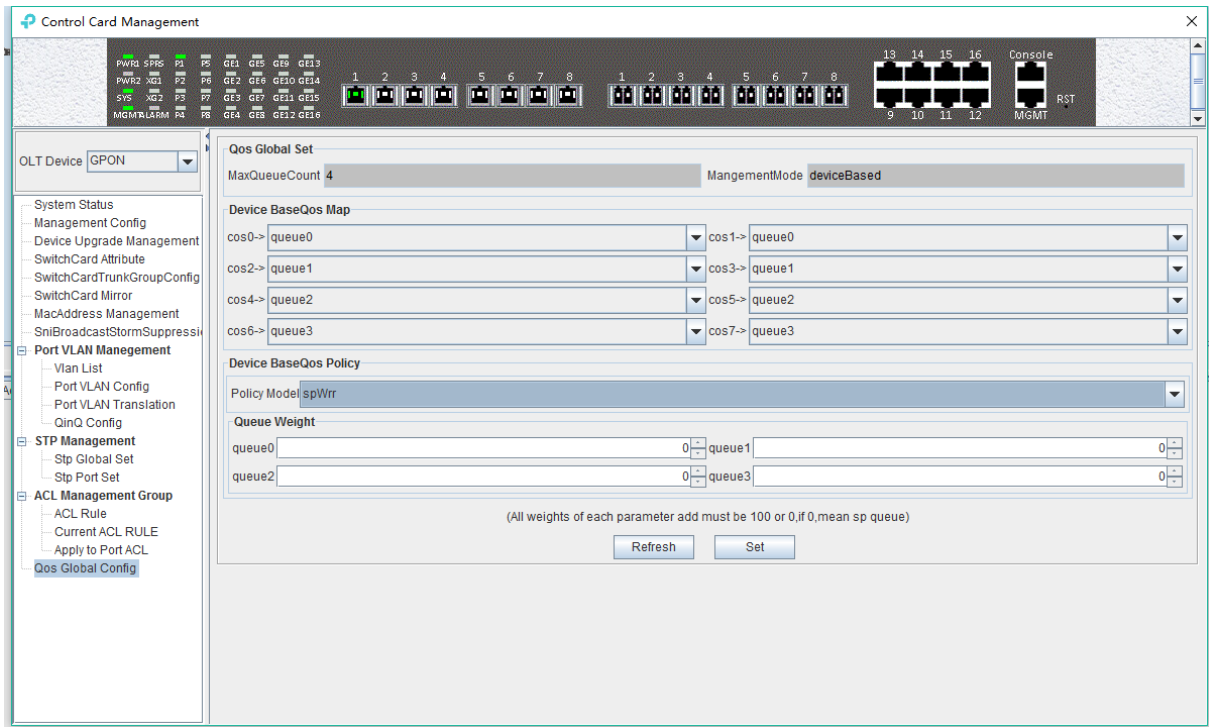
Note: In the WRR mode, the value of weight can`t be set to 0. If the value of weight has 0, Qos schedule mode is SP+WRR.

6.3   OLT PON Card Management

This section introduces OLT PON Card Management function.

Double click the **'PON Module'** icon on the left side of the main page and enter the **'PON Card Management'** window. The typical page is shown below:
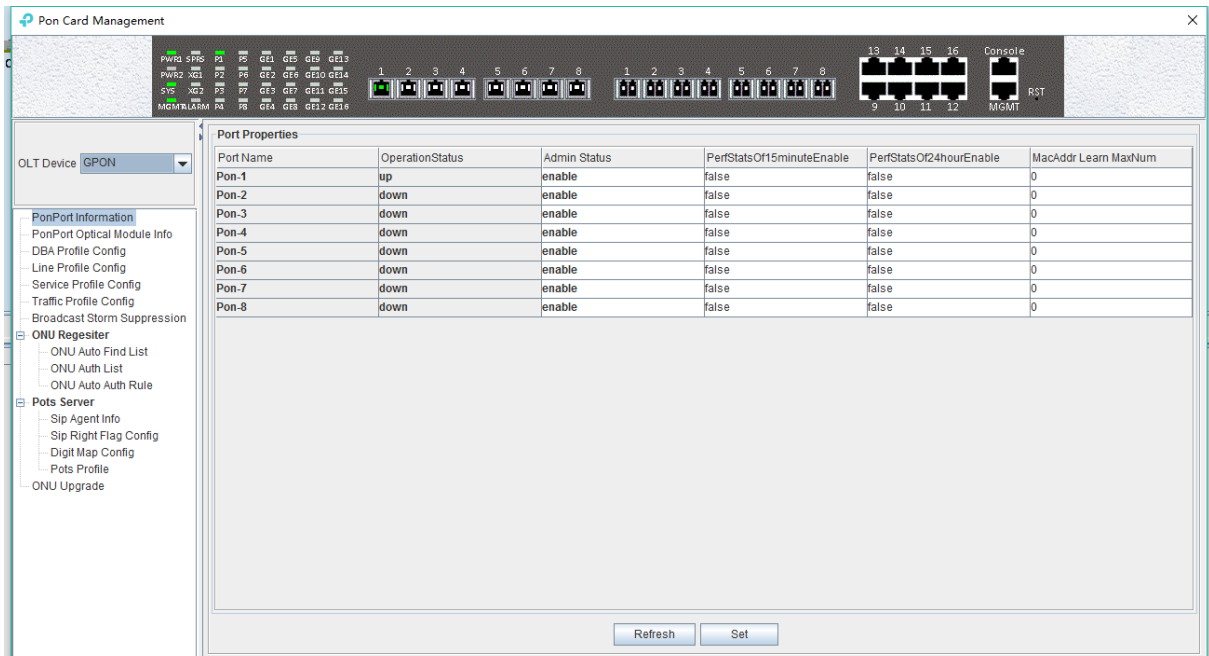
Through this window the user can do the following management:

✓ Some basic management of PON port of OLT;

✓ PON port storm suppression configuration;

- ✓ all kinds of template (DBA profile, line profile, service profile, traffic profile);
- ✓ Pots Server configuration
- ✓ ONU upgrade
- ✓ Authenticate the registration of the ONU;
- ✓ View the optical power information of the PON port;

The following sections describe the functional modules involved in the PON card management window.

6.3.1 OLT PON Port Basic Configuration

Double click the **'PON Module'** icon on the left side of the main page to enter the **'PON port information'** page of the **'PON card management window'**:
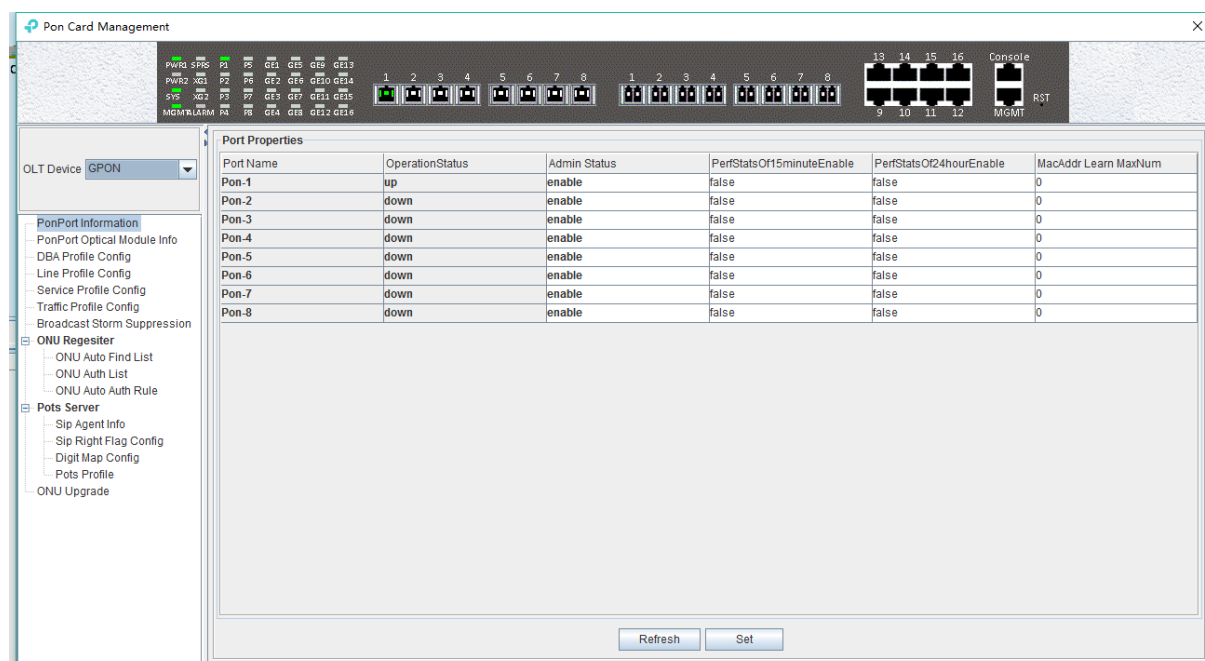
The **'PON port information'** property page configures and views the PON port property parameters of the OLT. The parameters are described below:

➢ Port Name

Displays the PON port name on the OLT. This parameter is unchangeable.

➢ Operation Status

Display the current PON port operation state, the status displays as **'UP'** when connects to an ONU or the ONU has registered under the PON port; the state displays as **'Down'** when not connected or the ONU unregistered under the PON port.

➢ Admin Status

You can configure the PON port of the OLT to be enabled or disabled. Configure **'Enable'** to turn on the PON port; Configure **'Disable'** to turn off the PON port; The default status is **'Enable'**.

➢ PerfStats Of 15minutes Enable

Displays the management status of the "15 minutes performance statistics", administrators can configure this parameter to **'True'** or **'False'**.

When set to **'True'**, the corresponding PON port will report the performance statistics information

every 15 minutes.

➢ PerfStats Of 24hour Enable

Shows the management status of the "24 hours performance statistics", administrators can configure this parameter to **'True'** or **'False'**.

When set to **'True'**, the corresponding PON port will report the performance statistics information every 24 hours.

➢ MacAddr Learn MaxNum

Configure the maximum number of MAC addresses can be learned by the corresponding PON port of the OLT, in the range of 0 to 8092.

6.3.2 PON Port Optical Module Information

Double click the **'PON Module'** icon on the left side of the main page to enter the **'PON port optical module info'** page of the **'PON card management window**':
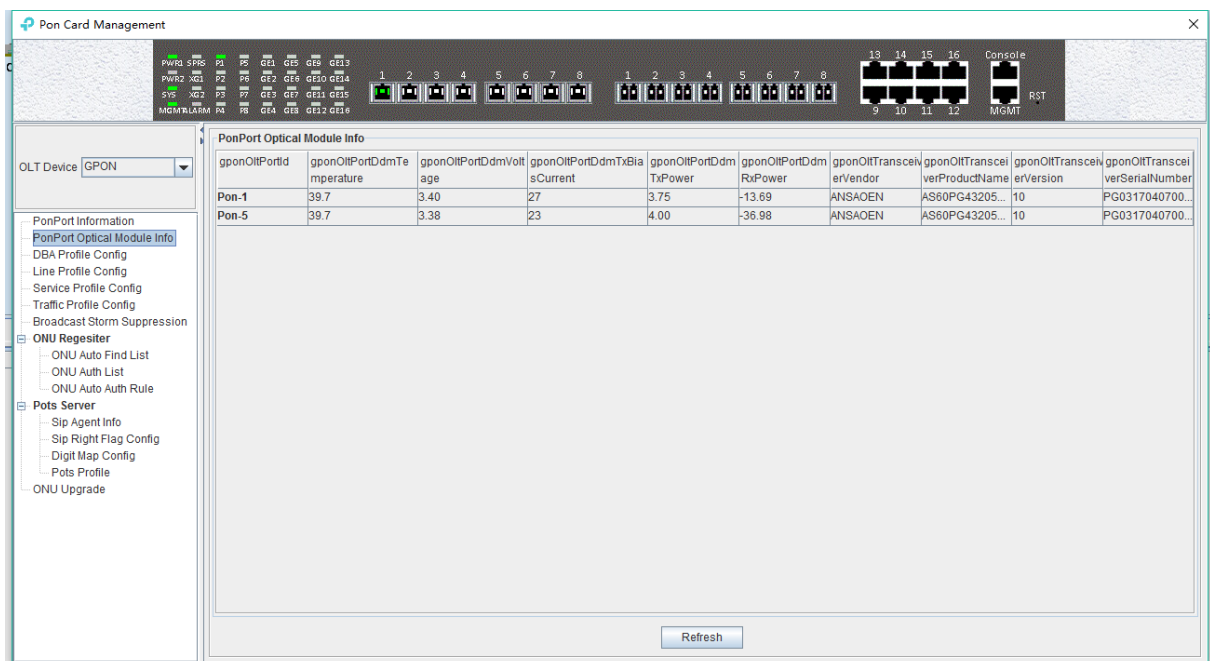
Enter this page to view the status of the PON port optical module, includes the temperature, voltage, current, vendor information, transmit power, etc.

6.3.3 OLT DBA Profile Configuration

OLT profile is used to limit upstream bandwidth of each service of the ONU. This section mainly describes how to view, create, modify and delete DBA profile.

6.3.3.1 View DBA Profile

Double click the **'PON Module'** icon on the left side of the main page to enter the **'DBA Profile Config'** page of the **'PON card management'** window, you can view fault DBA profile and created DBA profile:
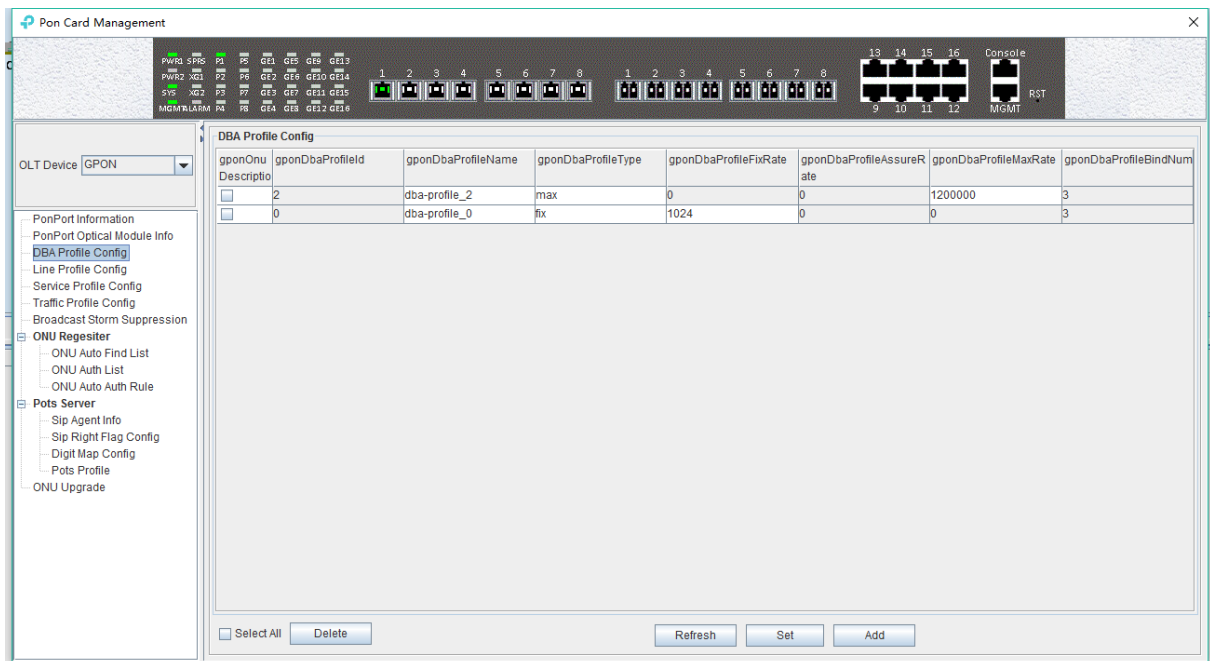
The parameters are described below:

➢ DBA profile

Display configured DBA Profile ID, and DBA profile ID is unique.

➢ DBA profile name

Display the name of the configured DBA Profile.

➢ DBA Type

Display configured DBA profile type, there are 5 types of DBA can be chosen, including `fix`, `assure` , `assure+max` , `max` , `fix+assure+max` .

➢ Fix Rate

Configure and display uplink DBA fix bandwidth. The unit is kbps.

➢ Assure Rate

Configure and display uplink DBA assure bandwidth. The unit is kbps.

➢ Max Rate

Configure and display uplink DBA max bandwidth. The unit is kbps.

➢ Number of mapping rules

Display how many T-CONTs are binding with this DBA profile.

6.3.3.2 Create DBA Profile

In the page of **'DBA Profile Config'**, click **'Add'** button to pop up **'Add DBA Profile'** window:
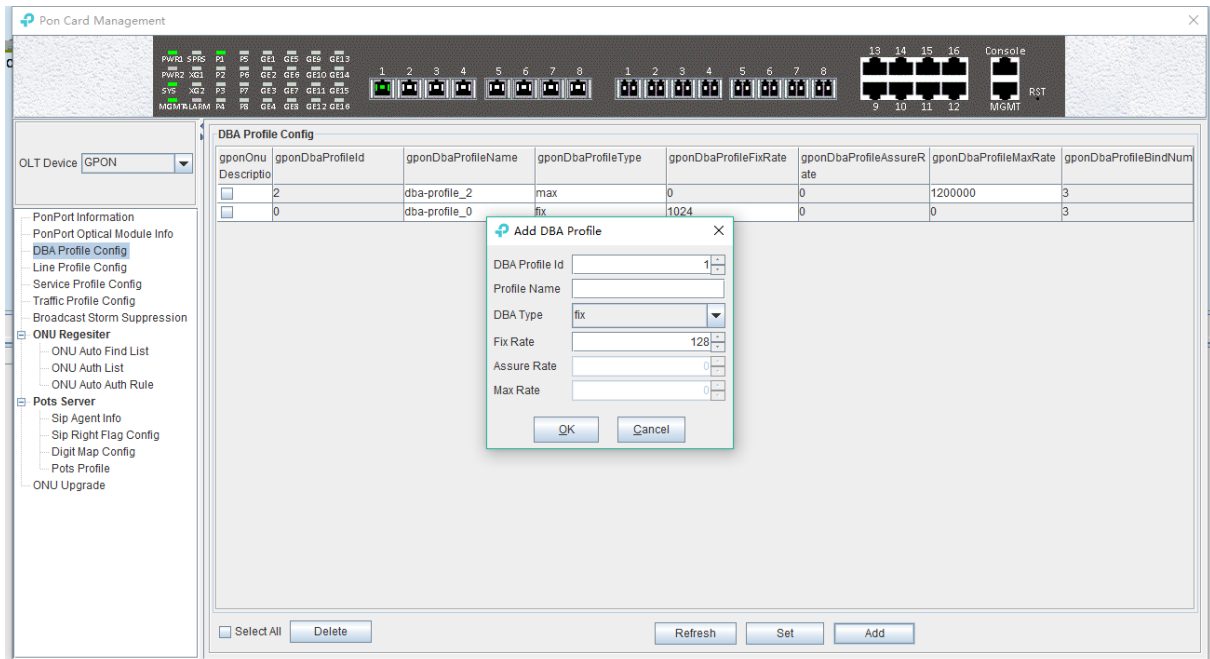
The page can create an uplink DBA profile, specified DBA profile id, DBA profile name, DBA profile type and configure the corresponding uplink data rate. Then click 'OK' to create the DBA Profile.

[Example of DBA Profile configuration]

Example: Create a DBA Profile that its ID is 50, name is 'up speed limit', and type is 100M fix bandwidth.
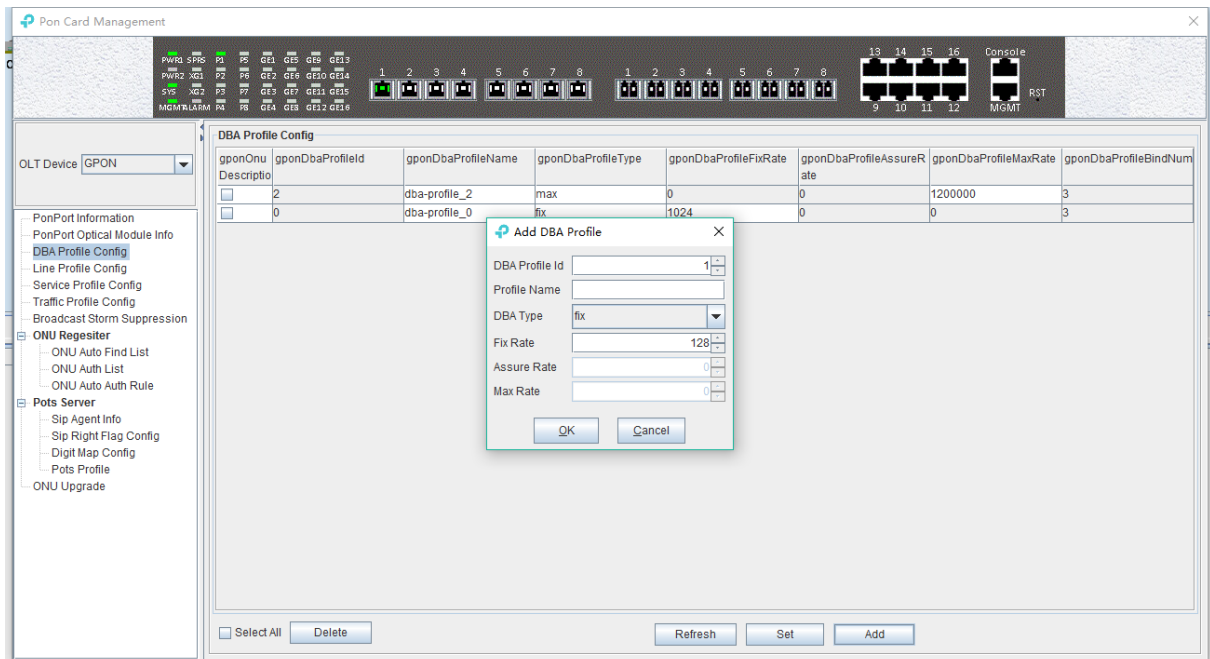
6.3.3.3 Modify DBA Profile

In the page of **'DBA Profile Config'**, users can modify some parameters of the DBA Profile, then click **'set'** button to let the new parameter take effect.
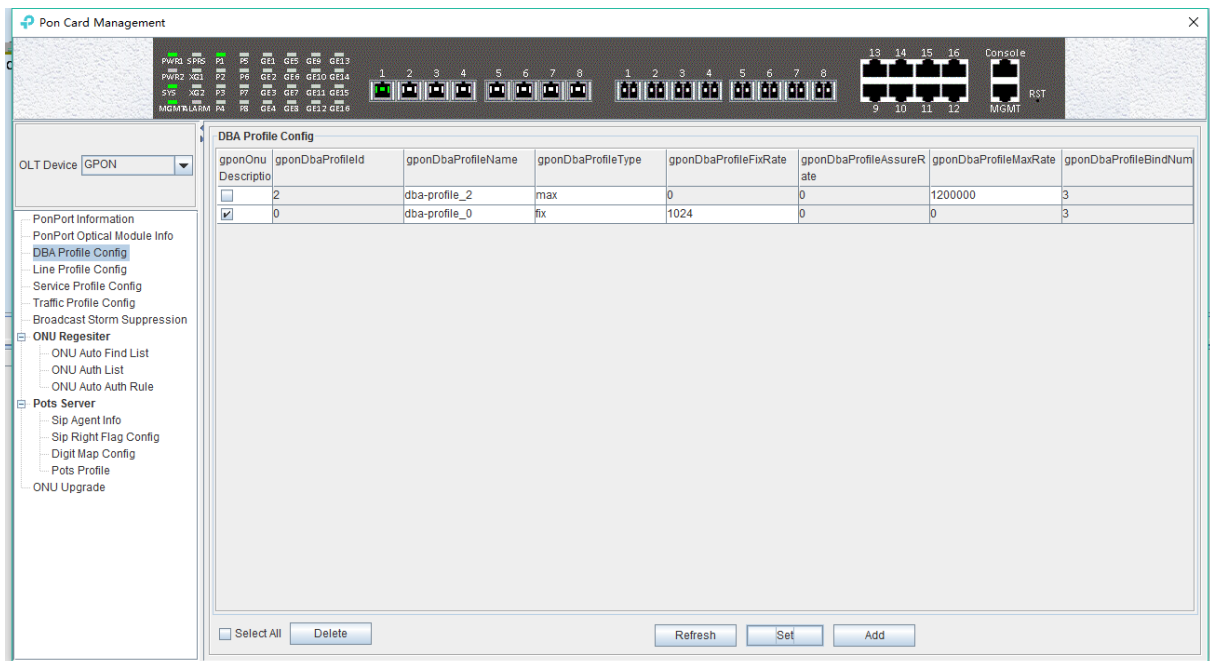
6.3.3.4 Delete DBA Profile

In the 'DBA Profile config' page, you can also delete some DBA profiles by select it then click `delete' button.
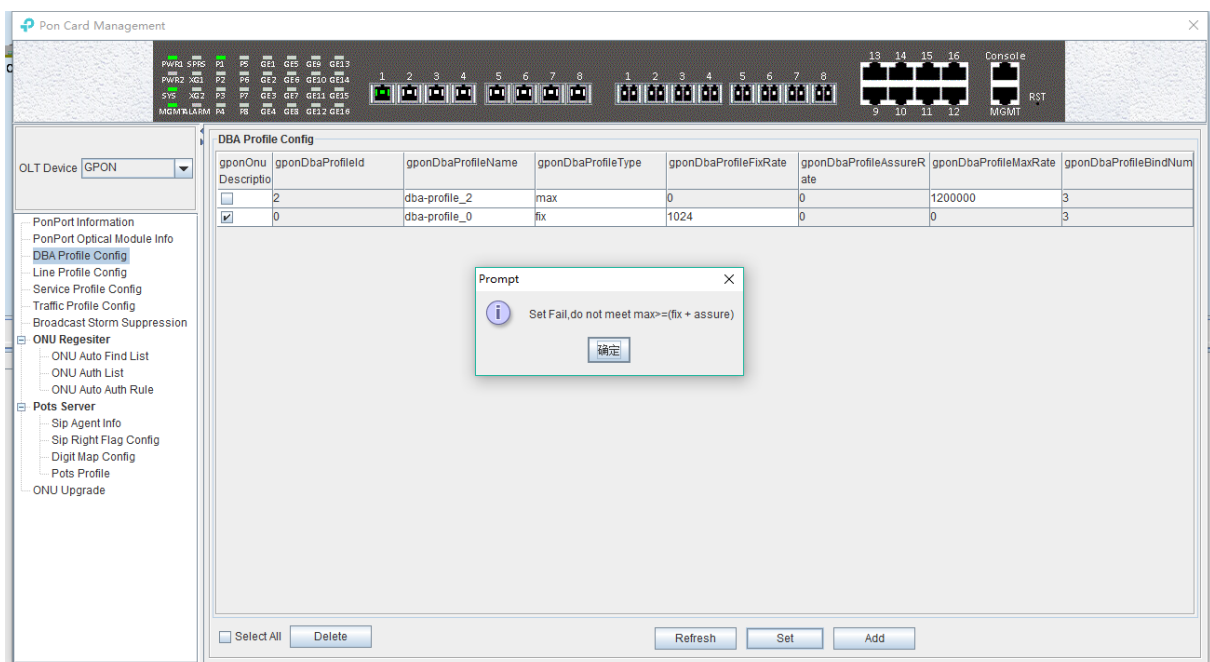
6.3.4 Line Profile Config

The GPON ONU line profile describes the binding relationship between the T-CONT and DBA profiles, the QoS model of the business traffic and the mapping relationships between the GEM Port and ONT side business.it is mainly used to configure DBA, T-CONT and GEM Port information, the ONU line correlation property is configured in the line profile, for the same ONU, you only need to configure once to save the configuration workload. The ONU management mode whether for OMCI or SNMP, will need to bind the GPON ONU line when adding ONU, and if not specified, the system will automatically bind ONU to the default line profile 0. After executing command success, user will enter the corresponding GPON ONU line profile configuration mode

and set the related properties of the GPON ONU line profile.

6.3.4.1 View line profile

Double click the **"PON Module"** on the left side of the main page and enter the **"line Profile Configure"** page of the **"PON Card Management"** window, which will show the line profile created on OLT:
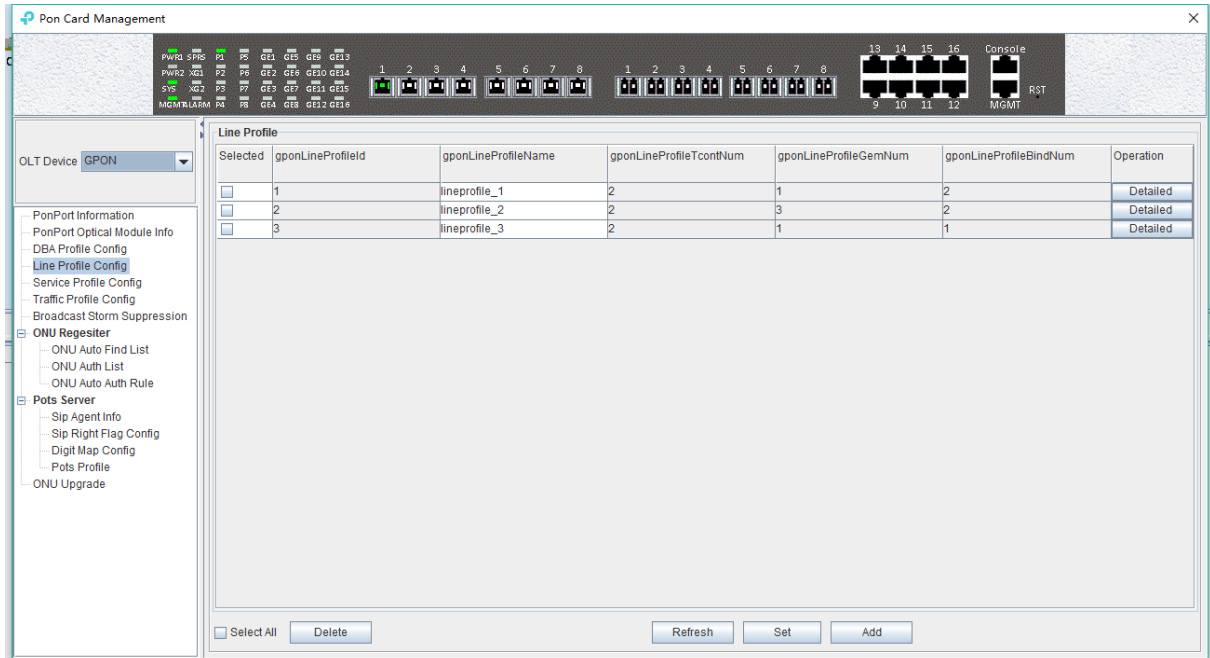
The parameters in the line profile are described in detail below:

➢ Line Profile ID:

Show the ID of line profile, this parameter is unique;

➢ Profile Name:

Show the name of the configured line profile.

➢ Tcont Num:

Show the number of T-CONT in the line profile. currently support maximum 4 T-CONTs. range: 0-3.

➢ Gem Port:

Show the number of GEM port in the line profile, currently support up to 24 GEMs, range: 1-24.

➢ Bind Num:

Show the number of ONUs bound to this line profile.

6.3.4.1.1 Create Line Profile

There are many steps to add a line profile.

Step 1 (create line profile ID):

In **'Line Profile Config'** page, click **"add"** button will pop up a **'Add Line Profile'** window, in the window input customized Line Profile ID, Profile Name and click **'OK'**:
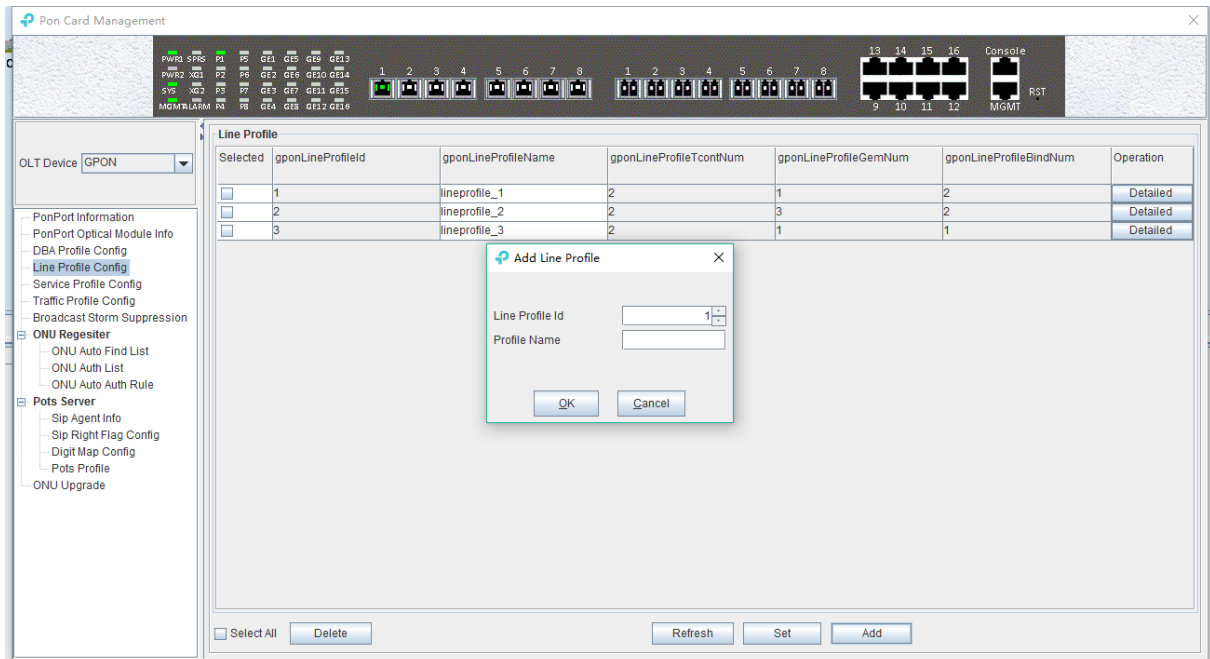
Step 2 (create T-CONT id)

In **'Line Profile Configure'** page, double-click the **'Detailed'** button in the line of the line profile you want to configure, then you can enter the **'Tcont Config'** page;
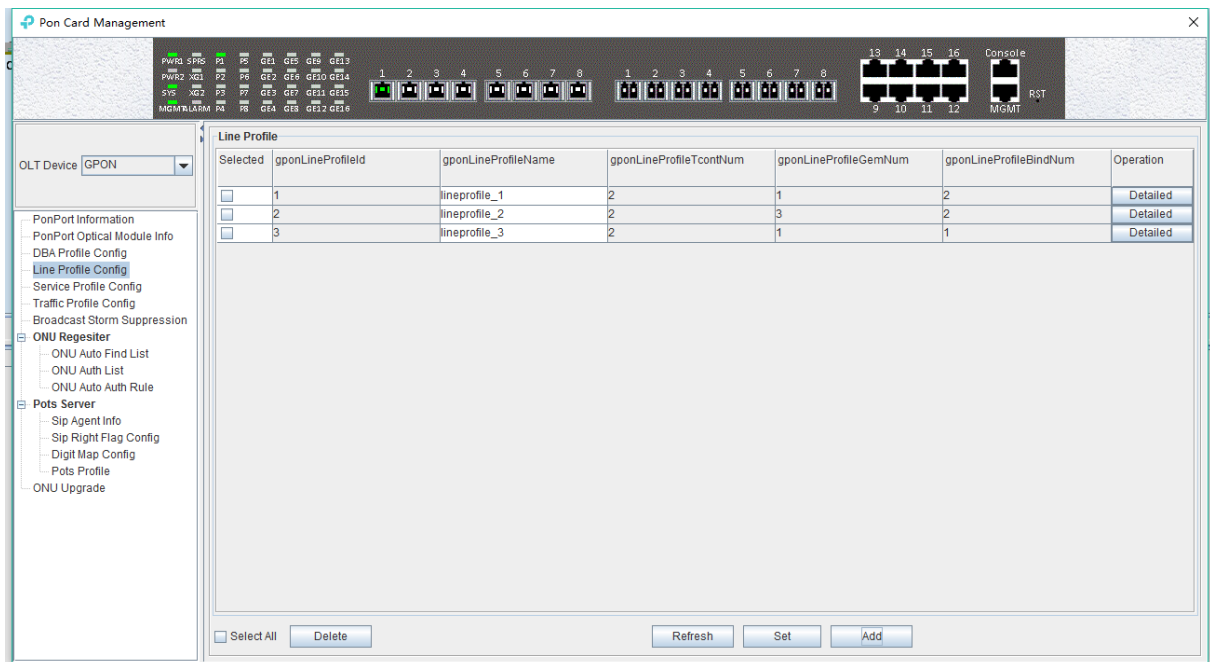
In the **'Tcont Config'** page, click **'Add'** to add a T-CONT. Input Tcont id, and select one DBA profile to bind, then click `**OK**` to add it.
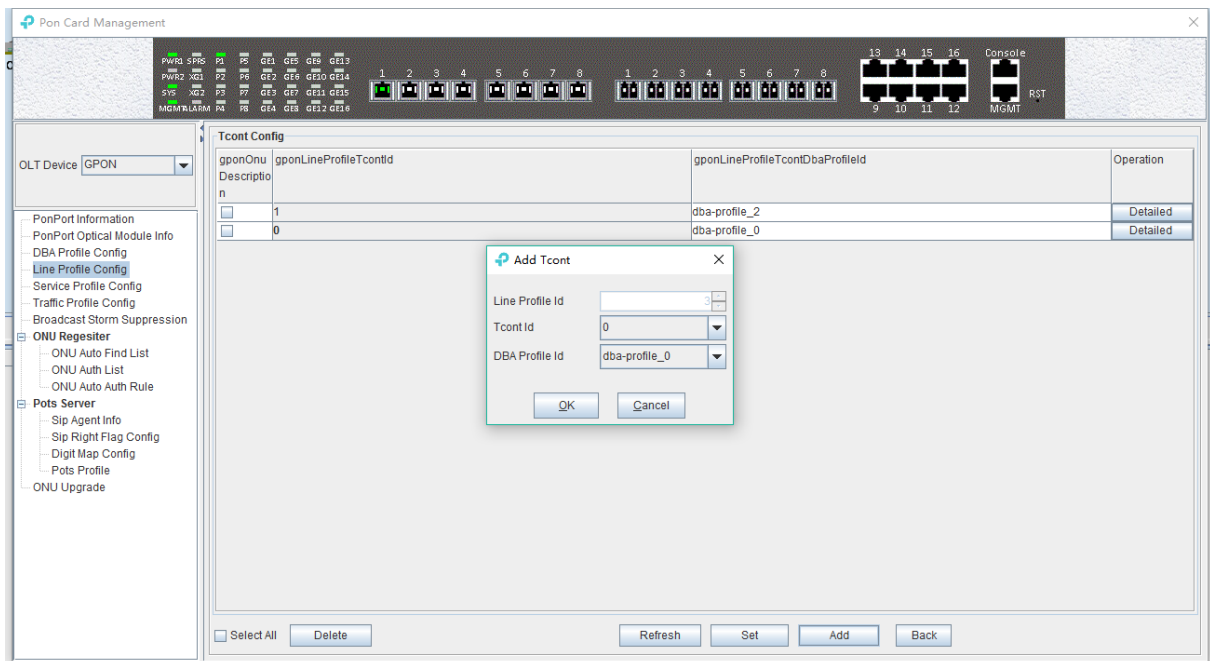
Step 3 (create GEM port) :

In the **'Tcont Config'** page, double-click the **'Detailed'** button in the line of the T-CONT you want to configure, you can enter the **'Gem Config'** page,
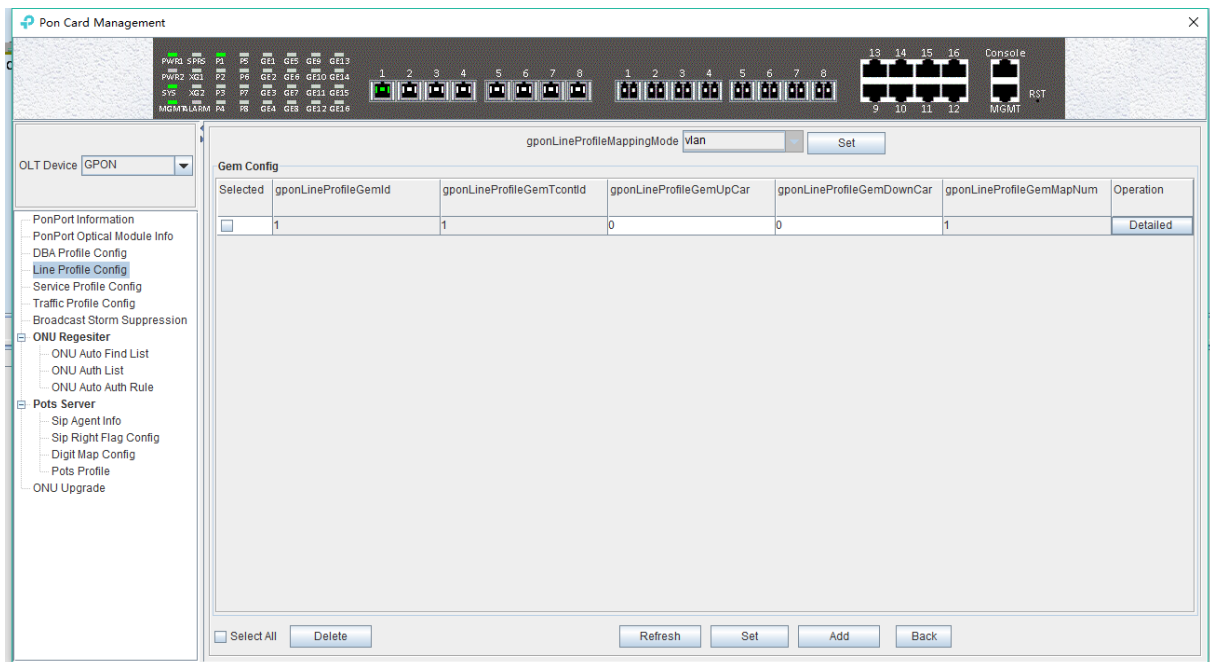
In the **'Gem config'** page click **'Add'** to add a GEM port, input the Gem id, and then bind a traffic profile of up and down (the default doesn't have to bind the traffic profile). Click `**OK**` to add the GEM port:
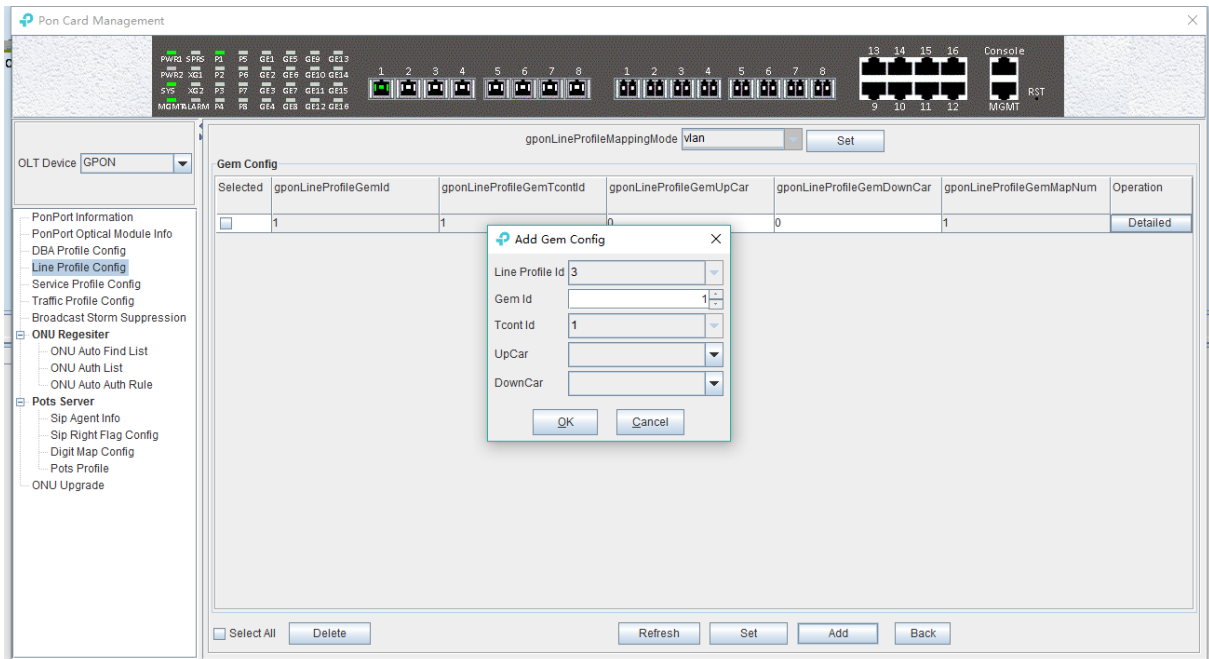
In this page, double-click the **'Detailed'** button below the **'Operation'** to enter the **'Gem Mapping'** page and create the gem mapping. Select a gem port, and then click **'Delete'** to remove a gem port; You can select vlan, vlan priority and vlan + priority, and then click **'Set'**.

Step 4(create GEM mapping) :

In **'Gem Configure'** page, double-click the **'Detailed'** button in the line of the GEM you want to config, then you can enter the **'Gem Mapping'** page.
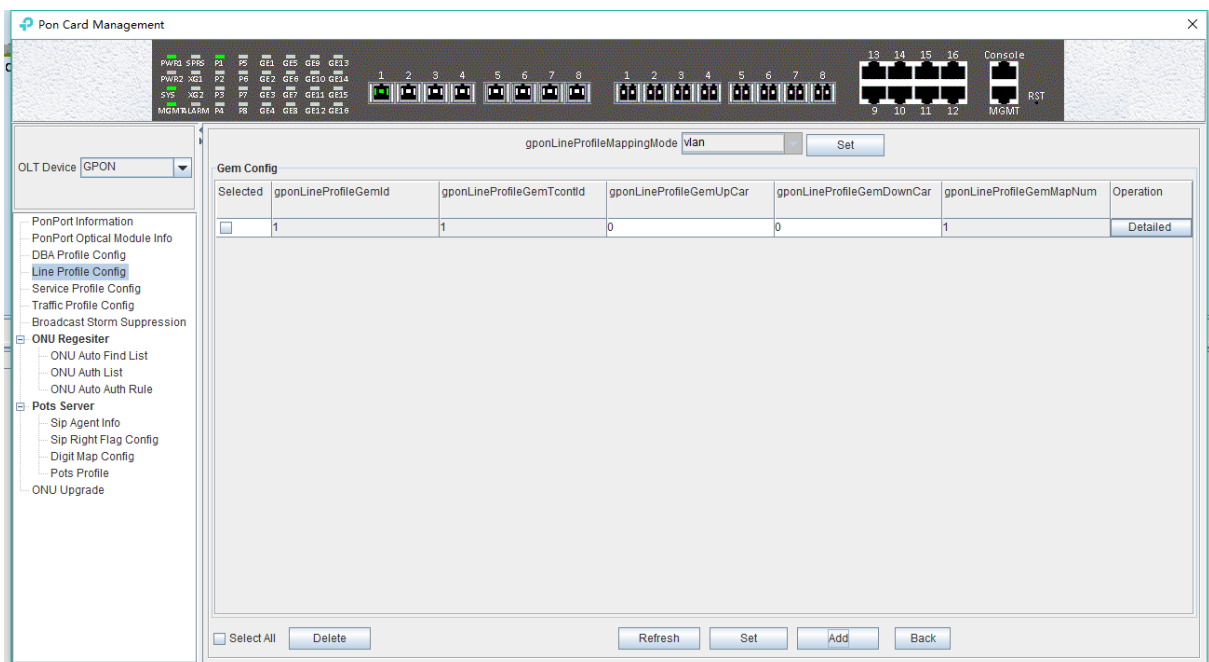
In the **'Gem mapping'** configuration page, click **'Add'** to add a GEM mapping. Input the Gem Map id and the Map vlan, then click `OK` to add the GEM mapping item:
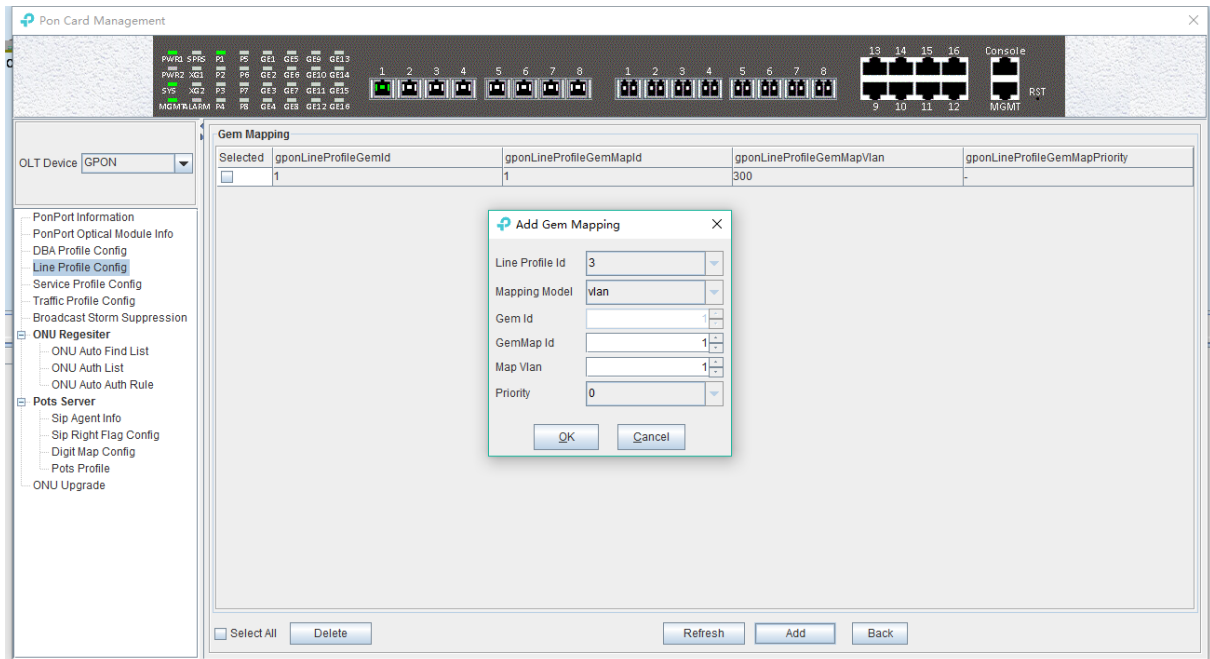
In this page, user can select an entry, then click **'Delete'** to remove a GEM mapping.

Now, we complete the creation of the line profile, we can click the **'Back'** button back to the Line Profile page and view the created line profile. (refer chapter 6.3.4.1)

6.3.4.2 Modify Line Profile

The name of the line profile can be modified in the Line Profile page.

Double-click the **'Detailed'** button in the line of the line profile you want to modified, we can modify the **T-CONT** and **GEM** of the line profile binding.

6.3.4.3 Delete Line Profile

In the main page of the **'Line Profile'**, you can select a line profile and click the 'Delete' button to delete the line profile.

Note: the line profile can only delete the unbound, if the line profile has been bound, the delete operation of the profile should be done before the ONU is deleted or bound ONU to other line profile.
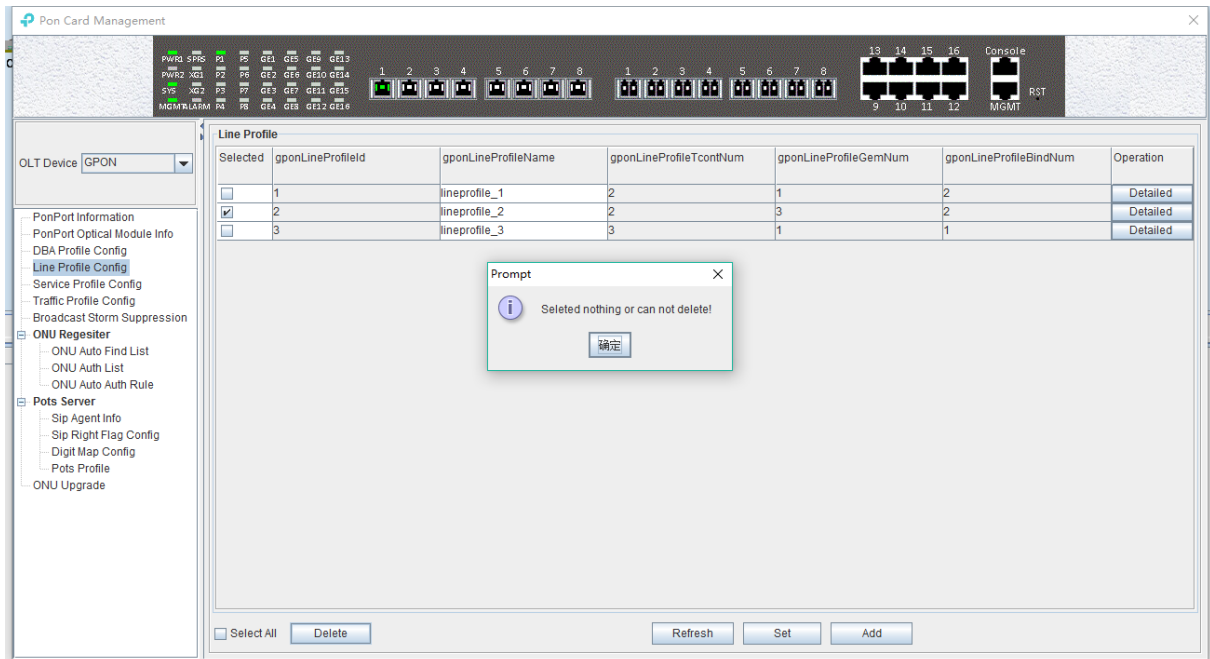
6.3.5 OLT Service (business) Profile Configuration

The GPON ONU service profile provide service profile configuration channel for OLT which use the OMCI (ONT Management and Control page) method manage.

The ONU service correlation properties are concentrated in the service profile for configuration. the same business only need to be configured only once to save configuration workload. When ONU management mode is OMCI

When adding ONU, you need to bind the GPON ONU business profile, which will automatically bind if not specified will bind the ONU to the default business profile 0. After the command executes successfully, we enter the corresponding GPON ONU service profile configuration Mode, we can set the associated properties of the GPON ONU service profile.

6.3.5.1 View Service Profile

Double click the **'PON Module'** icon on the left side of the main page and enter the **'Service Profile Configure'** page of the **'PON Card Management'** window, which will show the service profile created on OLT:
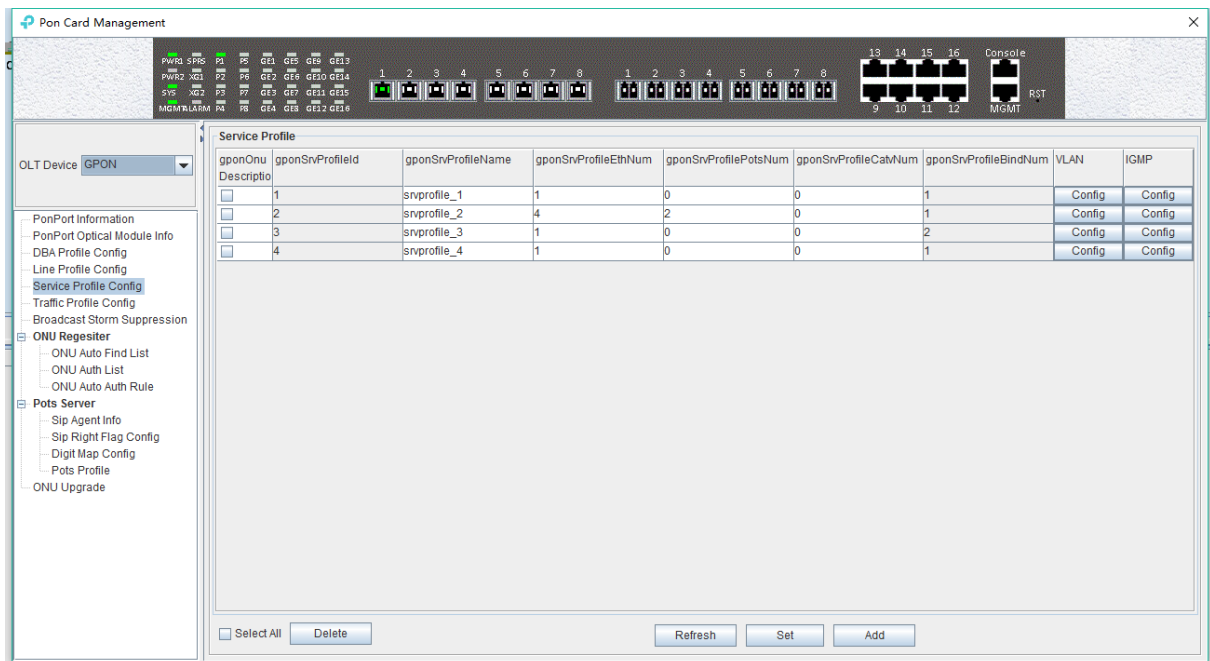
the parameters in the service profile are described in detail below:

➢ Profile id

Show the configured service profile ID, It is unique;

➢ Profile Name

Show the name of the configured service profile.

➢ Eth Num

The number of ONU Ethernet (eth) ports bound to the service profile; The value "**Adapt**" indicates that the number of Ethernet ports can be adapted to the ONU, and no manual configuration is required. For example, the actual number of ethernet ports of the ONU bound to the service profile is 4, we can select 4 or Adapt.

➢ Pots Num

The number of ONU POTS ports to bind to the service profile, ranging from 0 to 8; The "Adapt" parameter indicates that the number of post ports can be adapted to the ONU, and no manual configuration is required. For example, the actual number of actual post ports of the ONU bound to the service profile is 2, we can select 2 or Adapt.

➢ Catv Num

The number of ONU CATV ports to bind to the service profile, ranging from 0 to 8; The "Adapt" parameter indicates that the number of CATV ports can be adapted to the ONU, and no manual configuration is required. For example, the actual CATV port number of the ONU bound to the service profile is 1, we can select 1 or Adapt.

➢ Bind Num

Shows the times that the service profile is bound by the ONU.

➢ VLAN

Configure the ONU port VLAN for the service profile binding.

➢ IGMP

Configure the ONU port IGMP configuration for this service profile binding.

6.3.5.2 Create Service Profile

In the **'Service Profile'** in the main page, click **"Add"** button, specify the service profile ID, name and number of each port to bind ONU, and then click **'OK'** button to complete the basic create for service profile:
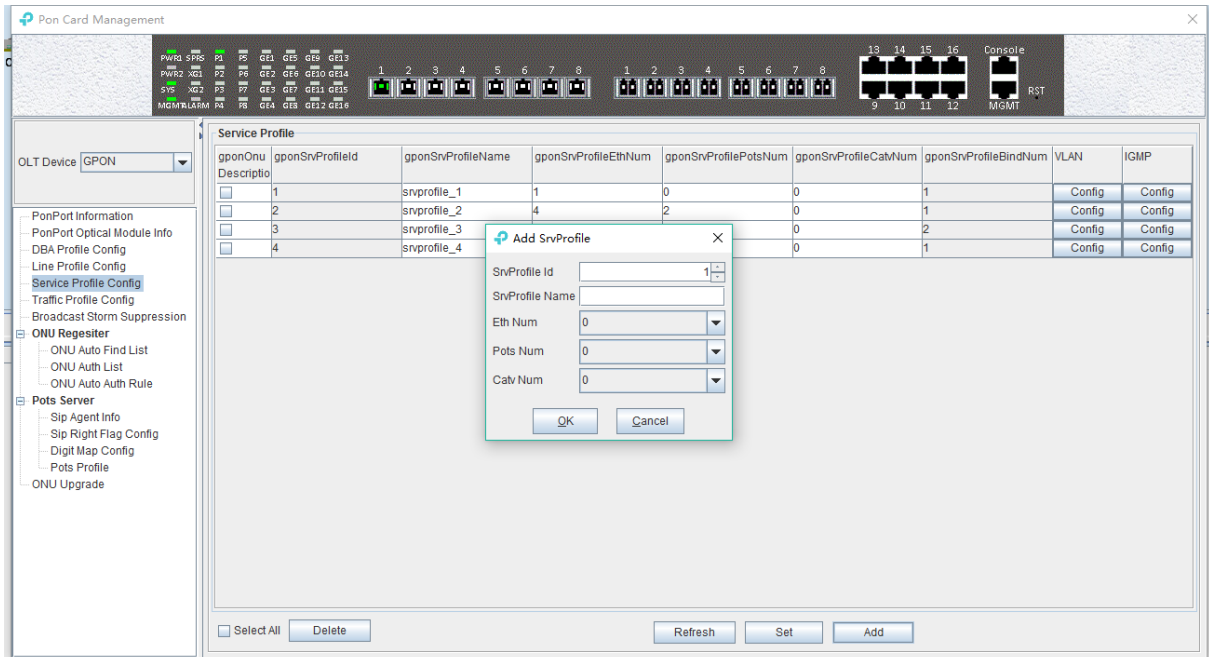
6.3.5.2.1 ONU VLAN Configuration In Service Profile

In the main page of the **'Service Profile'**, double-click the **'Configure'** button in the **'VLAN'** column of the entry you want to configure to enter the **'Vlan Configure'** page:
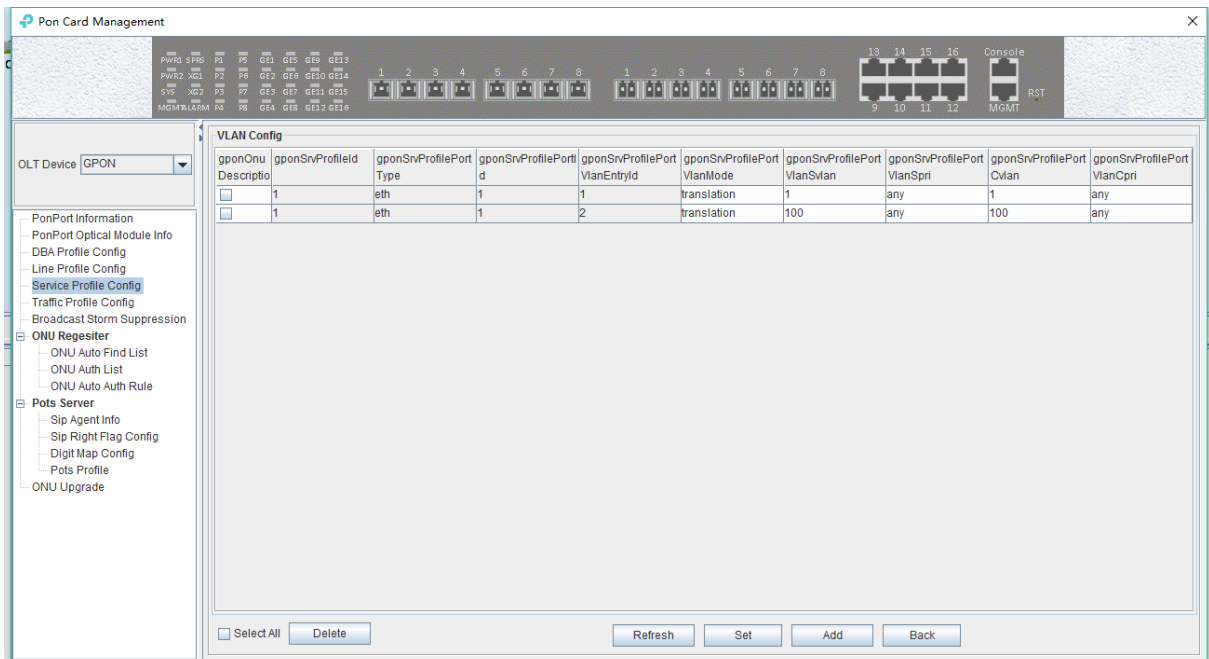
The following is a description of VLAN related configuration in service profiles:

➢ select

Select the eth port of ONU.

➢ Profile Id

Show the service profile of current modified ONU vlan

➢ Port Type

Show the port type of ONU and is shown by default in the name of the eth (Ethernet) port.

➢ Eth Port Id

Show the serial number of the ONU port, and if the ONU is 4, it will appear from top to bottom 1-4.

➢ Vlan Entry Id

The configured VLAN index number, if the port is configured with multiple VLANs, It will be displayed from 1-x.

➢ Vlan mode

Translation: the translation model here has two meanings:

When the ONU port SVLAN and CVLAN configured under the translation mode are the same, the configuration is configured with the ONU trunk mode under the VLAN;

When the ONU port SVLAN and CVLAN configured in translation mode are different, the ONU port VLAN transformation mode is configured to convert the ONU to the SVLAN on the network side.

QinQ: the port configuration of the ONU is configured with QinQ VLAN mode. In QinQ mode, the VLAN from ONU is on the outer layer and the VLAN is forwarded to the top. The downstream data will strip off the outer VLAN tag and then forward it down.

Transparent: the port configuration of the ONU is configured with VLAN transmission mode, which can be directly forwarded either with VLAN tag or VLAN tag in the VLAN transmission mode.

➢ Svlan

Configure the SVLAN on the network side for a range of 1-4094.

➢ Svlan priority

Configure priority of the SVLAN on the side of the network, the values range 0-7 and any, 0 has the lowest priority, and 7 has the highest priority. Any means any priority.

➢ Cvlan

The CVLAN configured on the network side ranges 1-4094.

➢ Cvlan priority

The priority of the CVLAN configured on the network side is 0-7 and any, 0 has the lowest priority, and 7 has the highest priority. Any indicates any priority.

6.3.5.2.1.1 ONU Transmission Mode VLAN Configuration

In **'service profile'** main page, double-click **'Configure'** button under **'VLAN'** of the need to configure, enter the **'Vlan Configure'** page, in the column of **'Vlan Mode'** choose **'transparent'** and the ONU VLAN mode can be set to transparent:

Prompt

Set failed,The VLAN translation or QinQ function has been already configured on the ONT port,or Priority error.

确定
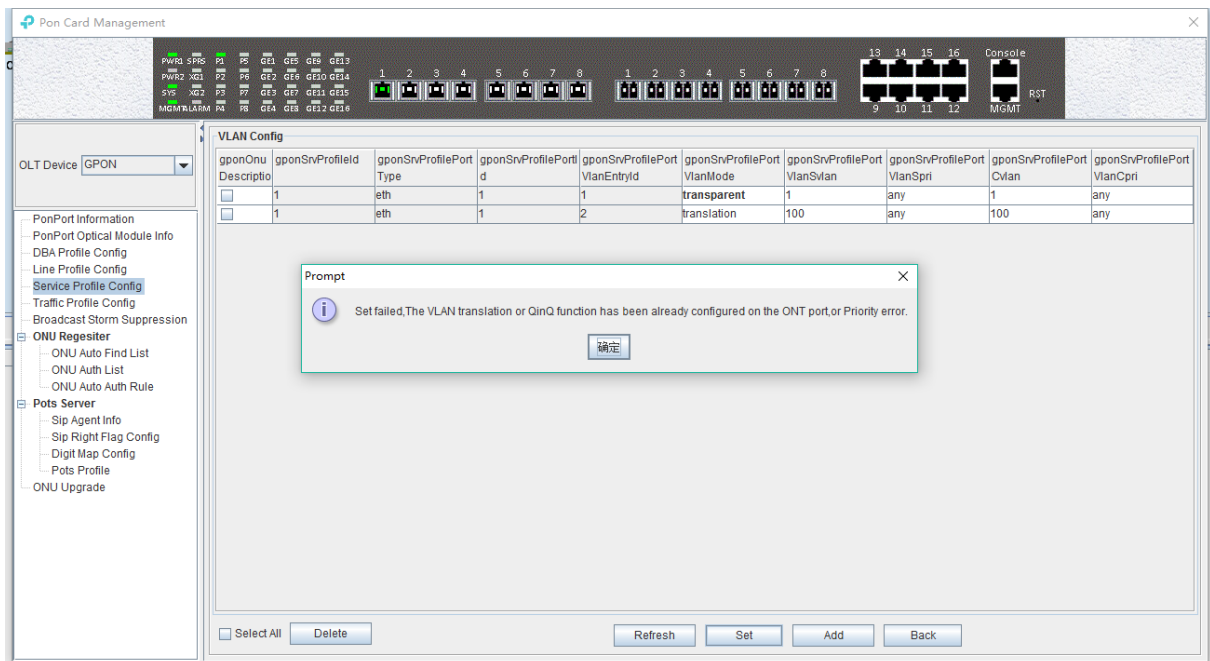
6.3.5.2.1.2 ONU Trunk Mode VLAN Configuration

In the main page of the **'Service Profile'**, double-click the **'Configure'** button in the **'VLAN'** column in the back of the VLAN service profile, and enter the **'Vlan Configure'** page. The specific configuration steps are as follows:

Note: pvid in trunk mode needs to be configured in port native - vlan in. refer to chapter 7.3.2.

Example: configure ONU trunk VLAN 100, 200, 300, PVID to 100.

Step 1:

In the **'Vlan Configure'** page, select **'translation'** of **'vlan mode'** and then click **'Set'** button to set the ONU port VLAN to translation mode:
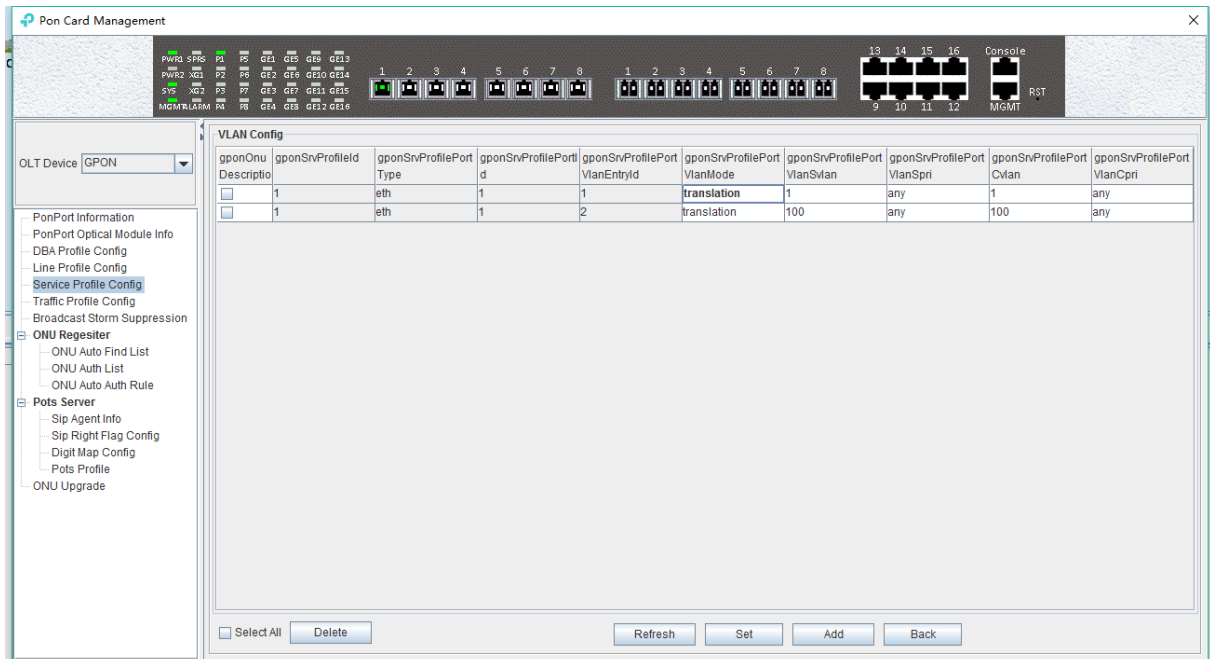
Step 2:

Click "Add" button, configure trunk VLAN 100,200,300 to the ONU port, need three times to add

this 3 VLANs, because every time can only add one VLAN, the screenshot below to add a trunk VLAN 300 to illustrate, SVLAN and CVLAN configuration for the same VLAN 300 which is trunk VLAN configuration mode:
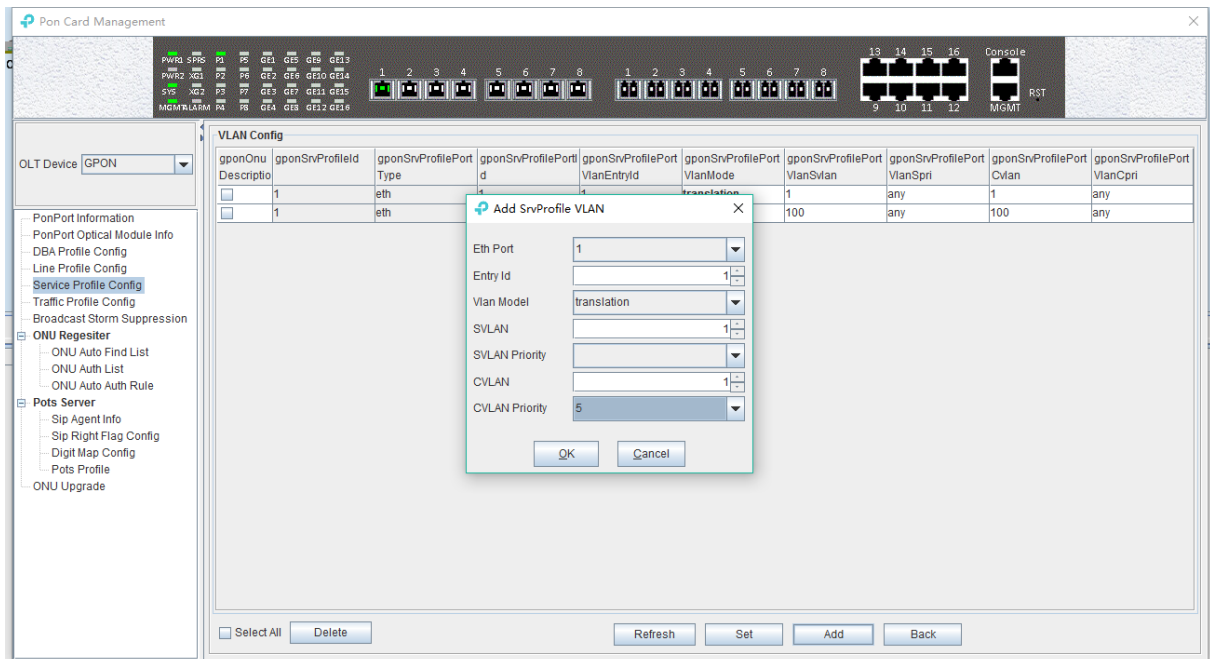
Step 3:

Return to the 'Vlan Configure' page to view the successful trunk VLAN 300:
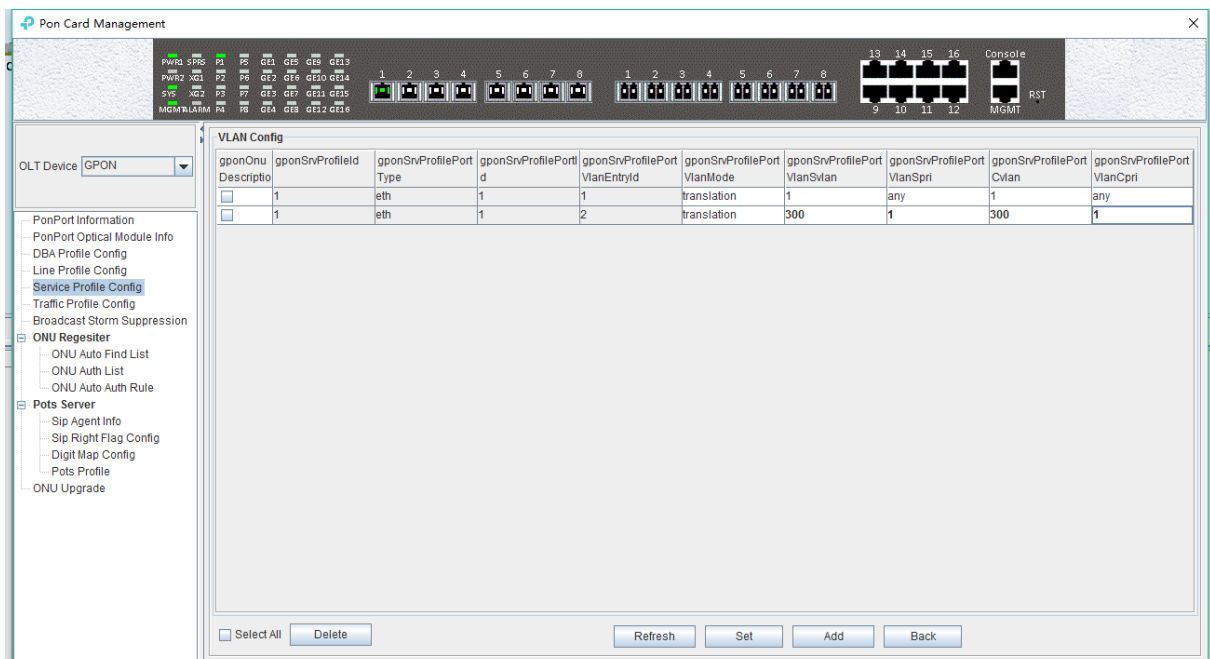
6.3.5.2.1.3 ONU Conversion Mode VLAN Configuration

In the main page of the **'Service Profile'**, double-click the **'Configure'** button in the **'VLAN'** column of the VLAN service profile you want to configure, and enter the **'Vlan Configure'** page. The specific configuration steps are as follows:

Note: PVID in translation mode needs to be configured in port native – vlan, refer chapter 7.3.2.

Example: configure port VLAN of ONU which converted from 101 to 201,102 to 202, 103 to 203,

and PVID to 100.

Step 1:

In the **'Vlan Configure'** page, select **'translation'** of **'vlan mode'** and then click **'Set'** button to set the ONU port VLAN to translation mode:
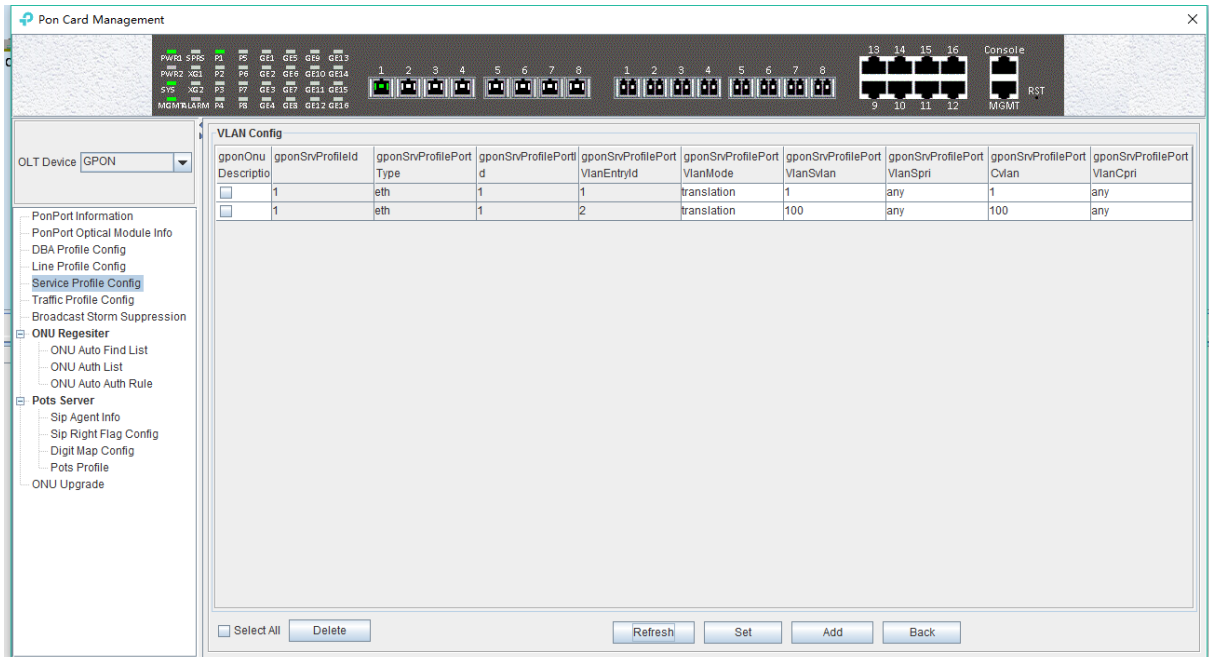
Step 2:

Click **'Add'** button, add transformation VLAN to the ONU port for 101 to 201,102 to 202,103 to 203, need three times to add the three transformations, because every time can only add one VLAN to convert, the following screenshots to configure VLAN is 103 to 203:
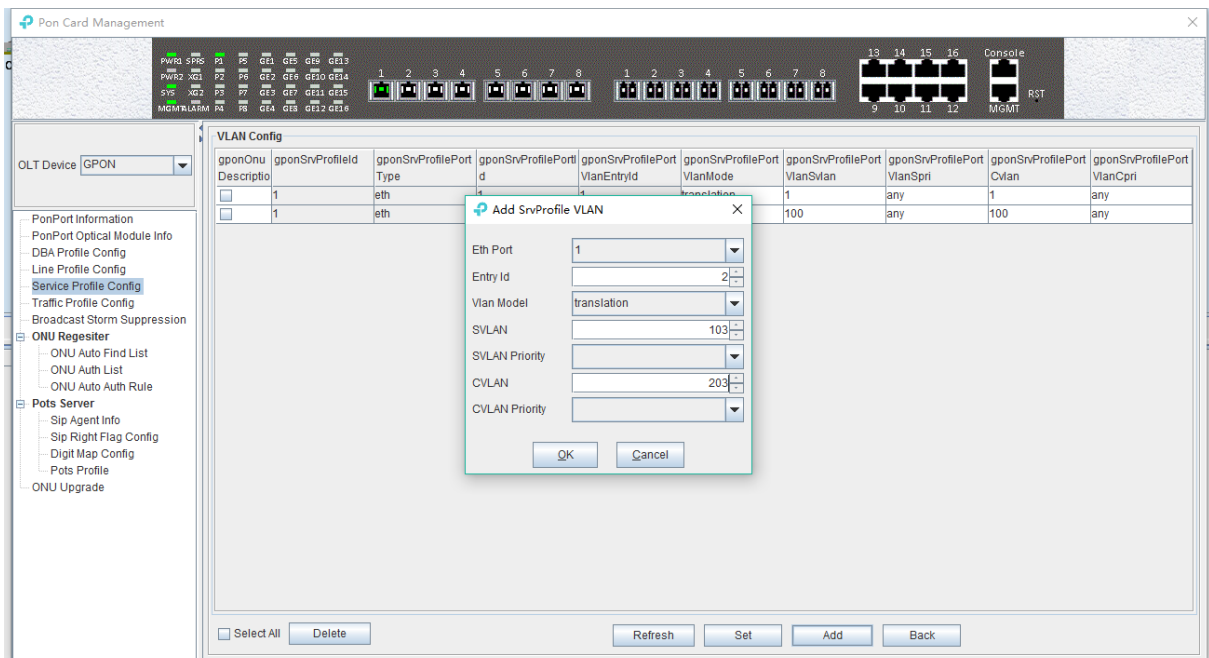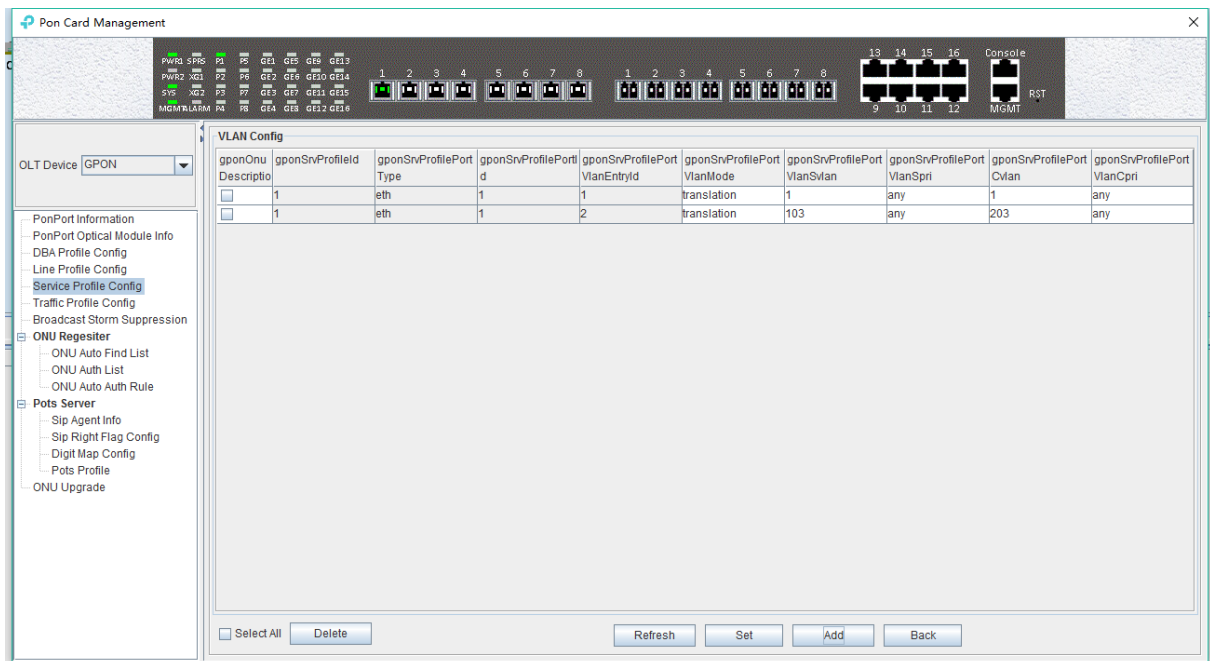
Step 3:

Return to the **'Vlan Configure'** page to view the VLAN transformation that adds success 103 to 203:
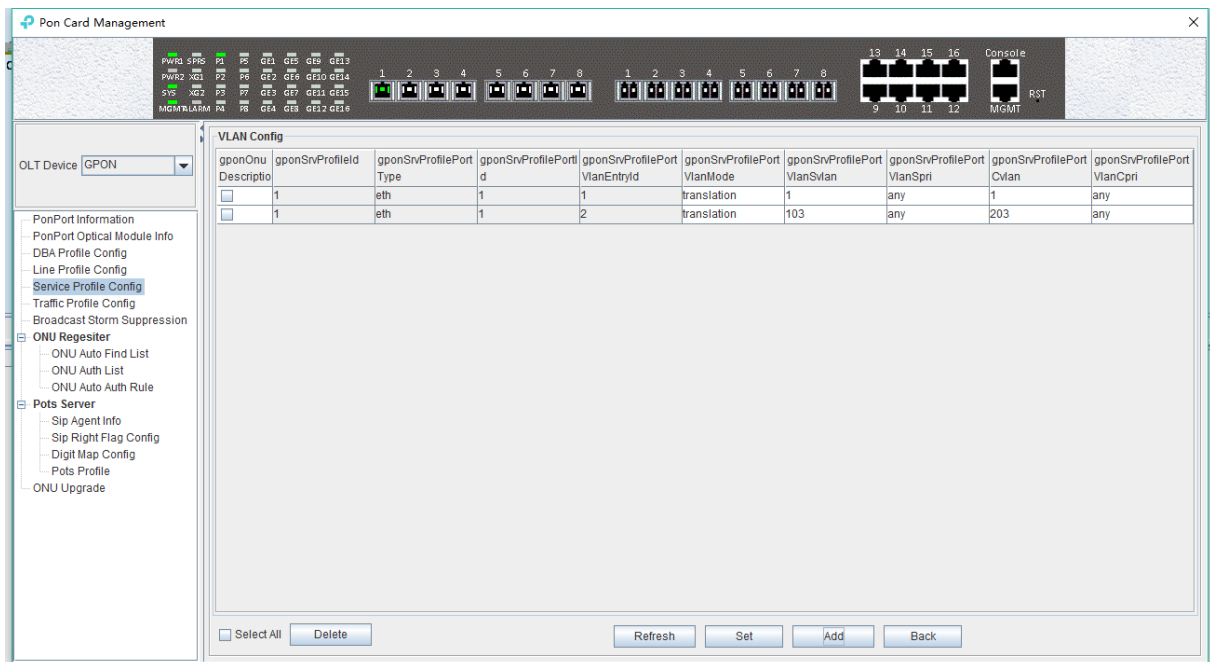
6.3.5.2.1.4 ONU QinQ Mode VLAN Configuration

In the main page of the **'Service Profile'**, double-click the **'Configure'** button in the **'VLAN'** column of the service profile you want to configure, and enter the **'Vlan Configure'** page. The specific configuration steps are as follows:

Note: PVID in translation mode needs to be configured in port native – vlan, refer to chapter 7.3.2.

Example: configure the outer VLAN (SVLAN) of QinQ to 1000, the inner VLAN (CVLAN) to 2000, and PVID to 3000.

Step 1:

Click **'Add'** button, configure ONU port VLAN mode for QinQ, SVLAN for 1000, and CVLAN for 2000:
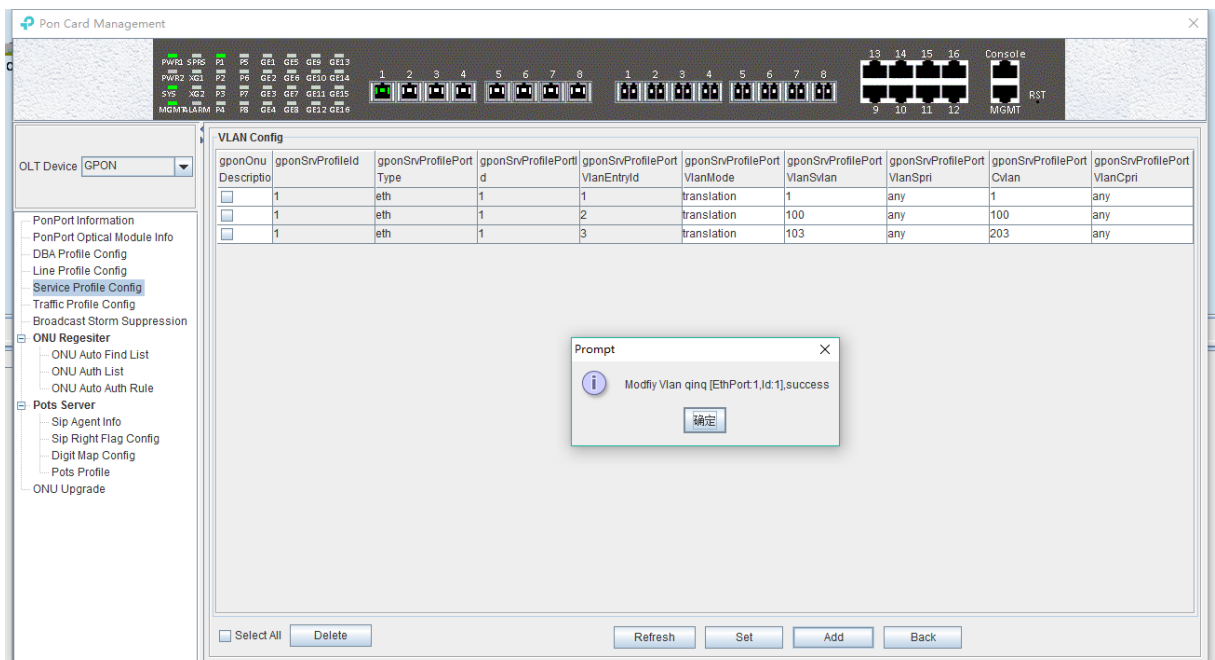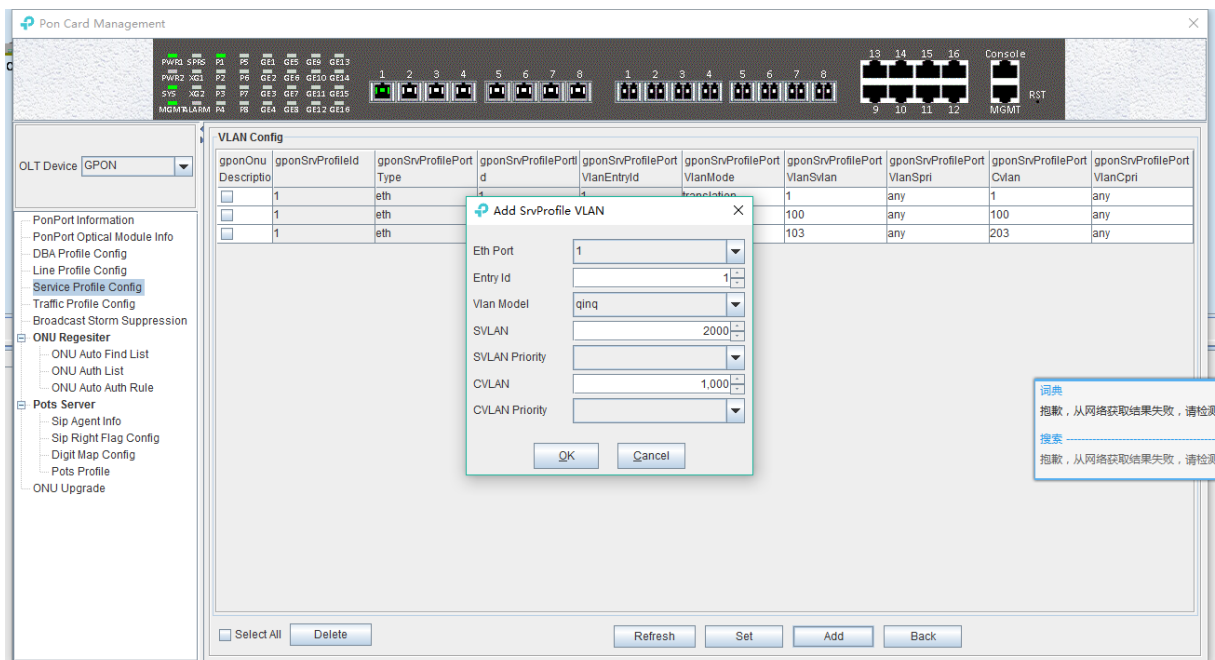
Step 2:

Return to the **'Vlan Configure'** page to view the added SVLAN as 1000, and CVLAN 2000 of QinQ VLAN:

Pon Card Management

gponOnu Descriptio	gponSrvProfileId	gponSrvProfilePort Type	gponSrvProfilePortI d	gponSrvProfilePort VlanEntryId	gponSrvProfilePort VlanMode	gponSrvProfilePort VlanSvlan	gponSrvProfilePort VlanSpri	gponSrvProfilePort Cvlan	gponSrvProfilePort VlanCpri
	1	eth	1	1	translation	1	any	1	any
	1	eth	1	2	translation	100	any	100	any
	1	eth	1	3	translation	103	any	203	any
	1	eth	1	4	qinq	2000	any	1000	any

6.3.5.2.2 ONU IGMP Configuration In Service Profile

Note: the IGMP service on OLT and ONU currently is passable, and IGMP related configuration is not work in the present OLT, here is a simple introduction.

In the main page of the service profile, double-click the "Configure" button below the "IGMP" column of the VLAN, and enter the "IGMP Configure" page:

IGMP Config

gponSrvProfileId	gponSrvProfileMcMode	gponSrvProfileUpIgmpFwdMode	gponSrvProfileUpIgmpTCI	gponSrvProfileDnMcMode	gponSrvProfileDnMcTCI
1	igmp-snooping	transparent	-	untag	0
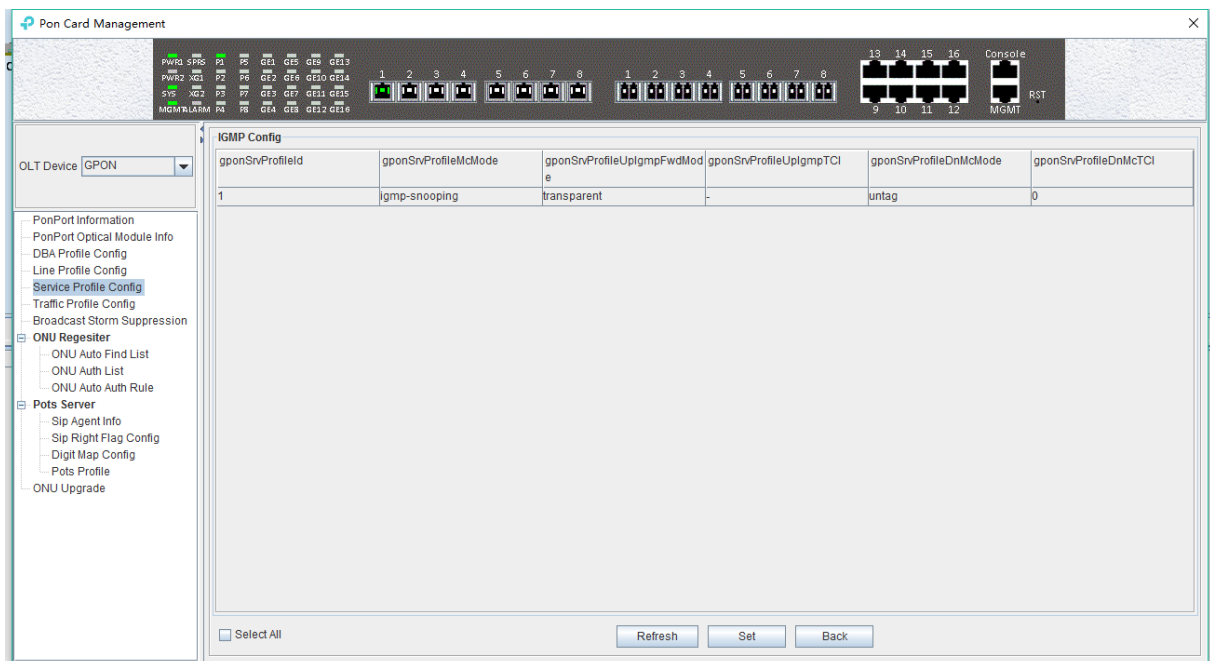
The following is a description of the configuration of ONU IGMP in service profiles:

➢ Profile Id

Show the service profile id that currently needs to do the multicast configuration.

➢ Multicast Model

The working mode of IGMP is: `igmp-snooping`, `igmp-proxy`, `igmp-snooping-proxy`

(1) igmp - proxy

74

Set the IGMP forwarding mode of ONU as proxy.

IGMP proxy is the multicast agent. The IGMP proxy intercept and handling the IGMP message between the user and the multicast router and then forwards it to the upper multicast router. From a user perspective, the system is a multicast server equivalent; From an upper point of view, the system is a multicast user equivalent. The IGMP proxy mode reduces the multicast protocol traffic of the network side.

(2) igmp snooping

Set the IGMP mode of ONU to IGMP snooping. IGMP snooping is the multicast listening. IGMP Snooping retrieves the relevant information of maintenance group by listening to the IGMP message that communicates between the user and the multicast router to maintain items. The system does not do any processing of the broadcast VLAN message.

(3) igmp snooping - proxy

Igmp-snooping - proxy does not currently apply.

➢ Igmp Forward

The IGMP forwarding mode is not applicable at this moment, the default transparent can be used, and the VLAN processing mode of the downstream multicast data is handled according to the single VLAN of the ONU port.

6.3.5.3 Service Profile Modification

In the main page of the **'service profile'**, the name and the number of ONU ports of the profile can be directly modified.

Double-click the **'Configure'** button below the VLAN or IGMP on the **'Service Profile'** main page to modify parameters such as VLAN and IGMP which the service profile binding. here no longer illustration. We can know the details by the VLAN and IGMP configuration instructions.

6.3.5.4 Delete Service Profile

In the main page of the service profile, you can select a service profile and then click the **'Delete'** button to delete the entire service profile information:

Note: the service profile can only delete in unbound status, if the service profile is already bound, the delete operation of the profile will be done after the ONU is deleted or the other service profile is used.
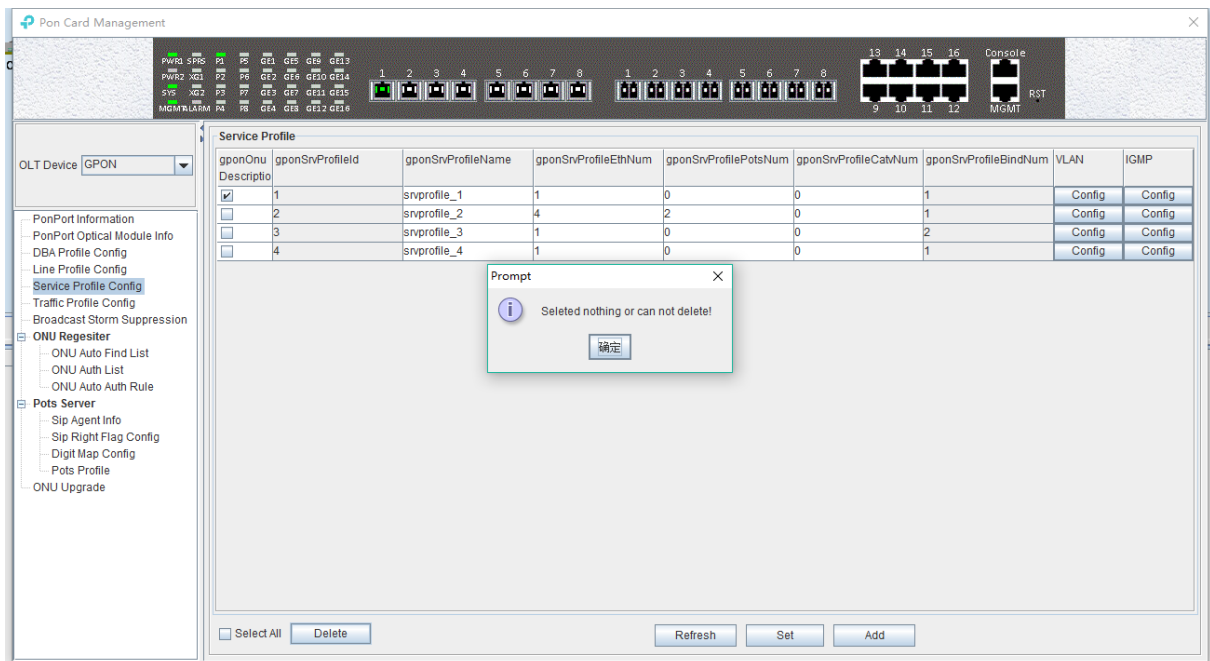
6.3.6 OLT Traffic Profile Configuration

The traffic profile on GPON OLT is mainly applied to the ONU port for the port speed limit. Applying to an ACL for speed limits for a particular message, because we need to create it in advance when using this profile, a chapter is used to specify some configuration parameters for the profile:

Double click the **"PON Module"** on the left side of the main page and enter the **"Traffic Profile Configure"** page of the **"PON Card Management"** window. The typical page is as shown below:
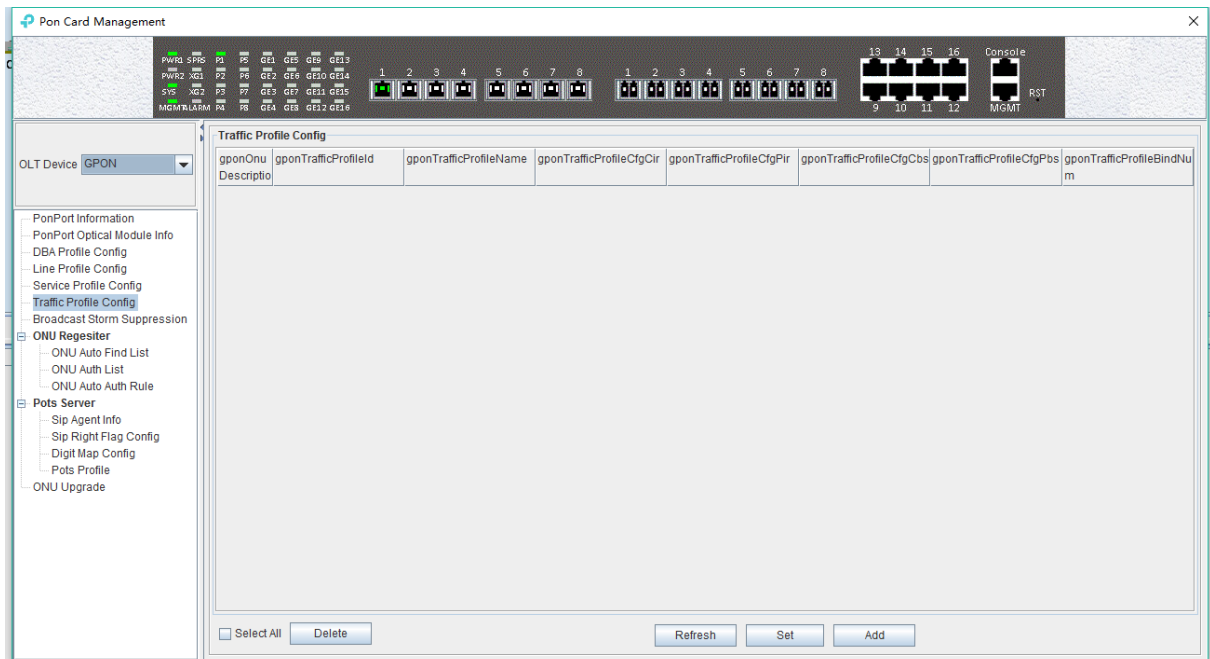
Some parameters in the traffic profile configuration are explained below:

➢ Profile id

Show the configured traffic profile id, which can be used later when you need to bind the traffic profile.

➢ Profile name

Show the configured traffic profile name, which can be modified when you need to bind the traffic profile.

➢ ensure information rate (CIR)

To show and modify the guaranteed bandwidth, the effect of bandwidth is to ensure that the traffic rate can reach its guaranteed bandwidth when the traffic is congested. The default minimum configuration is 64kbps, and the unit is kpbs.

➢ peak information rate (PIR)

The maximum bandwidth is shown and modified, and the maximum bandwidth is only a limited effect. The limit of the traffic can not exceed its maximum bandwidth. The default minimum configuration is 128kbps, and the unit is kpbs.

➢ ensure the burst length (CBS)

Show and modify the guarantee burst length, that is the instantaneous ability to pass the promise burst traffic, the default minimum configuration is 2000bytes, the unit is byte.

➢ peak burst length (PBS)

Show and modify peak burst length, peak burst size, the default minimum configuration is 2000bytes, the unit is byte.

➢ Bind Num

Show times the traffic profile has been applied.

[Example of traffic profile configuration]

Example: add a traffic profile which id is 200, name is **'GPON TEST'**, ensure bandwidth is 20M and the maximum bandwidth is 100M.
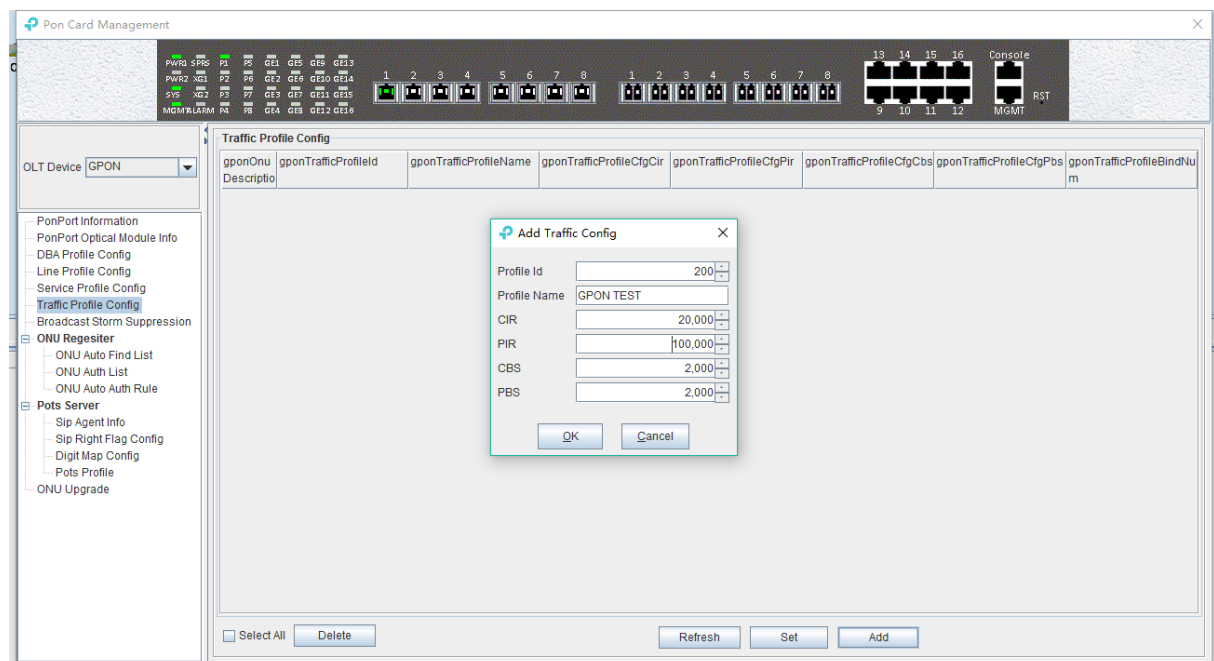
6.3.7 PON Broadcast Storm Suppression

The number of the broadcast network frame increase sharply and affects normal network communication, broadcast storm will occupy a considerable network bandwidth, cause the entire network cannot work normally. Broadcast storm control is allowing the port to filter the broadcast storm that appears on the network. When the broadcast storm control is enabled, the port will

automatically discard the broadcast frames received when the broadcast frames received from the port are accumulated to the predetermined threshold value. When the function disabled or broadcast frames don't come to limit, the broadcast frames will be broadcast to other ports of OLT.

Double click the '**PON Module**' icon on the left side of the main page and enter the **'Broadcast Storm Suppression'** page of the **'PON Card Management'** window. The typical page is as shown below:
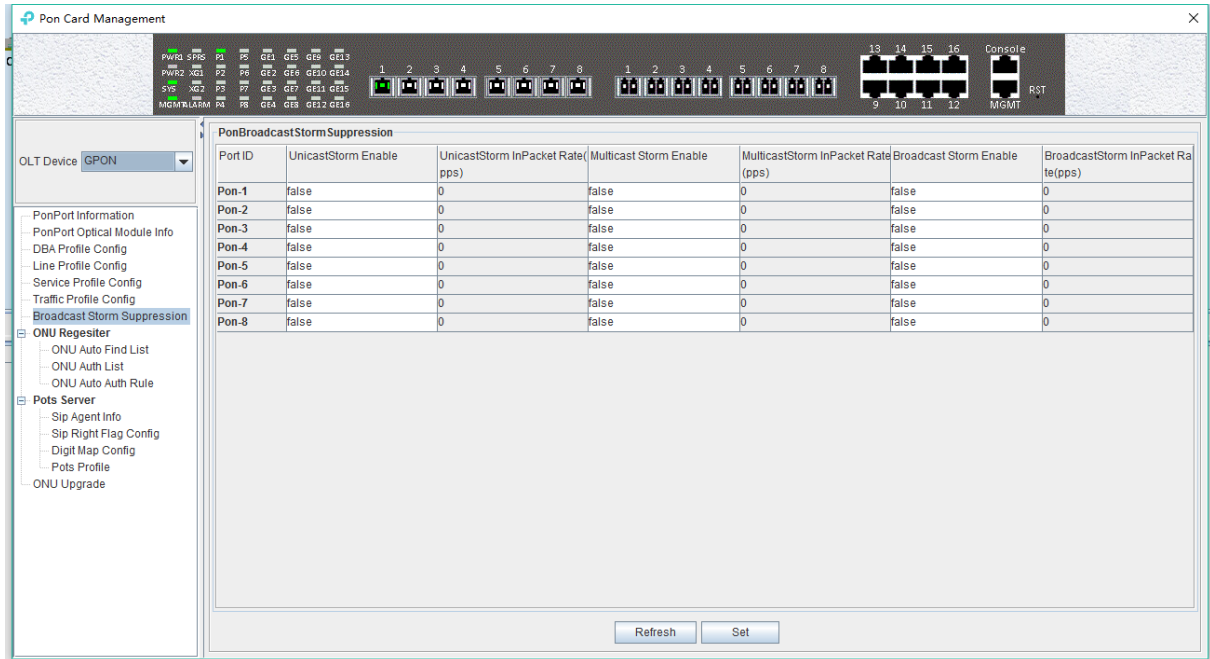
Entering this page can set and enable the storm suppression and setting speed of various storm suppression for OLT's PON.

The following is a description of the storm control parameters of the PON port of OLT.

➢ Port ID

Show the PON index number that needs to be configured for storm suppression.

➢ Unicaststorm Enabled

Enable or disable the unknown unicast storm suppression function of the PON, select 'true' to enable and 'flase' to disable.

➢ UnicastStorm InPacket Rate

Configure unknown unicast storm suppression rate for PON port, the unit is PPS.

➢ Multicast Storm Enabled

Enable or disable the unknown multicast storm suppression function of the PON, select 'true' to enable and 'flase' to disable.

➢ MulticastStorm InPacket Rate

Configure multicast storm suppression rate for PON port, the unit is PPS.

➢ Broadcast Storm Enable

Enable or disable the broadcast storm suppression function of the PON, select 'true' to enable and 'flase' to disable.

➢ Broadcast Storm InPacket Rate

Configure broadcast storm suppression rate for PON port, the unit is PPS.

6.3.8 ONU Auto Authentication

Before GPON authentication, the OLT needs to open the automatic discovery function of the PON, then find the ONU in the automatic list, and finally add the ONU to authentication.

The authentication steps of GPON is mainly divided into the following parts.

6.3.8.1 Open ONU Auto Discovery and Auth

Double click the **'PON Module'** icon on the left side of the main page and enter the **'ONU Auto Find List'** page of the **'PON Card Management'** window:
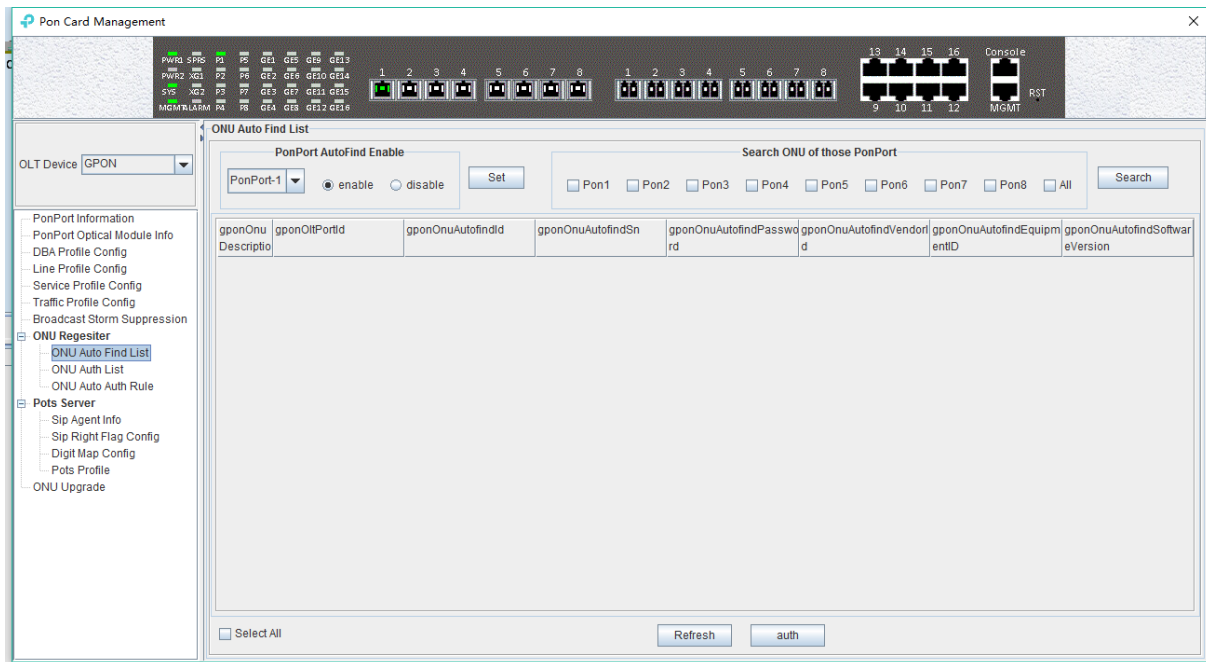
We can do many operations in this page, we can enable the automatic find function of the ONU of PON, check the automatical but not auth ONU, and verify the ONU of automatic find.

Enables PON automatic find

Turn on the ONU auto find function of the specified PON ports, and only the ONU connected to the PON will be displayed.

Select the specified PON port, select **'enable'** (open) or **'disable'** (not open), and then click the **'Set'** button.

View the PON's ONU

When the ONU auto find function is opened, you can select a PON port to view which ONU is found under the PON port.

Select the specified PON port and click the 'Search' button.

Authentication

Auth the ONU which we found on this page.

[Example of enable the ONU automatic find + authentication configuration]

Example: start the ONU automatic authentication of PON1, then add the ONU of the PON1 finding and bind to the created line profile and service profile.

Step 1:

Enable the automatic find function of PON1 in the **'ONU Auto Find List'** page:
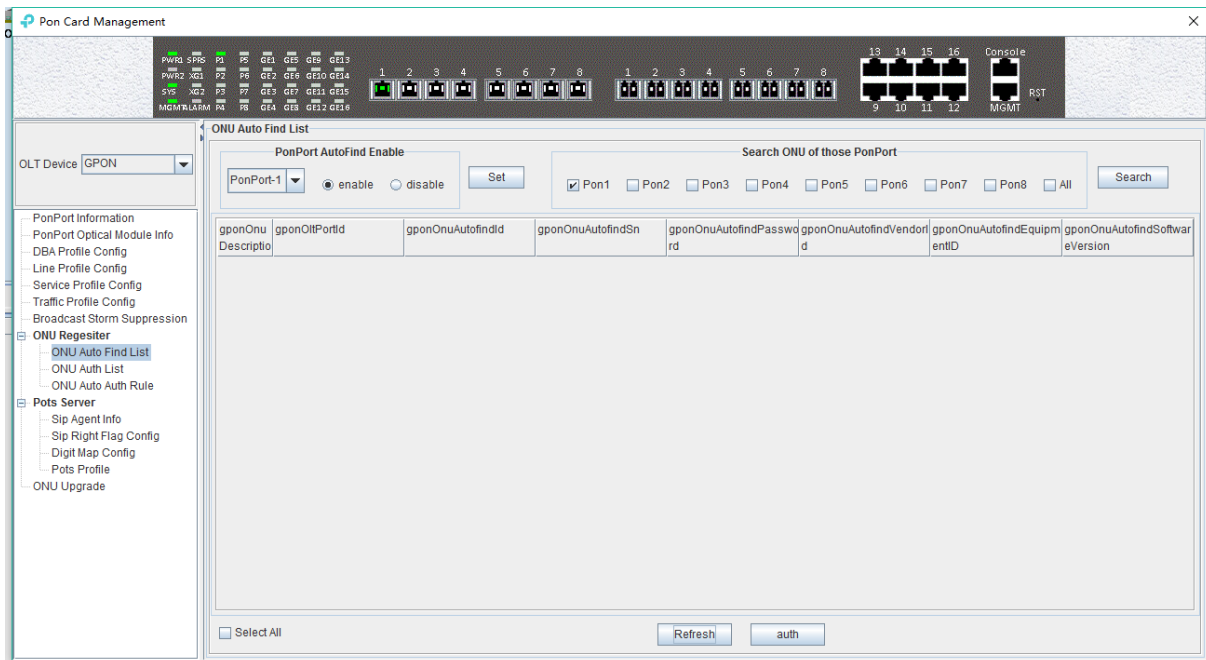
Step 2:

Find ONU at the **'Search ONU of those PonPort'**:
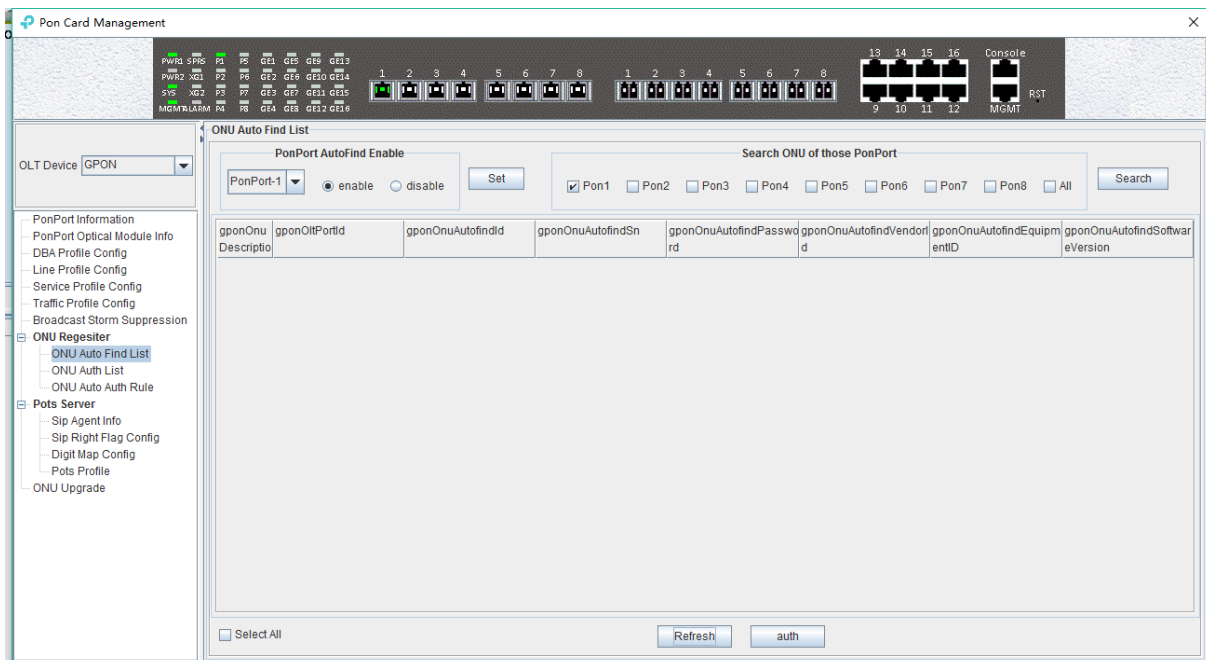
Step 3:

Select ONU, Click the **'auth'** button, and select the line and service profile created before:

6.3.8.2 View Registered ONU And Register ONU Independently

Double click the **'PON Module'** icon on the left side of the main page and enter the **'ONU Auth List'** page of the **'PON Card Management'** window:

In this page, you can view the ONU information that has been registered and manually add the authentication ONU, detailed description of some of the more important parameters as follows:

Check the registered ONU

You can query All (All) registered ONU of OLT or registered under specific PON port (pon1-pon8).

The relevant ONU parameter as follows:

➢ Auth Mode

It shows that the registered mode of ONU. GPON is certified by SN. The ONU authentication mode supported on OLT is: sn, sn + password and password.

➢ ONU Sn

Show the registered ONU's SN in port, the SN of ONU must be the ASCII value of 12 bits.

➢ Password

If ONU is registered by the SN + password or password authentication mode, the ONU authentication password will be displayed here.

➢ Line Id

Shows which line profile id is binding on the ONU, and double-clicking the id to displays detailed information about the line profile configuration.
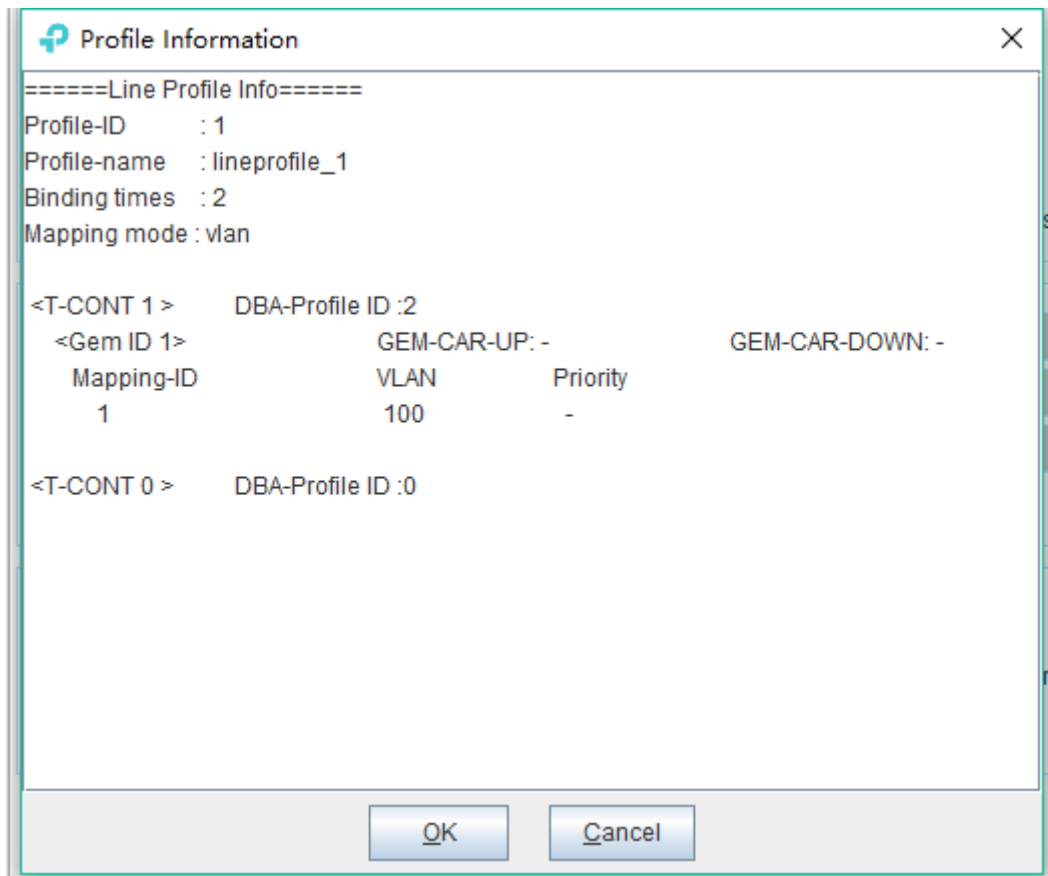
➢ Service Id

Shows which service profile id is binding on the ONU, and double-clicking the id displays the details of the service profile configuration.
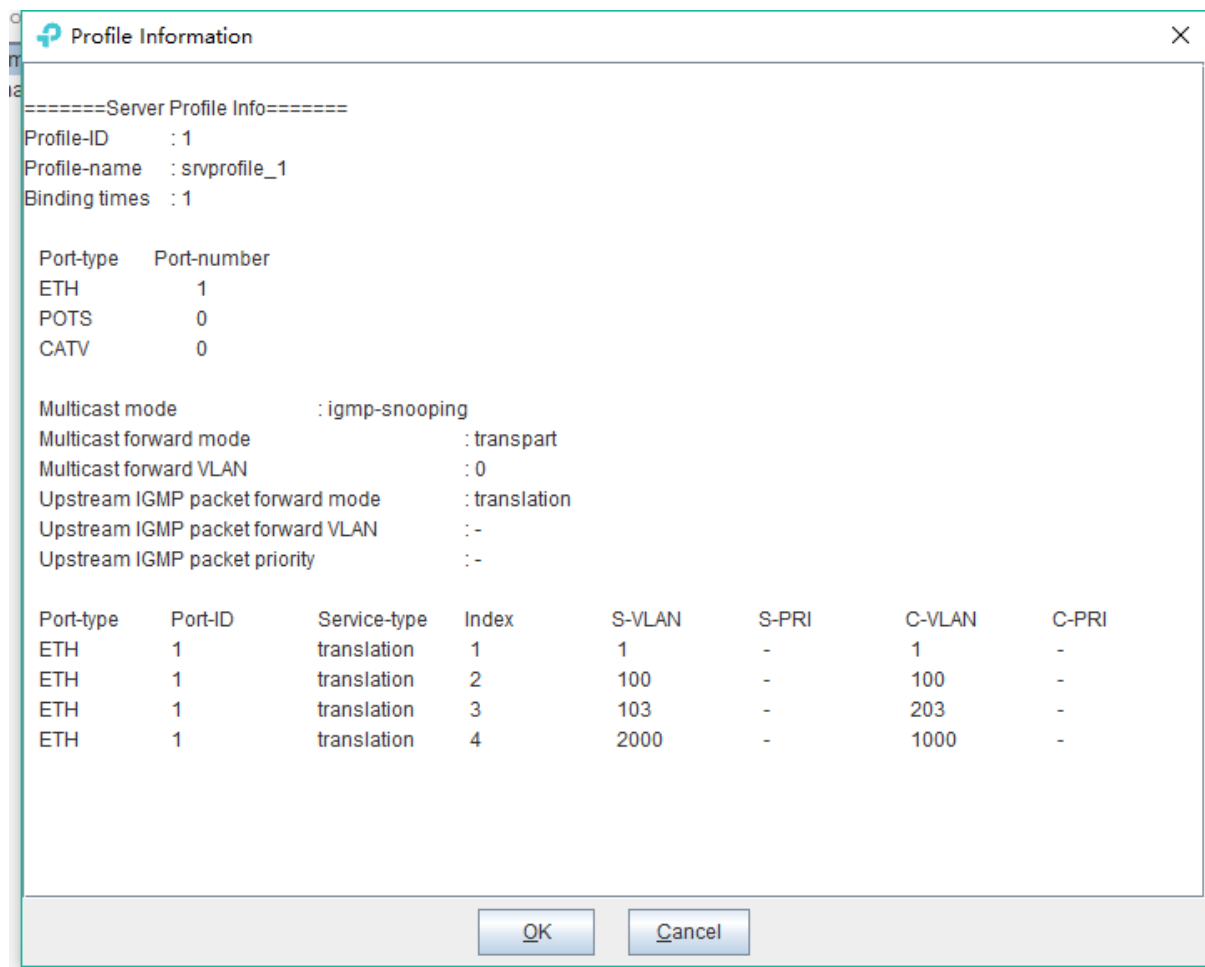
➢ Run State

The running state can reflect whether the ONU is online or not. The state of 'online' state indicates that ONU has been registered and launched. The 'offline' state indicates that the ONU is not registered, and it is necessary to check whether the light power of the ONU is normal.

➢ Config Statue

The configuration statue can reflect whether OLT send the configuration file to ONU successfully. The **'failed'** status indicates that the default configuration is not recognized by the ONU, which requires the positioning analysis. **'success'** shows that the status indicates that the default configuration of OLT is recognized by the ONU.

➢ Match State

Match statue can reflect the ONU port whether actual ability and binding service profile configuration of port capacity match, **'match'** status show that port number of ONU service profile configuration is match to ONU actual report; **'mismatch'** status show that port number of ONU service profile configuration is not match to ONU actual report, need to see the actual reported ONU port number, and then configure the ONU port number in the ONU service profile.

➢ Active Status

The active state indicates whether the ONU is active, and the **'active'** indicates that ONU has

been activated on OLT; 'deactive' means that ONU is not activated on OLT.

add authentication and auth ONU manually

If you know the auth SN or password of ONU in advance, you can register the ONU with the "Add" button on this page.
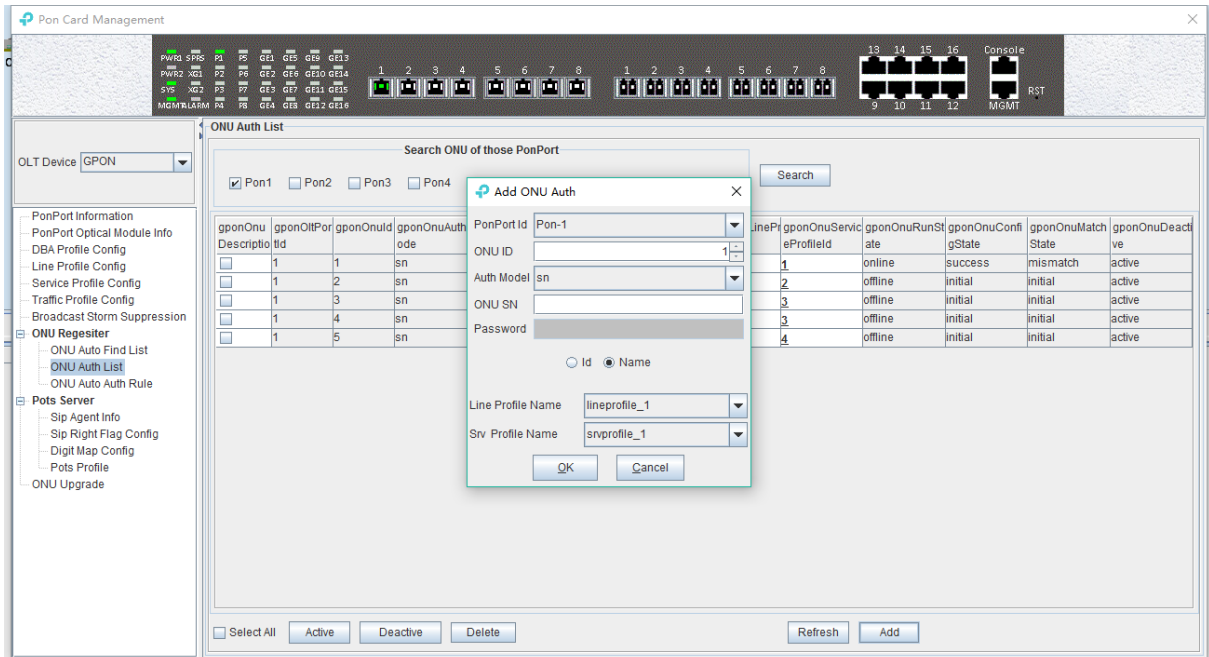
active or deactive ONU

In the **'ONU Auth List'** page, select an ONU to active or deactivate the ONU that has been registered.

6.3.8.3 Register ONU Automatically

GPON OLT support automatic auth ONU function, if the OLT enable the function of automatic auth and configured automatic auth rules in advance, ONU can automatically register according to the configuration.

Double click the **"PON Module"** on the left side of the main page and enter the 'ONU Auto Auth rule" page of the "PON Card Management" window:
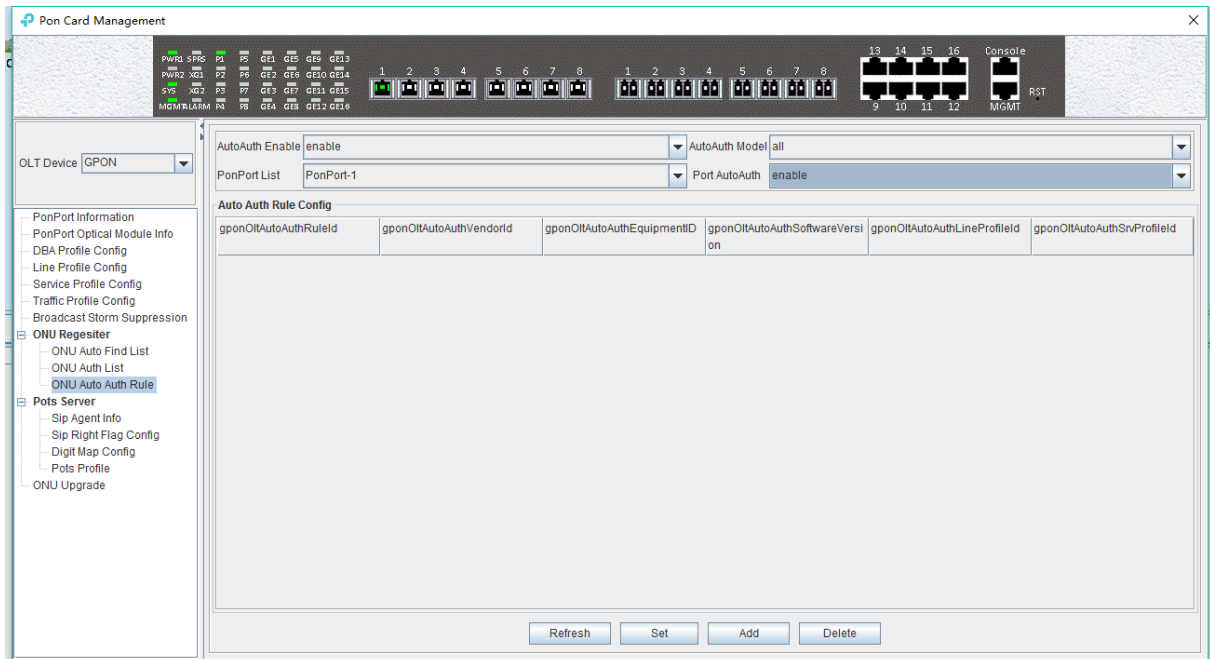
We can configure rules of register ONU function on GPON OLT automatically in this page, and some parameters will be given to illustrate:

AutoAuth Enable

This option enables or disable the global auto auth ONU function on OLT.

AutoAuth Model

Configure auto auth rules of the ONU on the OLT, we can choose all (all) ONU adopt automatic auth certification, according to ONU model (equid) automatic auth certification, according to the ONU manufacturer (vendor) automatic auth certification, according to ONU model (equid) + ONU software version (swer) automatic auth certification.

PonPort List

Specify which PON port to open ONU automatic auth function.

Port AutoAuth

enable or disable the ONU automatic auth function of a PON.

Add rules of auto auth

The 'add' button on the page can add an auto auth rule.

[Example of ONU automatic registration configuration]

Example: enable the automatic registration function of PON1 on OLT, the automatic registration rules are based on the ONU model of ONT 1GE, automatic binding line profile: ontline profile_50, service profile: ontsrvprofile_50.
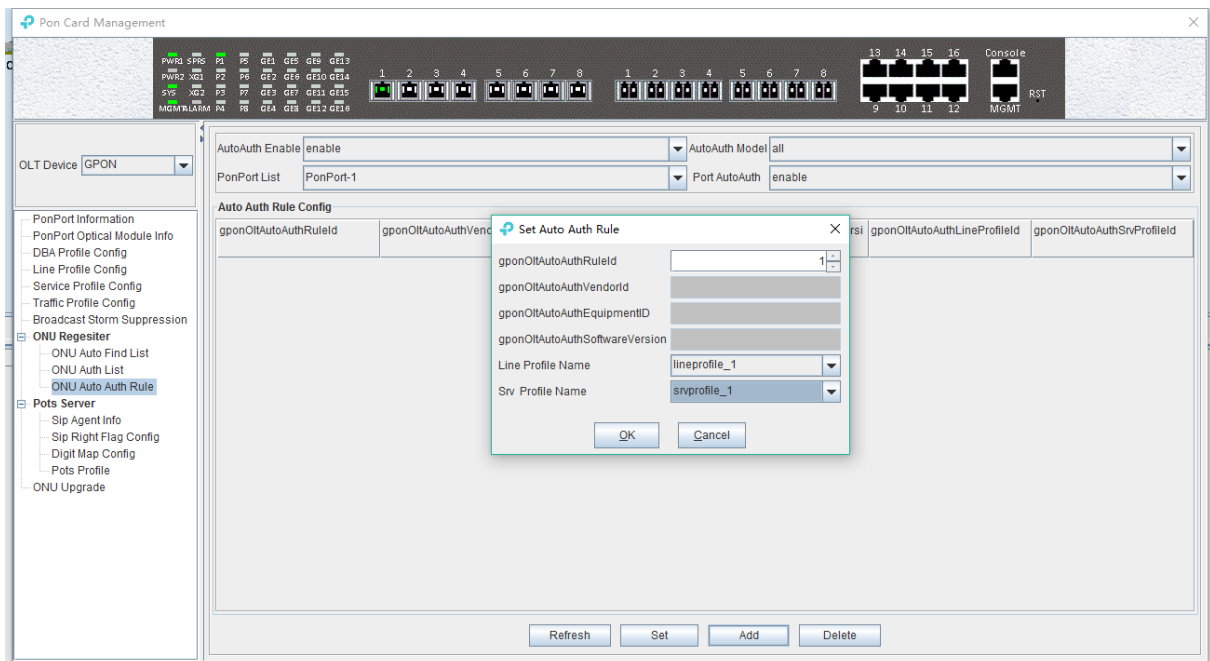
6.3.9 ONU VOIP Service Configuration

TP-Link GPON OLT supports configuring ONU SIP, but in the real deployment, some of the ONU only support SIP configuration through TR-069, and can not be configured by OMCI. In that case, you should not do the SIP configuration on OLT. The following sections describe the SIP voice configuration on OLT:

6.3.9.1 SIP Proxy Server Profile Settings

Double click the **'PON Module'** icon on the left side of the main page and enter the **'SIP Agent Info'** page of the**' PON Card Management '**window:
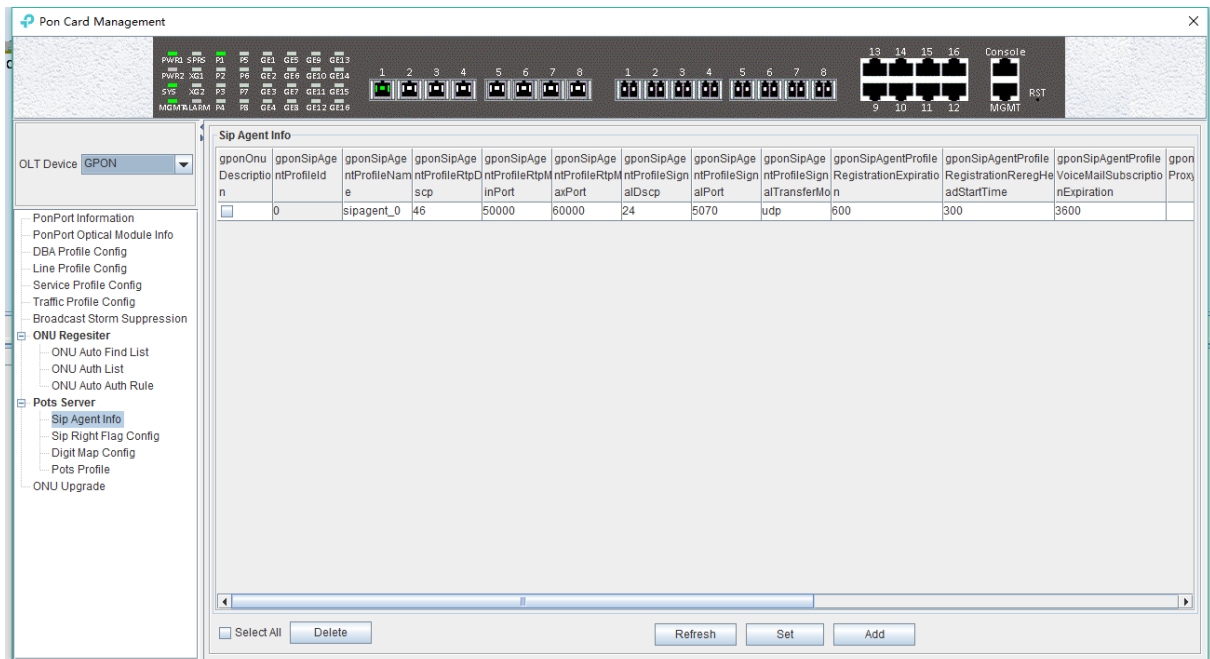
In this page, user usually need to configure the following parameters. For the other parameters , please keep it as default value.

➢ gponSipAgentProfileSignalPort

Configure the SIP registration server port number on the ONU, default is 5070, can be set according to your SIP register server configuration.

➢ gponSipAgentProfileProxyServerUrl

Configure the proxy server address on the ONU, which is generally the IP address or domain name.

➢ gponSipAgentProfileRegistrationServerUrl

Configure the registration server address on the ONU, which is generally the IP address or domain name.

➢ gponSipAgentProfileVoiceMailServerUrl

Configure the voice mail server address on the ONU, which is generally IP address or domain name.

➢ gponSipAgentProfileConfFactory

Configure the meeting server address on the ONU, which is generally the IP address or domain name.

➢ gponSipAgentProfileBindNum

Show times that the SIP Agent profile is bound by ONU.

[Example of SIP proxy server configuration]

Example: create a SIP agent profile with ID 1, with a port number of 5060, and the proxy server and registration server IP address set to 192.168.5.254

Step 1:

Click the 'Add' button to add a SIP proxy server profile:
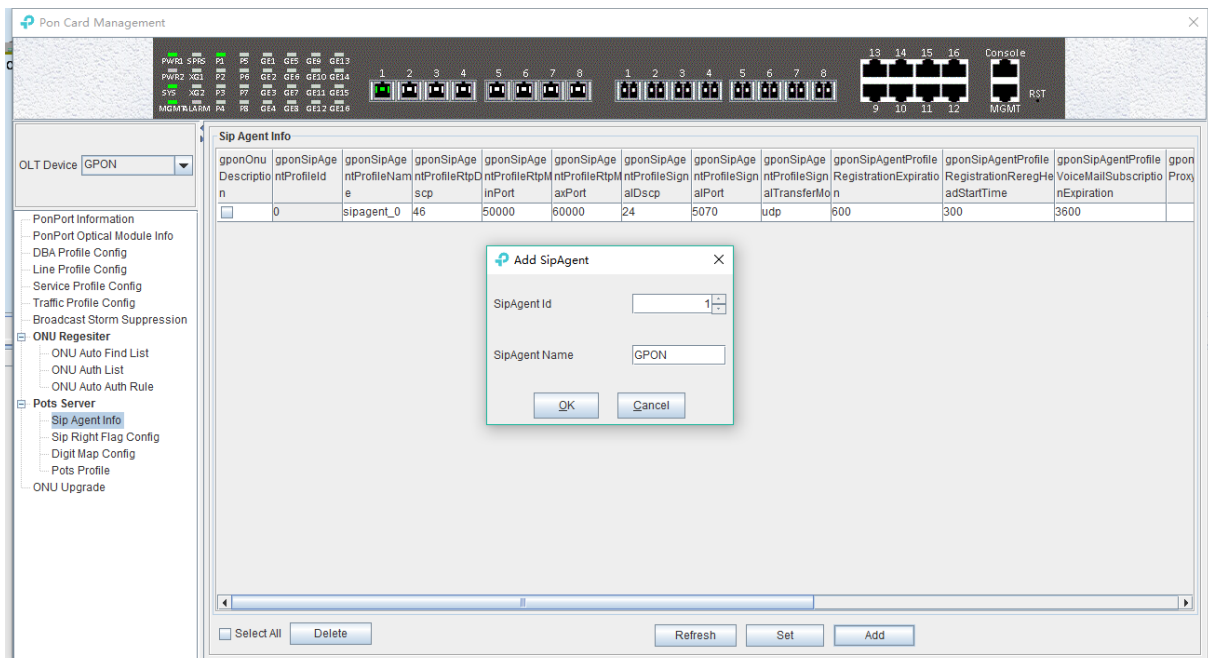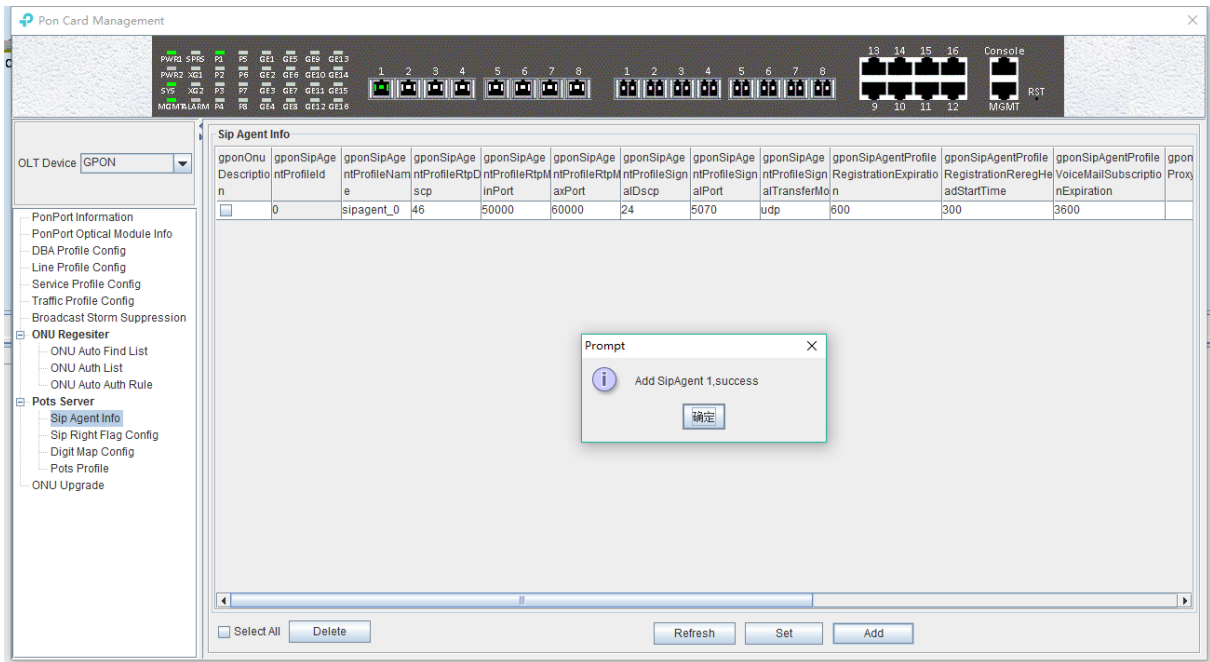
Step 2:

Configure the SIP registration port to 5060, the SIP registration server and the proxy server address to 192.168.5.254:
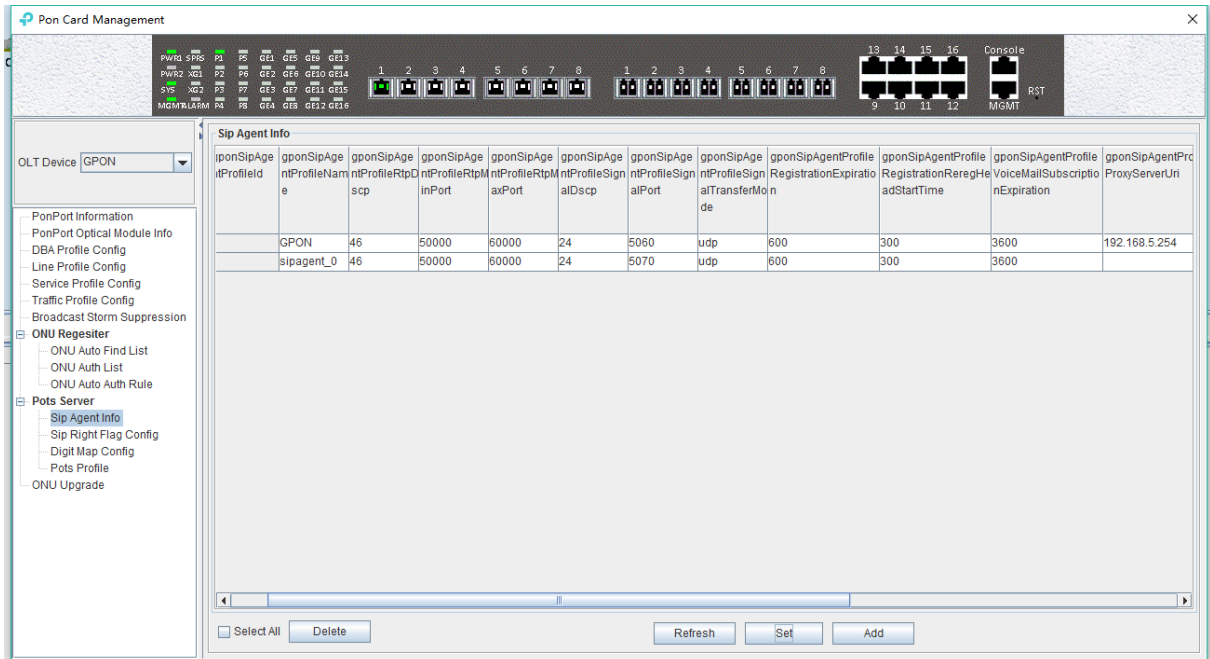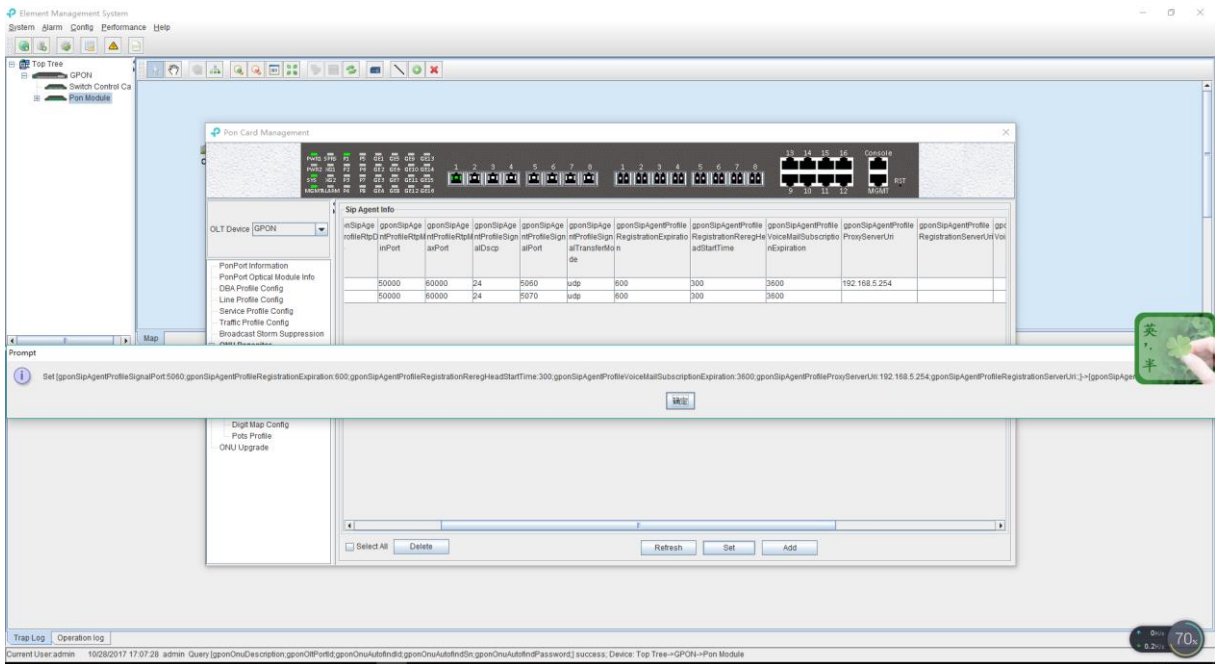
6.3.9.2 SIP Extension Business Profile Settings

Double click the **'PON Module'** icon on the left side of the main page and enter the **'Sip Right Flag Configure'** page of the **'PON Card Management'** window:
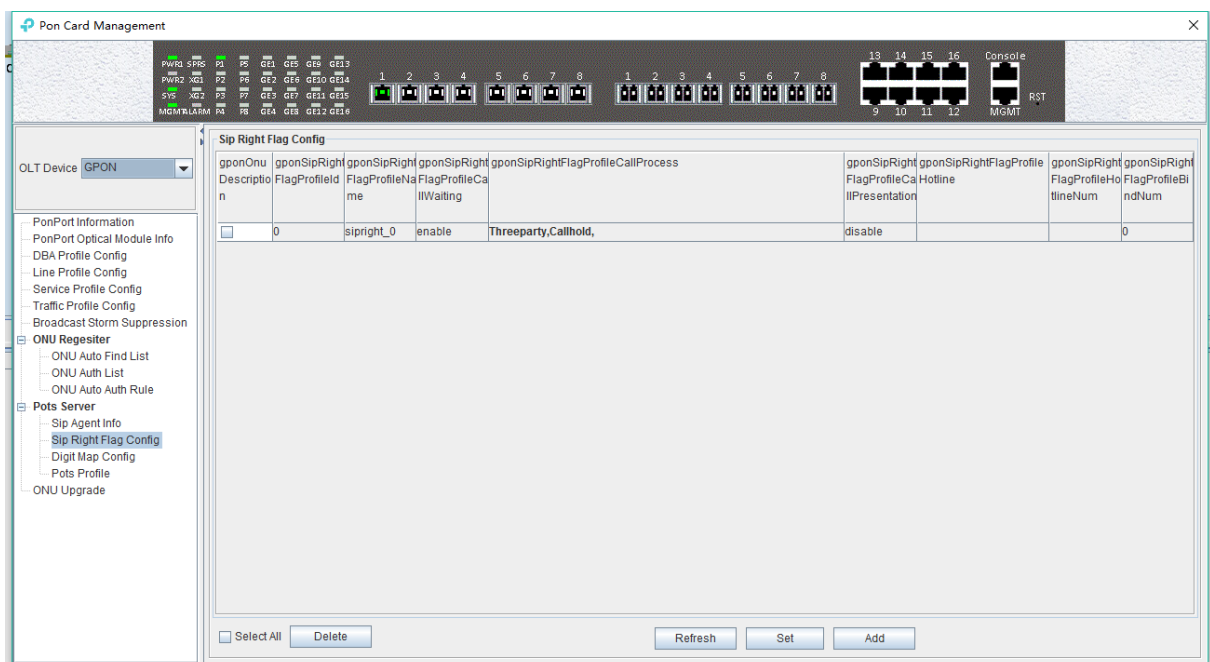
In this page, user can enable the call waiting, call transfer, call display and other extension functions. Click the **'Add'** button to add a SIP extension business profile, which is configured as follows:
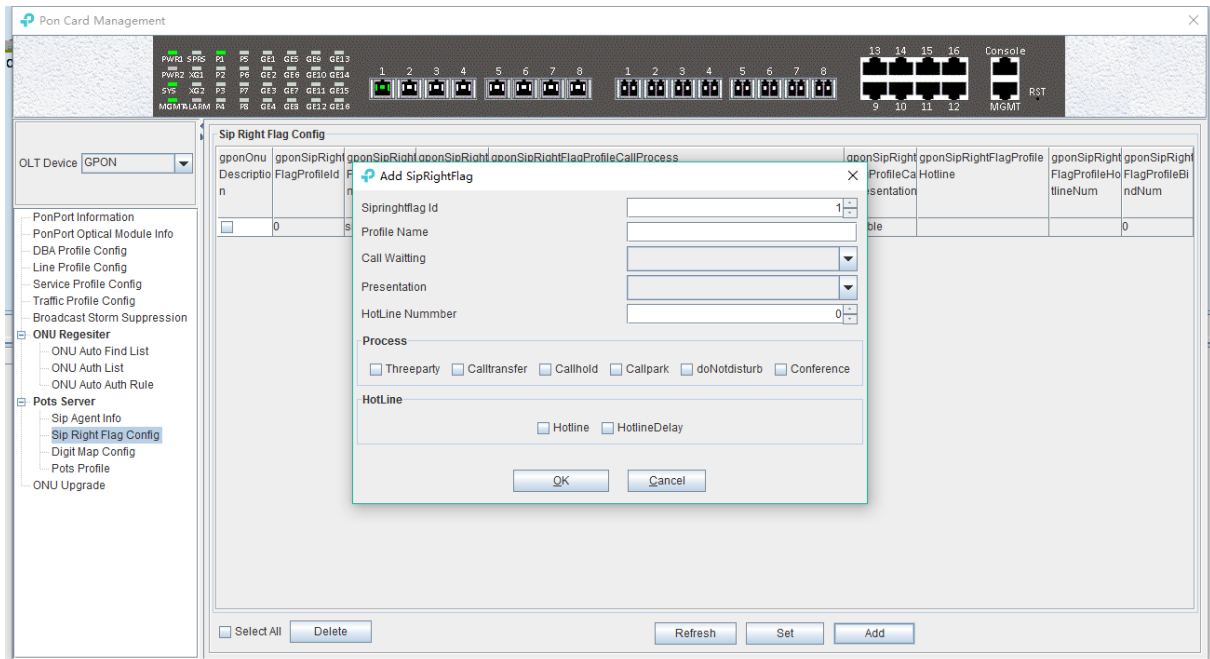
➢ call waiting

Configure the ONU SIP voice call waiting function with both enable and disable options.

➢ call processing

Threeparty: enable or disable the three-way call feature of the ONU SIP voice.

Calltransfer: enable or disable the call transfer function of the ONU SIP voice.

Callhold: open and close the ONU SIP voice call waiting.

Callhold: start and close the ONU SIP voice call ban.

DoNotdisturb: the ability to turn on and close ONU SIP voice.

Conference: open and close the ONU SIP Conference function.

➢ hotline

Hotline: open or close the SIP voice Hotline function of ONU.

HotlineDelay: open or close the SIP voice helpline delay function of ONU

[Example of SIP extension business profile configuration]

Example: create a SIP extension business profile with id 1 and open the hotline number 88884444.

Step 1:

Click the **'Add'** button to add a SIP extension business profile:
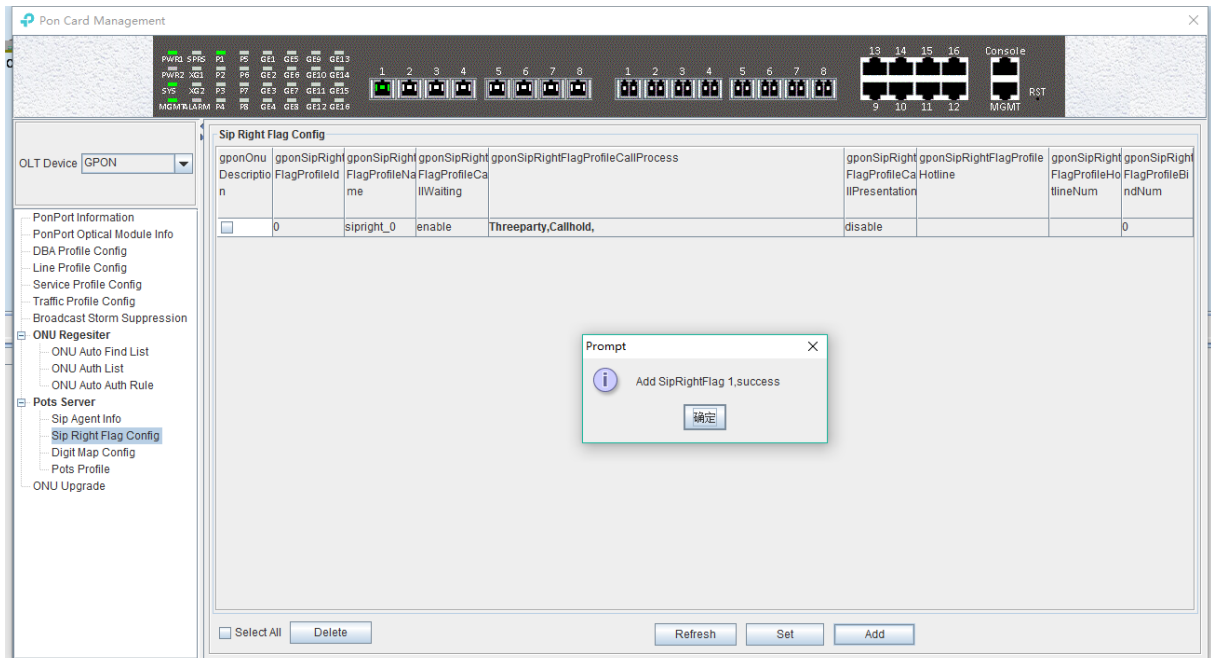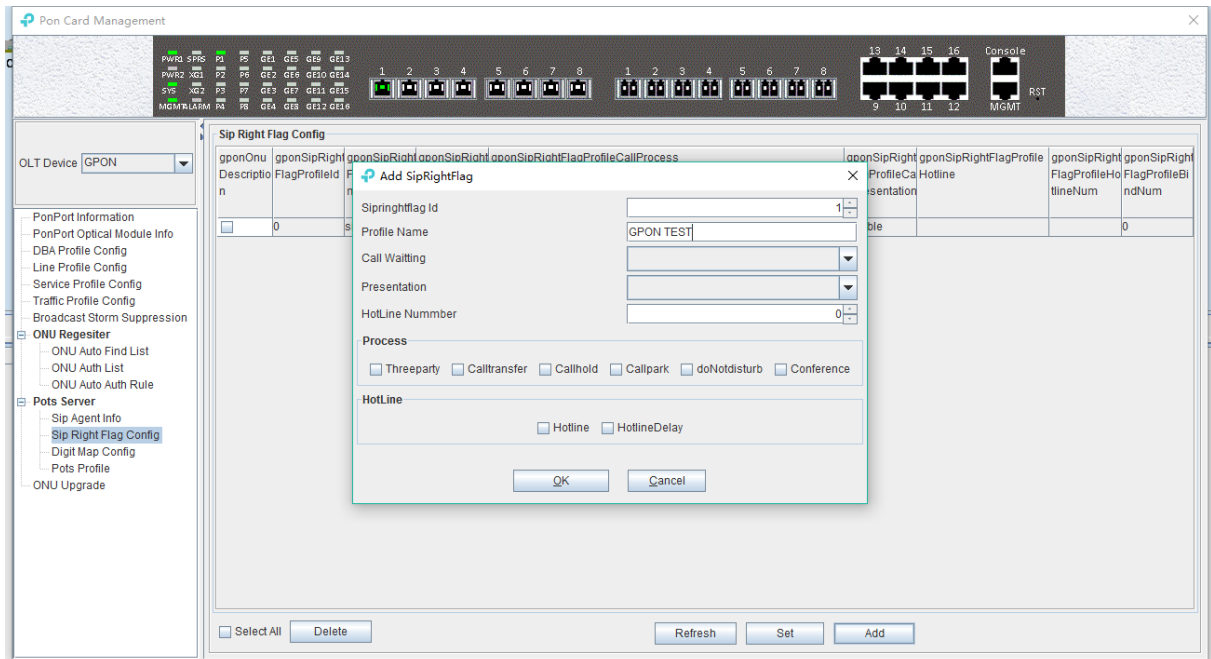
Step 2:

The **'SipRight Flag config'** page can look at the SIP extension business profile that has been added to it:

Pon Card Management ✕

Sip Right Flag Config									
gponOnu Description	gponSipRight FlagProfileId	gponSipRight FlagProfileName	gponSipRight FlagProfileCa llWaiting	gponSipRightFlagProfileCallProcess		gponSipRight FlagProfileCa llPresentation	gponSipRightFlagProfile Hotline	gponSipRight FlagProfileHo tlineNum	gponSipRight FlagProfileBi ndNum
☐	1	GPON TEST	enable	**Threeparty,Callhold,**		disable			0
☐	0	sipright_0	enable	**Threeparty,Callhold,**		disable			0

☐ Select All   Delete   Refresh   Set   Add

OLT Device GPON

- PonPort Information
- PonPort Optical Module Info
- DBA Profile Config
- Line Profile Config
- Service Profile Config
- Traffic Profile Config
- Broadcast Storm Suppression
- ☐ ONU Regesiter
  - ONU Auto Find List
  - ONU Auth List
  - ONU Auto Auth Rule
- ☐ Pots Server
  - Sip Agent Info
  - Sip Right Flag Config
  - Digit Map Config
  - Pots Profile
- ONU Upgrade

6.3.9.3 Set SIP Number Diagram Profile

Double click the **' PON Module'** icon on the left side of the main page and enter the **'Digit Map config'** page of the **'PON Card Management'** window:

Pon Card Management ✕

Digitmap Profile							
gponOnu Description	gponDigitMapProfileId	gponDigitMapProfileName	gponDigitMapProfileCritica lDialTime	gponDigitMapProfileCfgPa rtialDialTime	gponDigitMapProfileCfgDi gitmapFormat	gponDigitMapProfileBindN um	Token Info
☐	0	digitmap_0	4000	16000	h248	0	Detailed

☐ Select All   Delete   Refresh   Add   Set

OLT Device GPON

- PonPort Information
- PonPort Optical Module Info
- DBA Profile Config
- Line Profile Config
- Service Profile Config
- Traffic Profile Config
- Broadcast Storm Suppression
- ☐ ONU Regesiter
  - ONU Auto Find List
  - ONU Auth List
  - ONU Auto Auth Rule
- ☐ Pots Server
  - Sip Agent Info
  - Sip Right Flag Config
  - Digit Map Config
  - Pots Profile
- ONU Upgrade

In this page, you can set the SIP Digit Map profile and dial matching rules for ONU, and the configuration parameters are as follows:

➢ Critial dial time(s)

Set the timeout time of the exact match rule for the ONU SIP digit map, and the time unit is 's'.

➢ Partial dial time(s)

Set the timeout time of the matching rule for the ONU SIP digit map, the time unit is s.

➢ Digitmap format

91

Set the format of the digit map to match the ONU SIP digit map, with notDefined, h248, NCS, vendorSpecific options.

➤ Bind Num

Show times the SIP map profile is bound by ONU.

➤ Token infor

Configure ONU SIP to match the number of matching rules, double click the **'Token Infor'** button, and open the SIP voice dial rule configuration page of ONU.

[Example of SIP digit map profile configuration]

Example: set up a SIP digit map profile with id 1, with a minimum of 8-digit phone Numbers.

Step 1:

Click **'Add'** button to add a SIP digiet map profile:
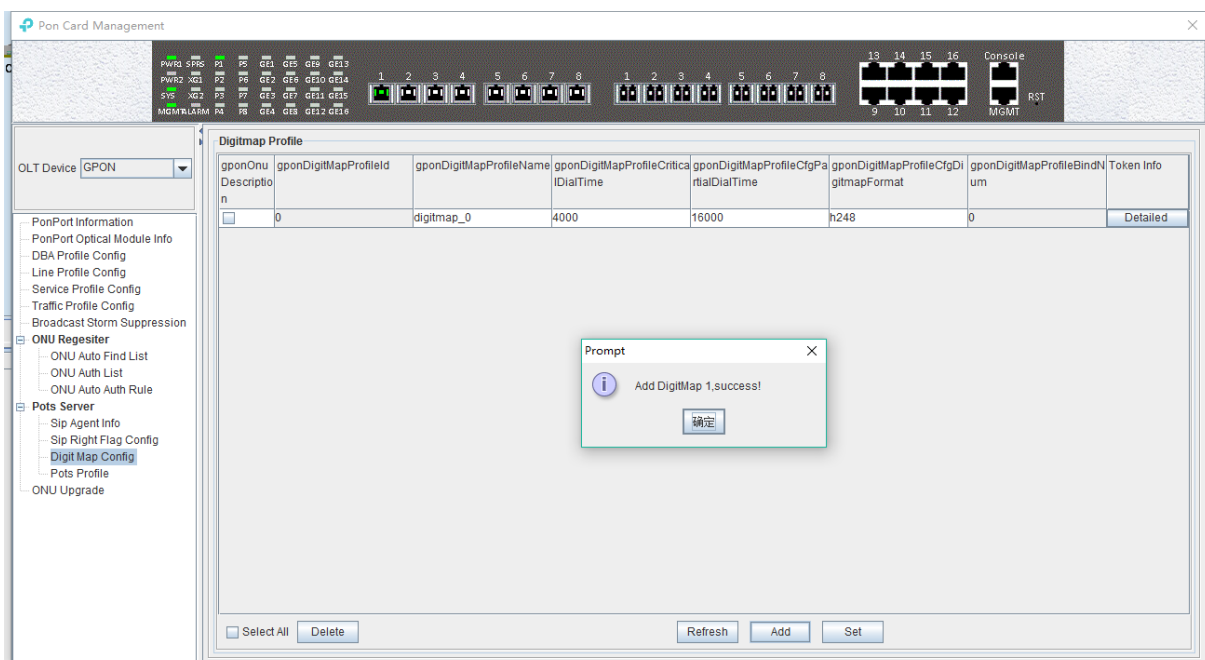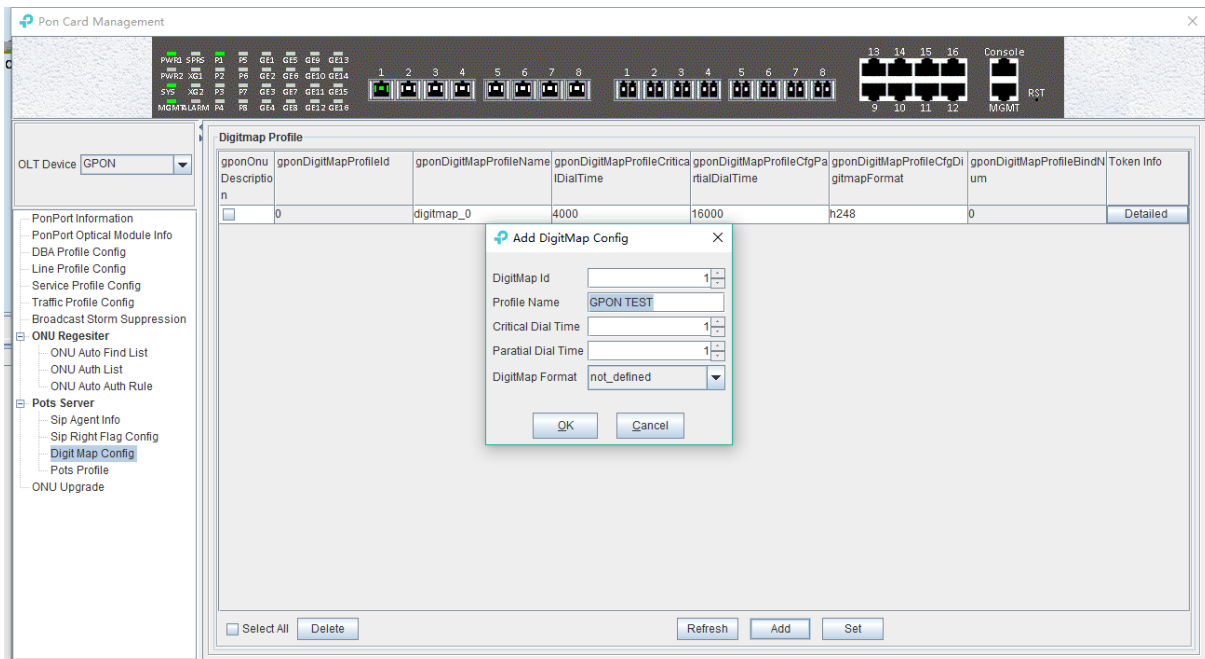
Step 2:

Double click the **'Add'** button of the **'Detailed'** button of digit map profile **'Token Infor'** that you just created, and enter the **' Dial Plan'** configuration page:

Step 3:

On the **'Dial Plan'** page, click **'Add'** to add a dial rule to match the 8-digit phone number, and 8 x can be configured in the matching rule.
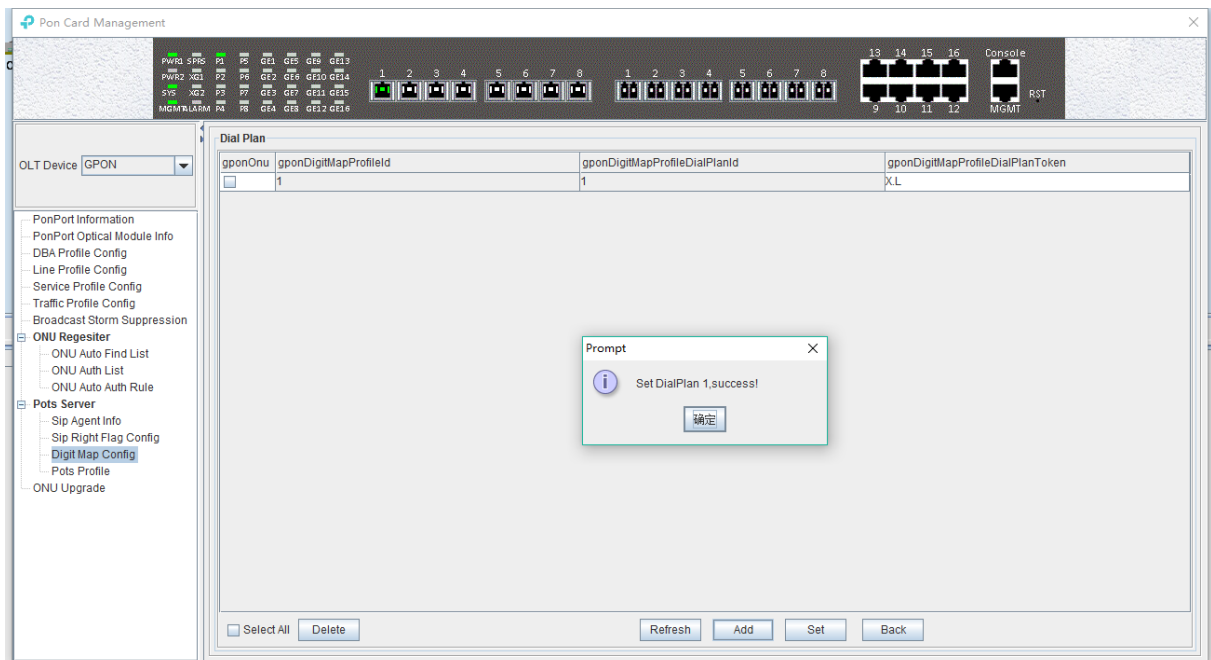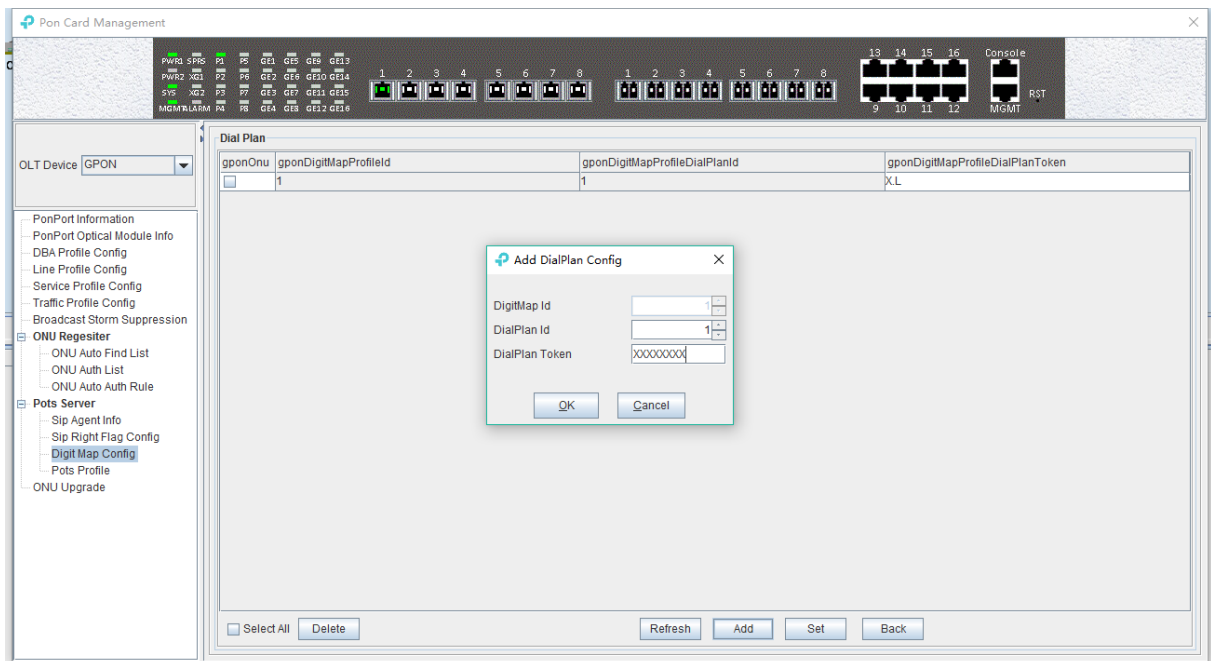
Step 4:

In the **'Dial Plan'** configuration page, you can view the matching rule of the phone number that you just created.
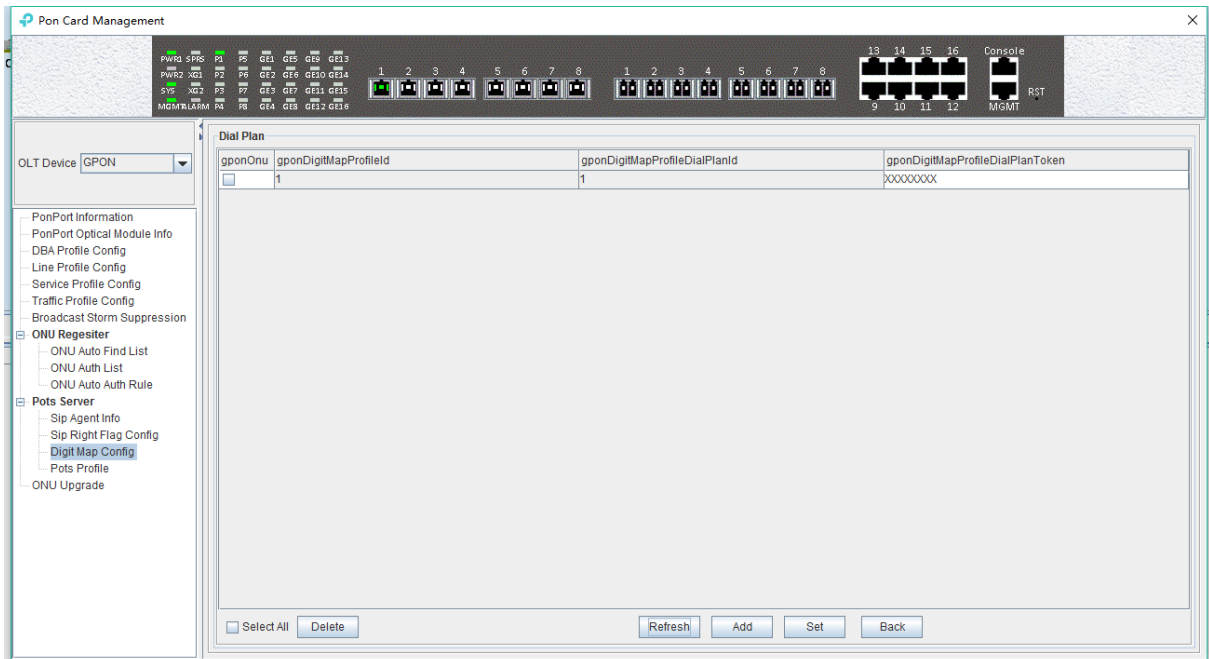
6.3.9.4 Set SIP Post Profile

Double click the **' PON Module'** icon on the left side of the main page and enter the **'Post profile'** configuration page of the **'PON Card Management'** window:
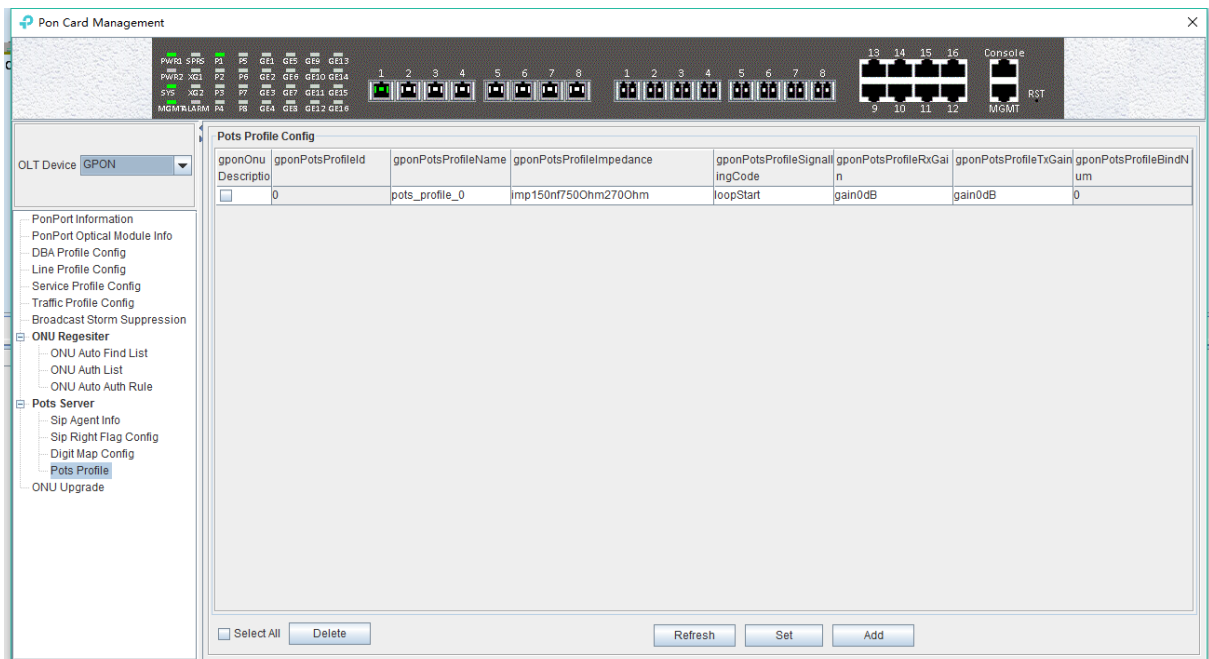
The main part of this page is to configure some of the hardware related parameters of the ONU post port, which can be added and adjusted as needed, not detailed in detail.

6.3.10 Upgrade ONU

Double click the **' PON Module'** icon on the left side of the main page, open the **'PON Card Management'** window and enter the **'ONU upgrade'** page:

The configuration management page can be used in batches or individual upgrades of ONU software.

Note: before upgrading, you need to ensure that there is an upgrade file. The FTP server can

connect with OLT.

[Example of the ONU device upgrade]

Example: upgrade the software of the ONU, through the FTP server of 192.168.5.209.

Step 1:

First, ensure that the computer is connected to an OLT inband or outband management port, and the computer can properly ping the IP of the inband or outband management port.

Step 2:

Configure the FTP server on your computer to access the username and password as well as the file storage path:
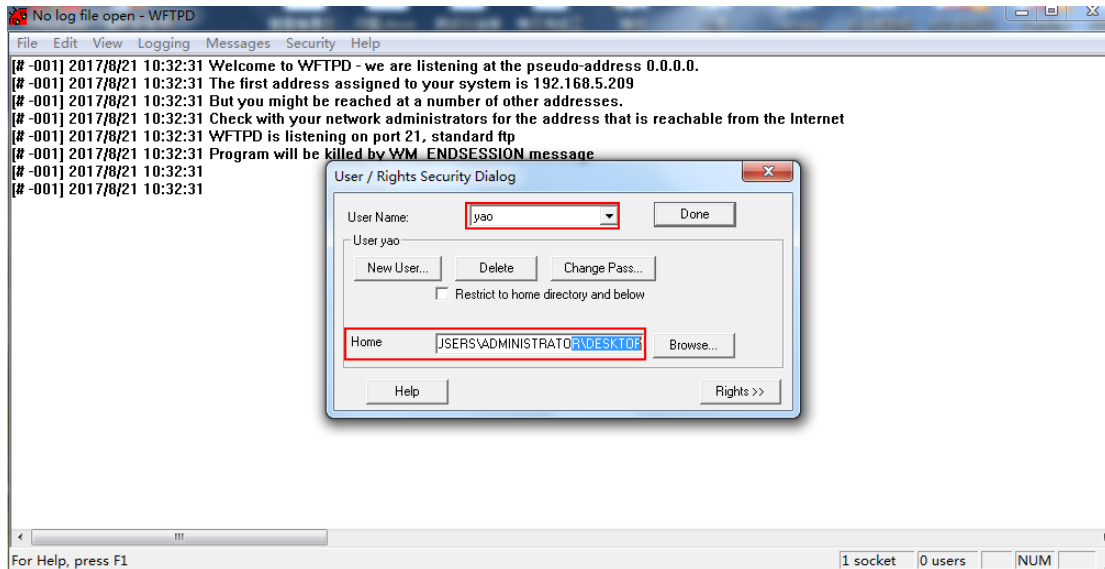
Step 3:

Operation of upgrade EMS on the ONU:
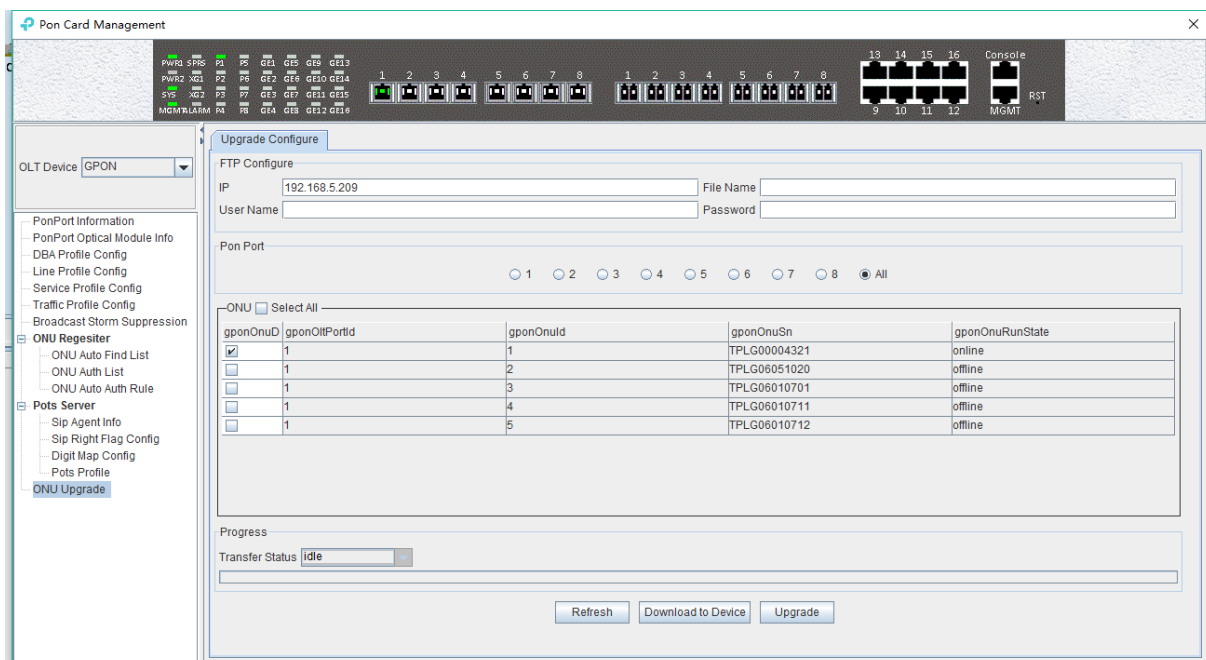
Step 4:

It is suggested that the upgrade operation of ONU is completed successfully.

6.4   PON Port Is Managed Separately

Double click on the **'Port-1'** icon on the left side of the main page and enter the **'PON Card management'** page. The typical page is as follows:
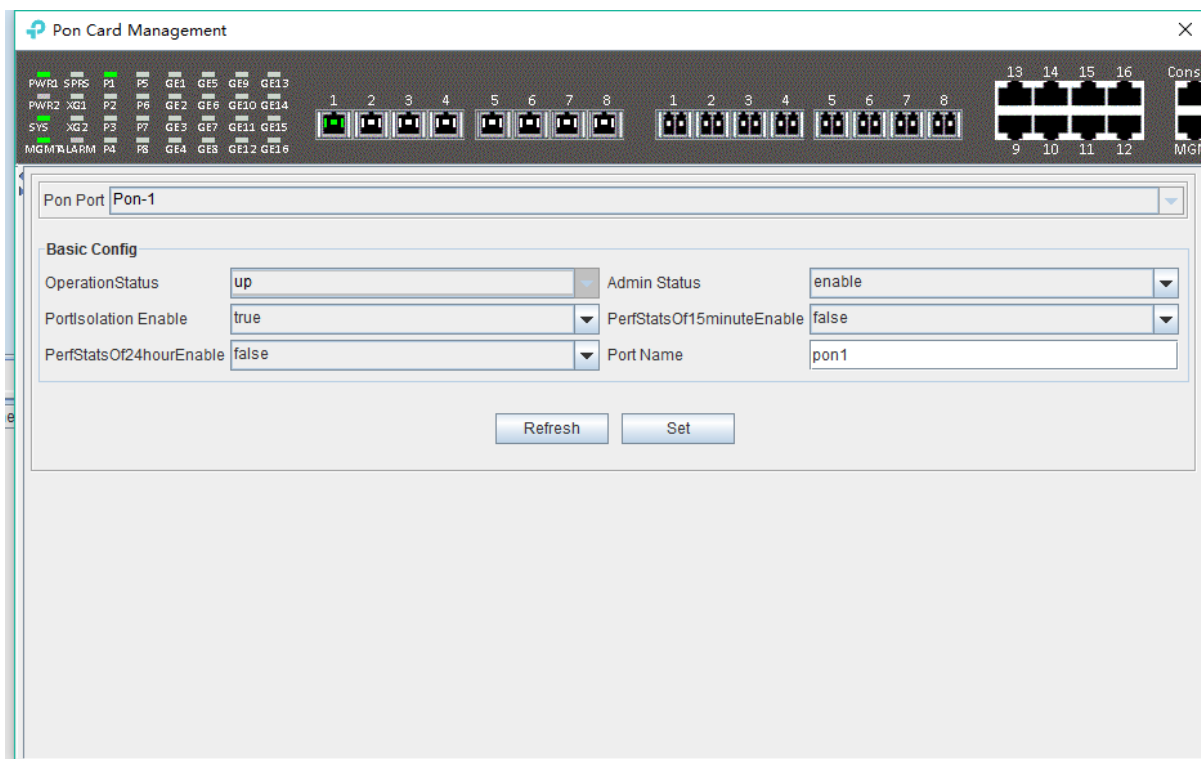
In this page, user mainly conduct a separate configuration operation on the PON of OLT, and the specific parameter configuration is as follows:

➢ OperationState

Display OLT's PON operation state, **"down"** state indicates that OLT has no registration ONU under the PON of OLT; The **"up"** state shows that the PON of OLT is registered ONU.

➢ Admin Status

You can display and open the PON port of OLT, and **'enable'** open the PON; **'disable'** closes the PON.

➢ PortIsolation Enable

Show that the PON port isolates manage state, and the administrator can configure this option, which has two states, **'true'** and **'false'** respectively.

➢ PerfStatsOf15 minutesEnable

Display 15 minutes of performance statistics to enable the managed state, the administrator can configure this option, which has two states: 'true' and 'false' respectively.

When set to **'true'**, the 15-minute performance statistics for the pon port will be enabled; When configured as **' false '**, the 15-minute performance statistics for the pon port will be disabled.

➢ PerfStatsOf24hourEnable

Show the 24 hour performance statistics to enable the managed state, the administrator can configure this option, which has two states: 'true' and 'false' respectively.

When set to **'true'**, the function of the 24-hour performance statistics of the pon port will be enabled; When configured as**' false'**, the function of the 24-hour performance statistics for the pon port will be disabled.

➢ Port Name

The name of the configuration PON can be displayed.

7 Manage ONU Device

7.1　Introduction of ONU Management

The ONU is the client device in the GPON system. The management of EMS software for ONU is carried out through the OLT connected to it. OLT's management of ONU is carried out by the OMCI management message based on itu-tg. 984. X standard.

EMS software support for a variety of types and models of ONU management, such as 1 FE ONU, 4 FE ONU, 8 FE ONU, 1 GE + WIFI ONU, 1 GE + CATV ONU, 4 FE + 2 POTS ONU, 4 FE + 1 CATV ONU, 4 FE + 2 + 1 CATV ONU POTS and so on.

This section with the commonly used 4FE + CATV ONU as an example to introduce the EMS software of ONU management, different port configuration type of data ONU, and more types of business data ONU part way through EMS software management basically the same, different parts in the device described in the relevant documents to type.

The ONU management window is opened by the corresponding ONU device icon on the left device tree of EMS software, and the ONU device is managed by the function parameters on the corresponding function page. The typical ONU management window page is shown below:
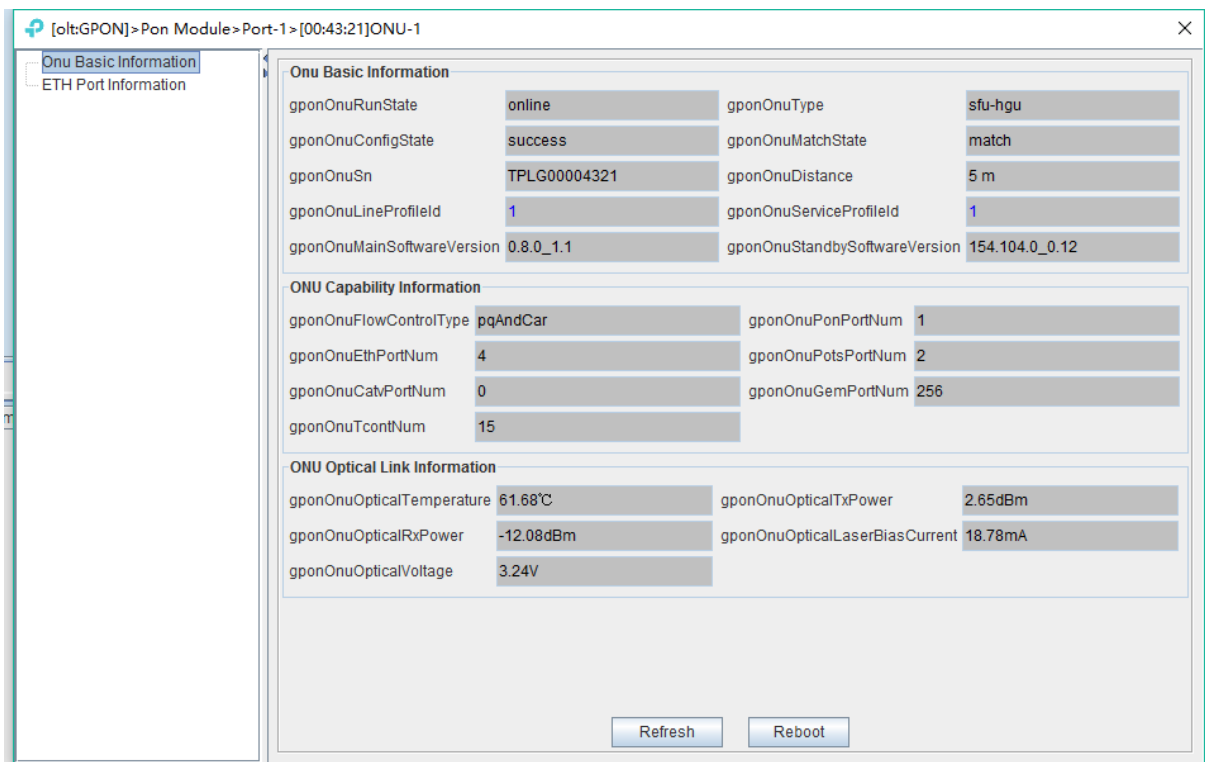
As shown in the figure above, the ONU device management includes the following contents:

➢ View ONU Basic information(ONU Basic information, ONU capability information, view ONU Optical link information)

➢ ONU port information view and configuration

➢ ONU CATV function configuration

The following sections describe the contents of the ONU administration.

7.2   ONU Basic Information Management

7.2.1 View Basic Information of ONU

The basic information of ONU can be viewed mainly, which can see the running state of ONU, the configuration status of ONU, the ONU ranging, and the hardware and software version of ONU, and the partial status description has been specified in section # 6.3.8.2.
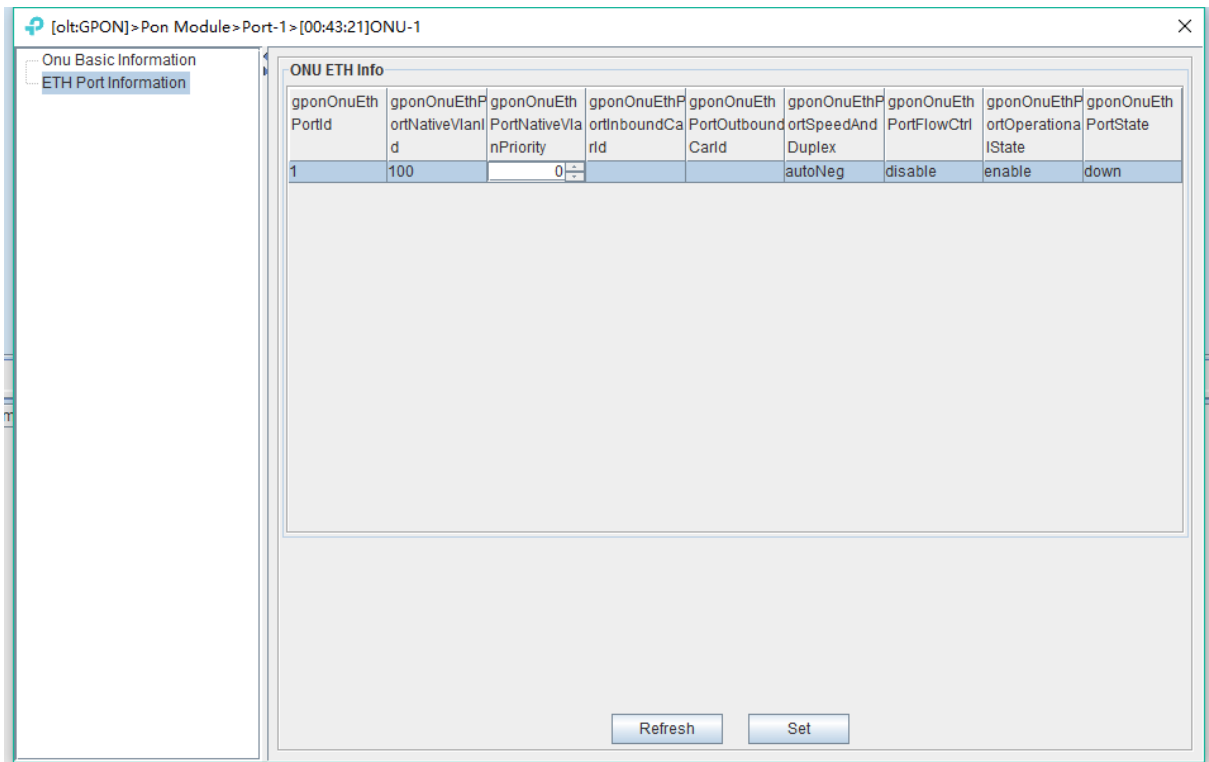
Double click on the left side of the main page to manage the ONU, enter the ONU management page, and click **'ONU Basic Information'** to enter the page to see the basic information of the ONU device:

7.2.2 ONU Capability Set Information View

The information of the ONU capability is mainly to see the number of ETH port number, CATV port number, post number and the support number of GPON related parameters such as gemport and tcont.

Double click on the left side of the main page to manage the ONU, enter the ONU admin page, and click **'ONU Basic Information'** to enter this page to view the port ability information of the ONU device.
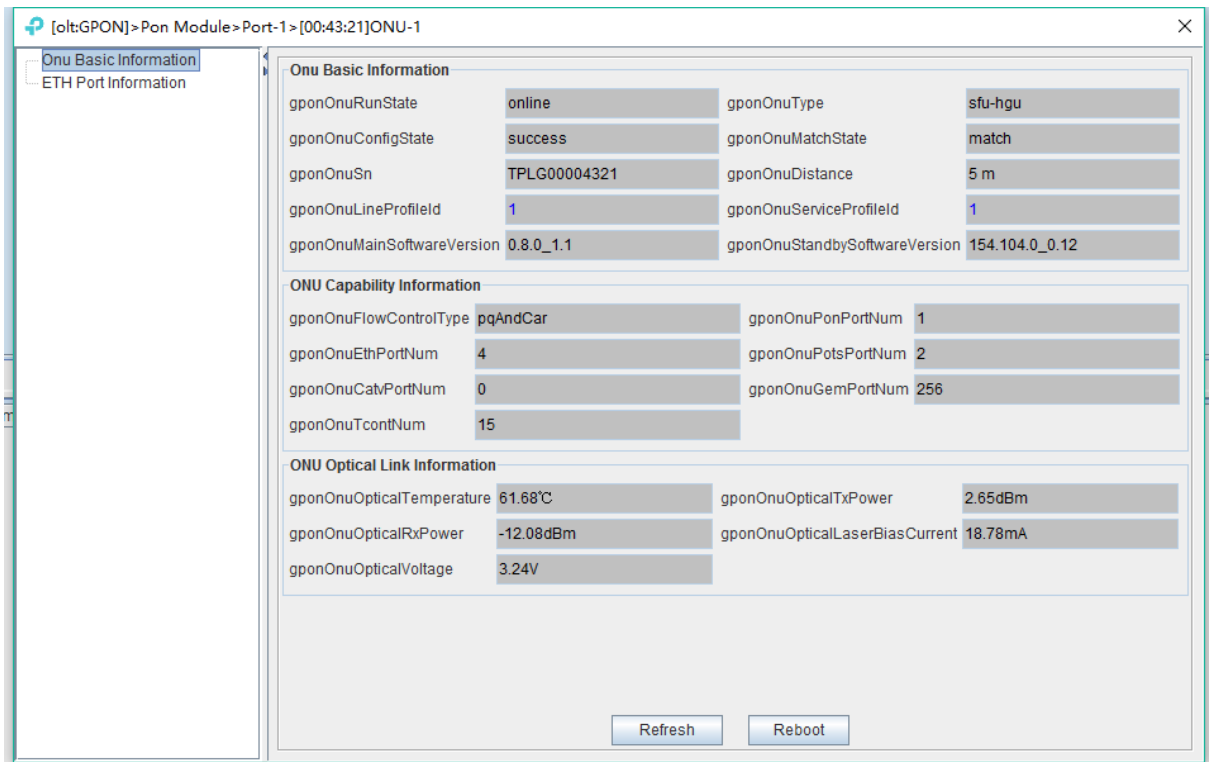
7.2.3 ONU Optical Link Information

The optical link information of ONU is mainly to check the optical link information of the PON of ONU, such as: ONU receiving optical power information, and ONU transmitting optical power information.

Double click on the left side of the main page to manage the ONU, enter the ONU management page, and click **'ONU Basic Information'** to enter the page to view the optical link information of the device's PON.
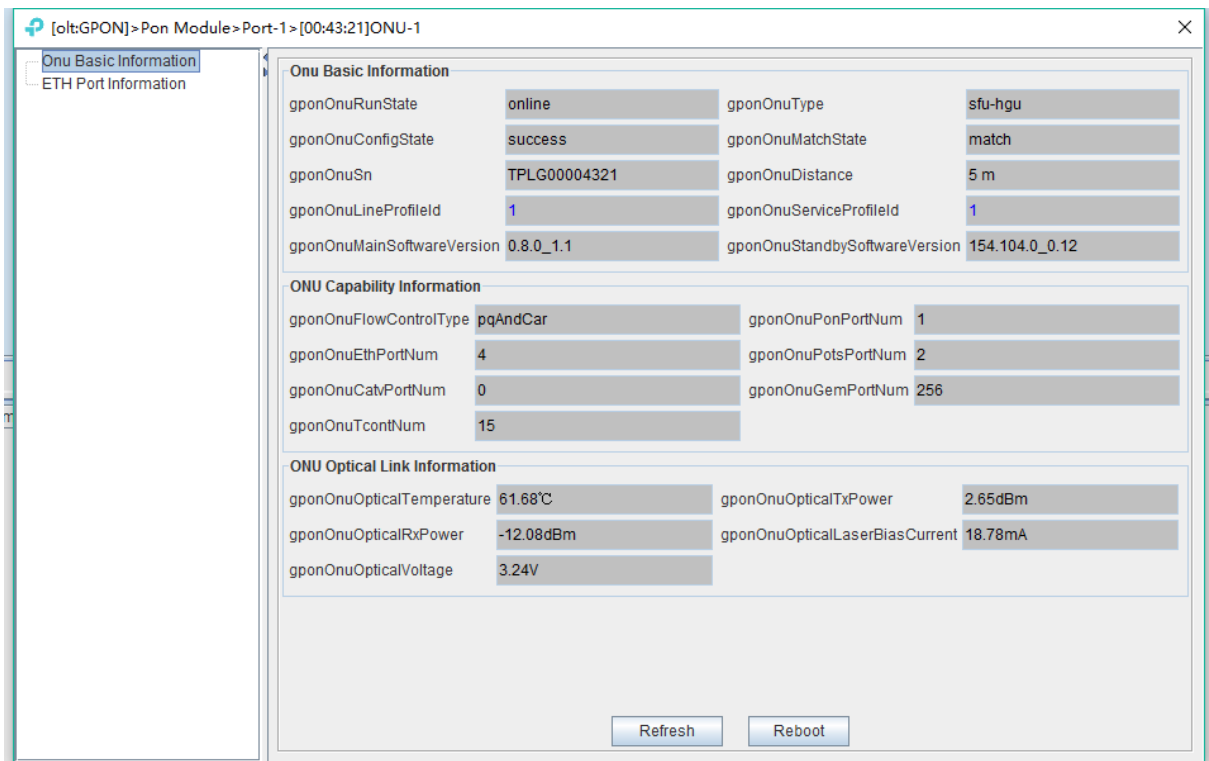
Note: GPON ONU registration for ONU receives light power requirement is very high, here on this side of the ONU receives the light power range must be between -8 ~ -27, OLT can automatically discover to the ONU, otherwise the OLT will always prompt ONU receives light power is too high. And it's easy to burn off the PON module of ONU if the ONU is too high.

7.3   ONU Port Management

This chapter is mainly about the ONU port configuration, which involves a lot of features is very important, such as ONU port access mode of the vlan configuration, ONU port speed limit and ONU port management state of open, etc.

7.3.1 Basic Configuration of ONU Port

The basic configuration of ports involves the opening and closing of ONU ports, the rate of ONU port and the ONU flow control function.

Double click on the left side of the main page to manage the ONU, enter the ONU management page, and click **'ETH Port Information'** to enter this page to do basic operations on the ONU port:
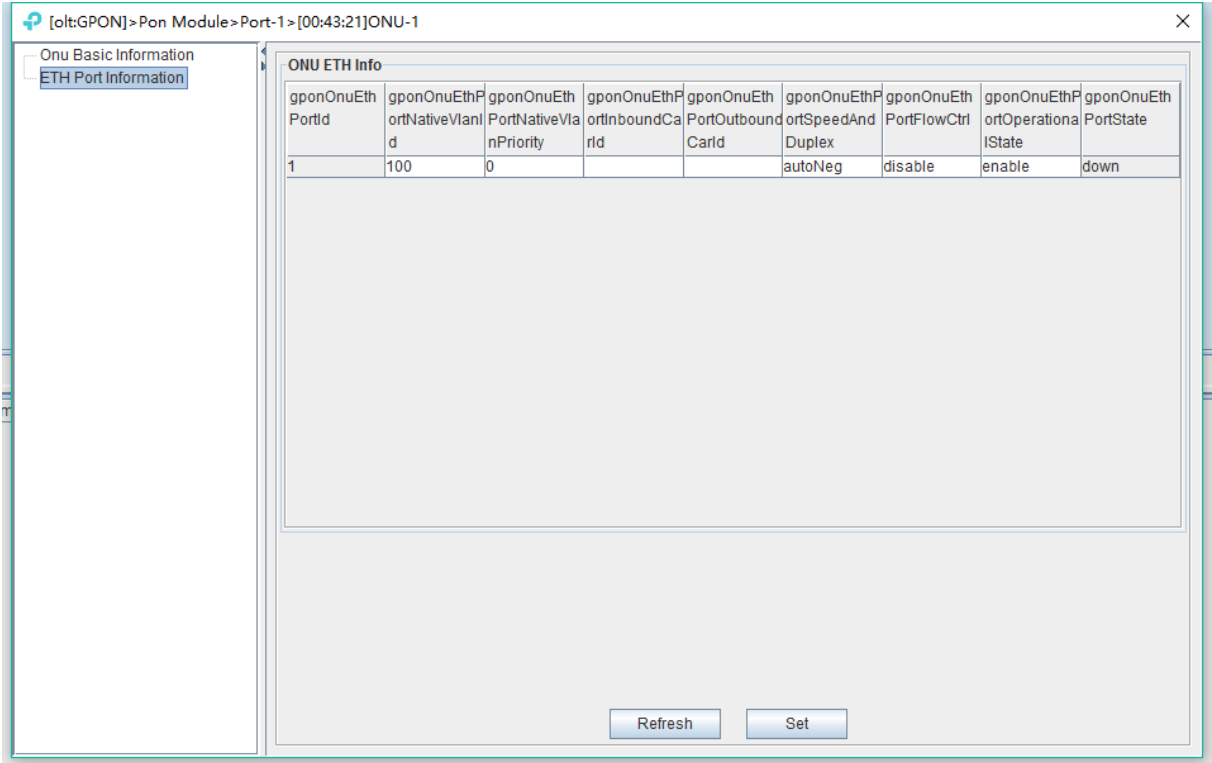
7.3.2 ONU Port Access Mode Vlan Configuration

In the 'service profile configuration' described in # 6.3.5.2.1 ONU trunk, passthrough mode, transformation, QinQ vlan configuration, but for the access mode of the vlan configuration ONU, need to configure in the ONU port management page, specific configuration is as follows:

Double-click on the left side of the main page to manage into the ONU management page, click **'ETH port information'** into the page to configure ONU port vlan access patterns, the following figure configuration ONU port access mode of vlan is 100, priority is 1:

7.3.3 ONU Port Rate Limit

Speed limit on the GPON OLT ONU port need to limit traffic profile is created in # 6.3.6 in advance, and bound to the ONU port on line in the ONU port management.

double-click on the left side of the main page to manage into the ONU management page, click on the **'ETH Port Information'** into the page you can configure the ONU port rate limit, for example the ONU port speed limit of 10 M as follows:
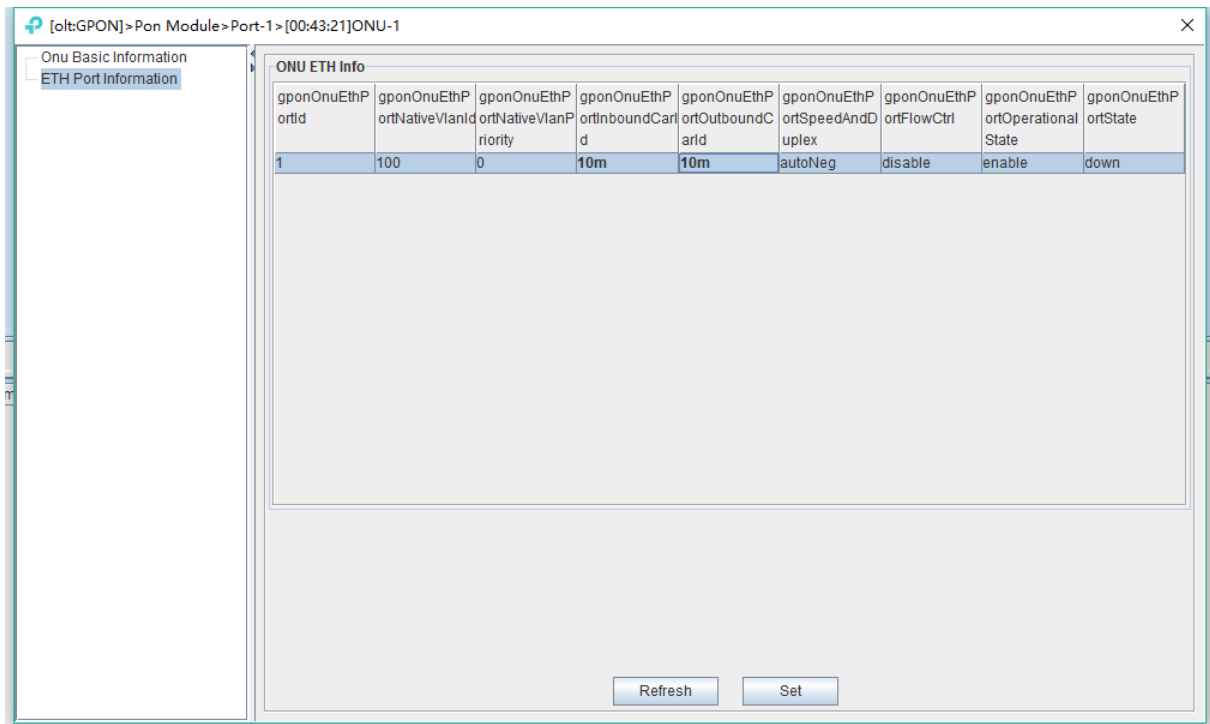
Step 1:

Create a flow profile with fixed bandwidth of 10M in advance:
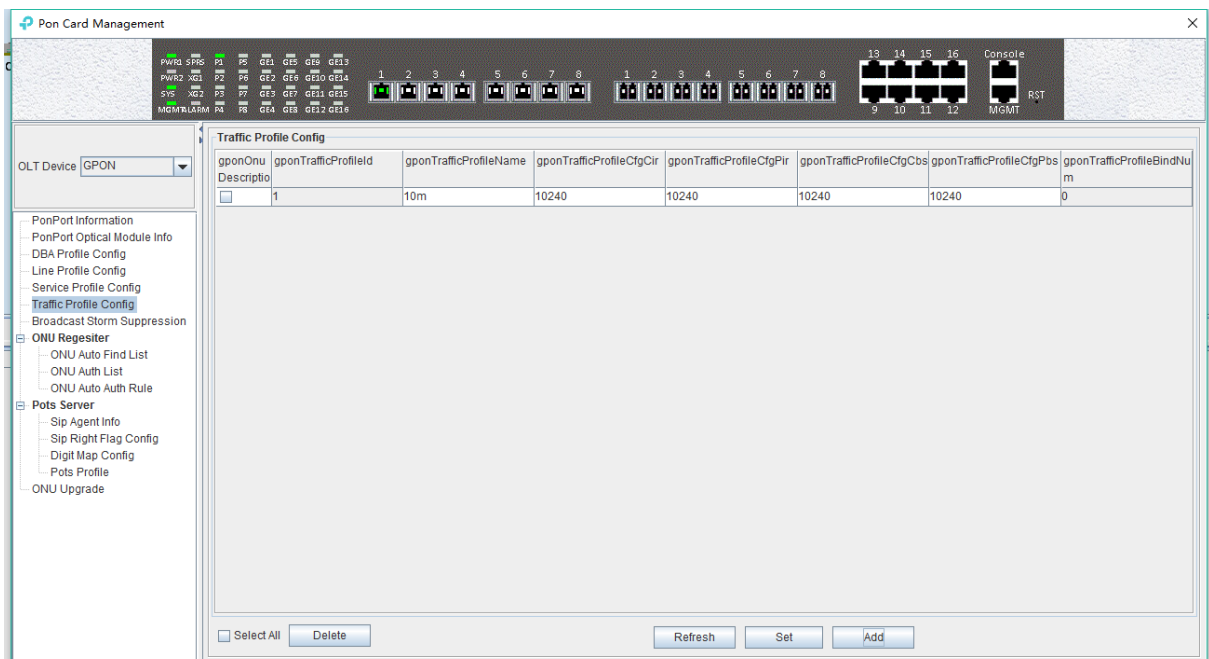
Step 2:

Bind the traffic profile for the speed limit 10M to the ONU port.

Step 3:

Then click the **'set'** button to complete the speed limit of the ONU port.

7.4   ONU CATV Management

Double click ONU managed in the left of main page, entering ONU management page, and click **'CATV Config'** to open or close CATV function.

**Note:** Before managing ONU's CATV function, users need to configure ONU's CATV port numbers at #6.3.5 service profile configuration.
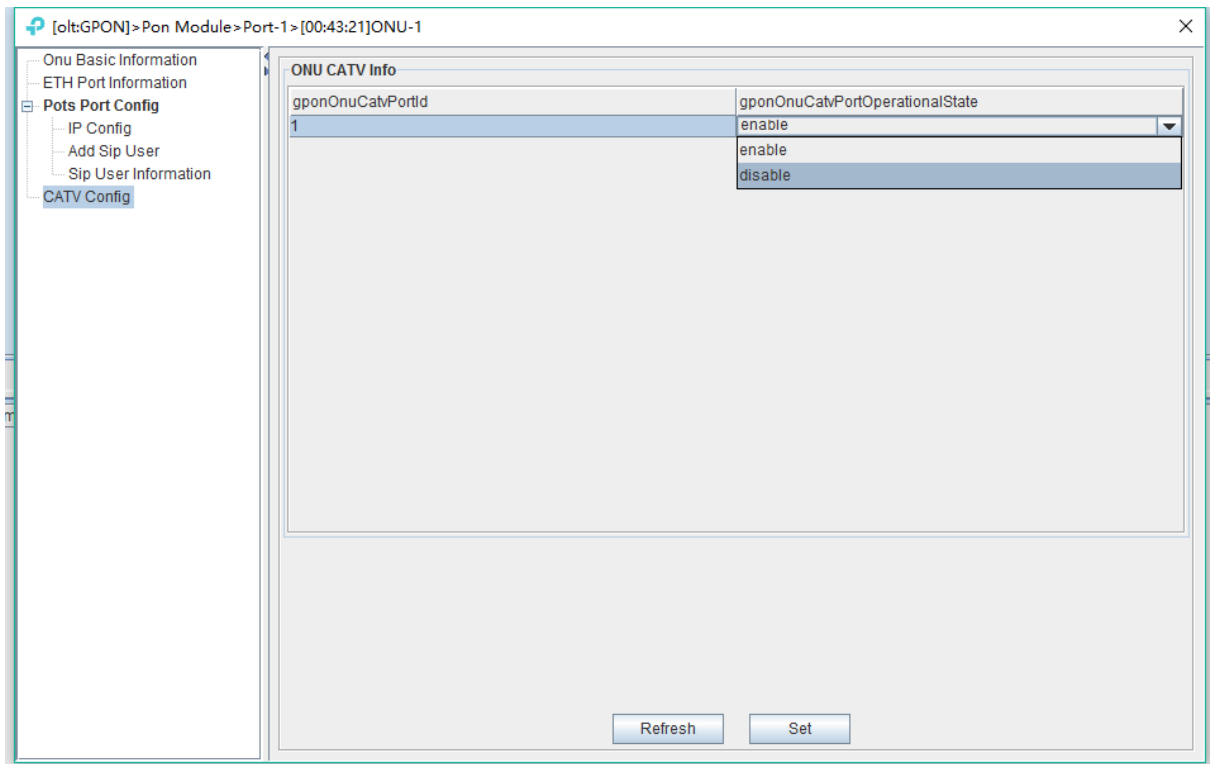
7.5   ONU VOIP Service Configuration

Double click ONU managed in the left of main page, entering ONU management page, and click **'Pots Port Config'** to configure ONU Pots Service.

Note: Before configuring ONU's Pots Service, users need to configure ONU's Pots port numbers at #6.3.5 service profile configuration.

7.5.1 ONU VOIP Service IP Configuration

The IP configuration of the ONU Pots service is a major indication that ONU needs to configure an IP address (static IP address or DHCP access dynamic IP) before communicating to the pots server.

Double click ONU managed in the left of main page, entering ONU management page, and click **'IP Config'** to configure ONU Pots Service WAN IP.
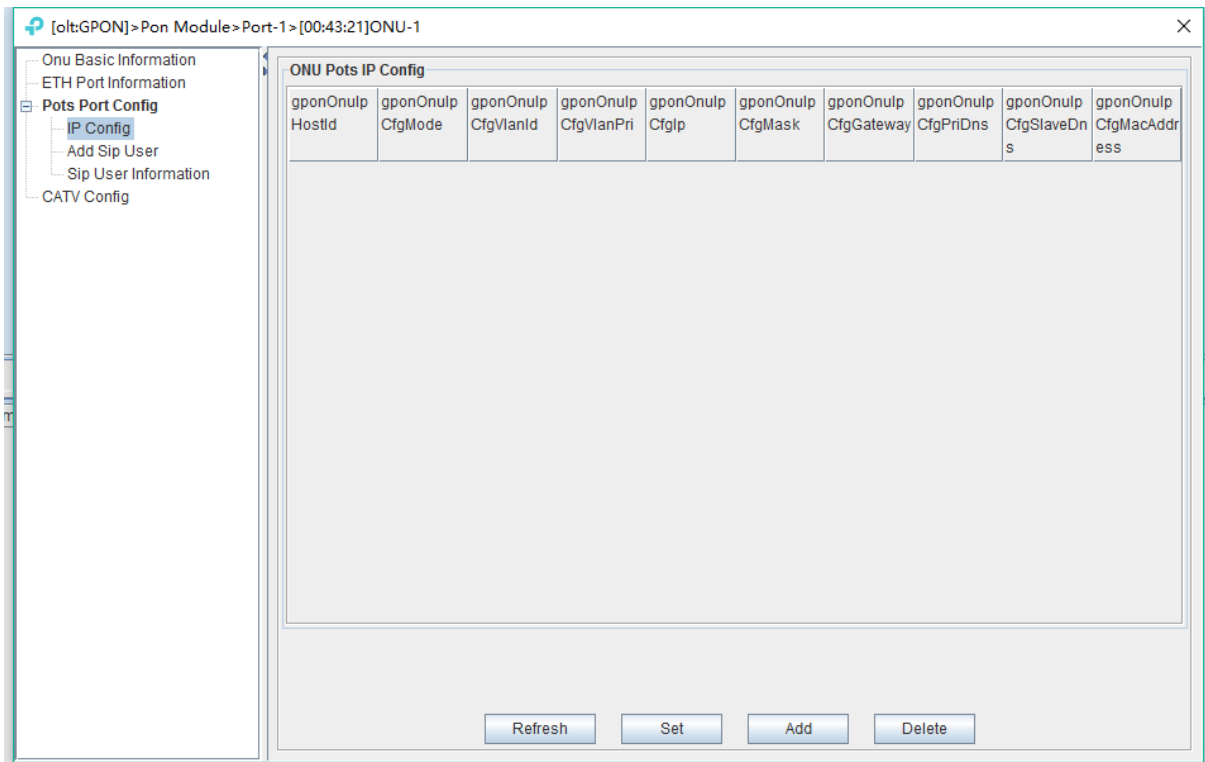
[Example of ONU Pots WAN IP Configuration]

Example: Configuring ONU Pots service WAN IP is static 192.168.1.111, the gateway is 192.168.1.254, and WAN vlan is 100.

Step 1：

Click '**Add**' button to configure ONU Pots service WAN IP:
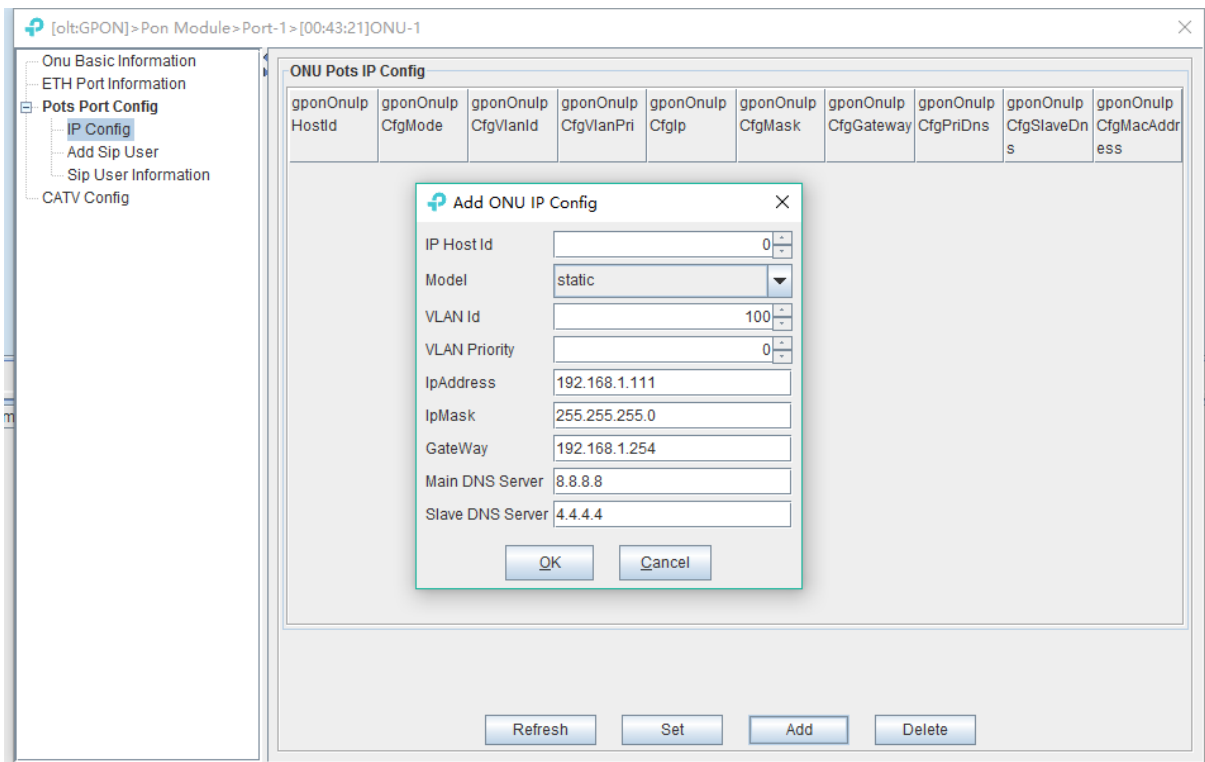
7.5.2 ONU VOIP Registered Tel-number Configuration

Mainly introduces the ONU Pots service this piece of registered tel-number, registered user name and Profile binding configuration.

Double click ONU managed in the left of main page, entering ONU management page, and click **'Add Sip User'** to configure ONU Pots Service registered tel-number.
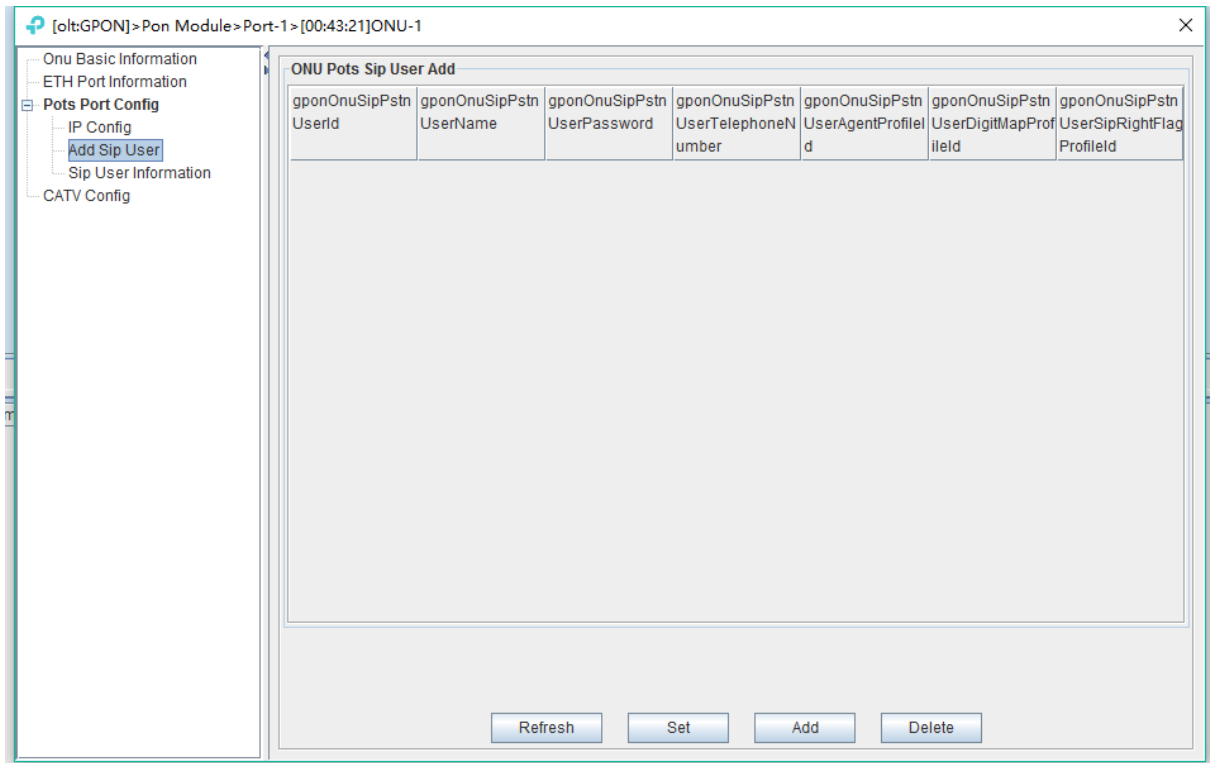
[Example of ONU Pots registered tel-number Configuration]

Example：Configuring ONU Pots Service registered tel-number is 88889999, registered user name and user password is admin/admin, and binding created all kinds of SIP Profile id 1.

Step 1：

Click **'Add'** button to configure ONU Pots Service registered tel-number and user name and so on:
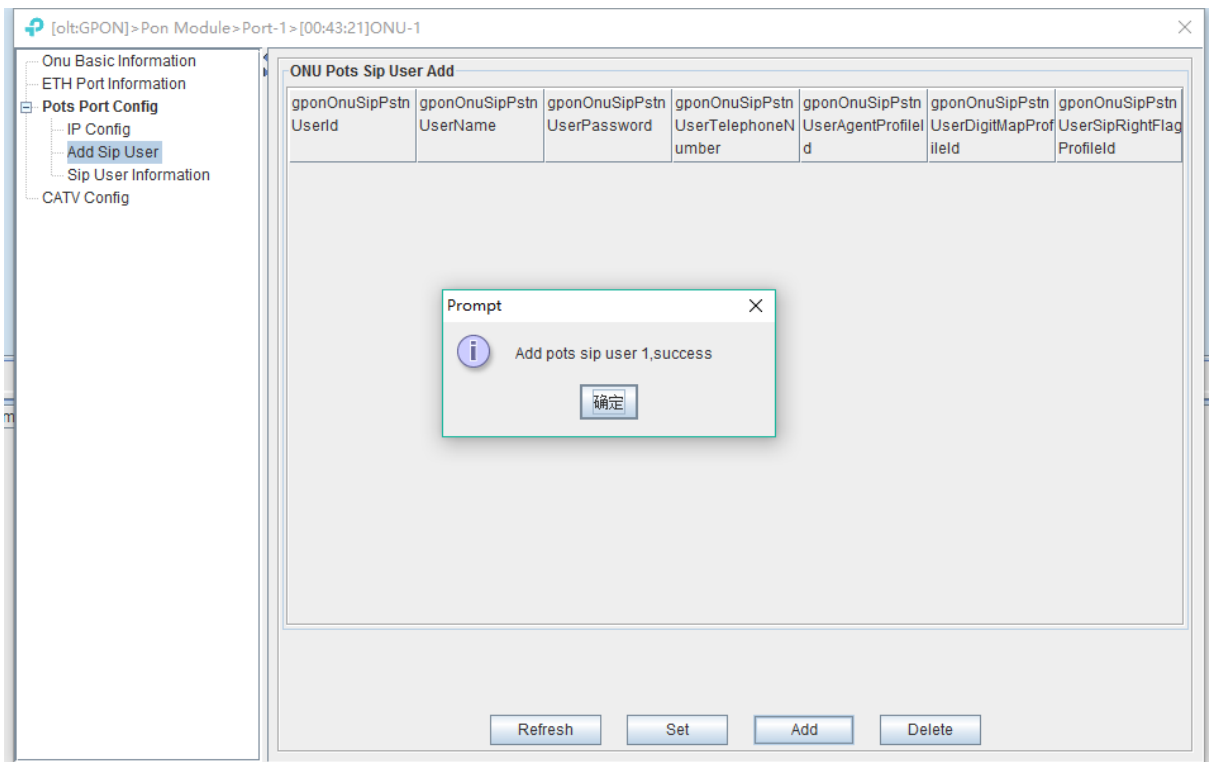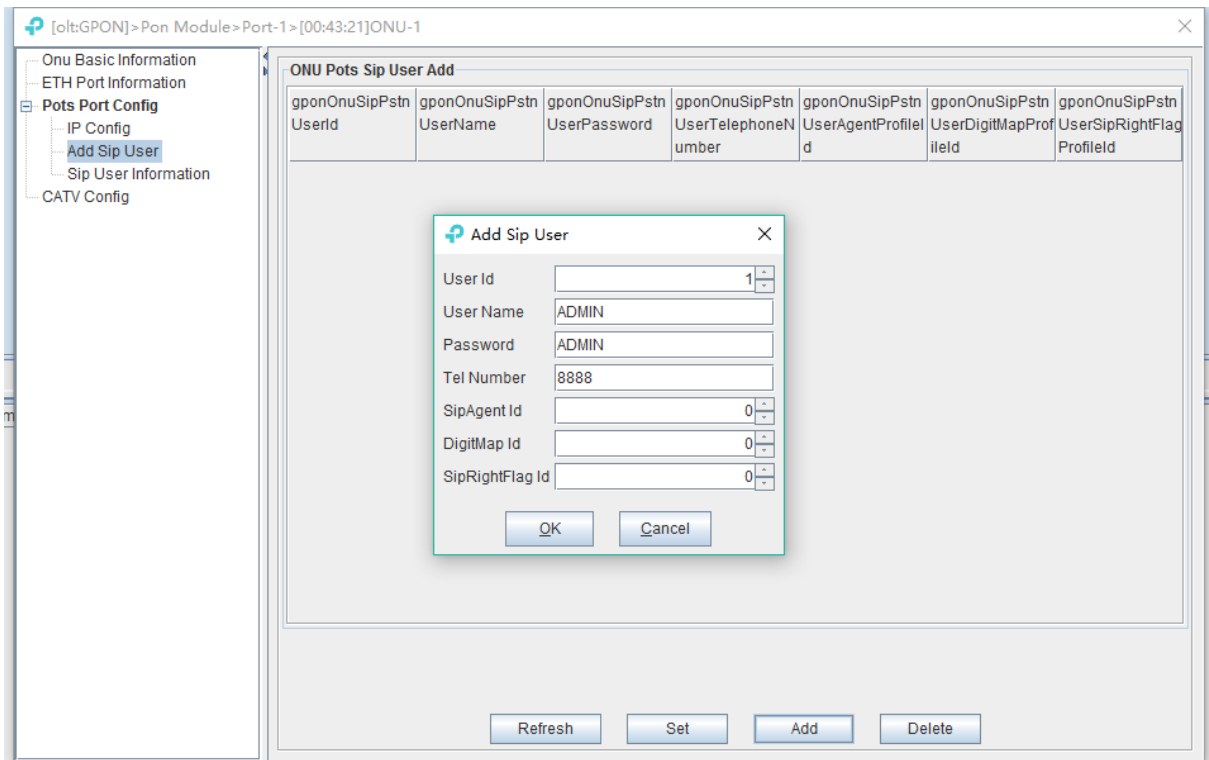
Step 2：

Return **'Add SIP User'** to view and modify tel-number configuration:
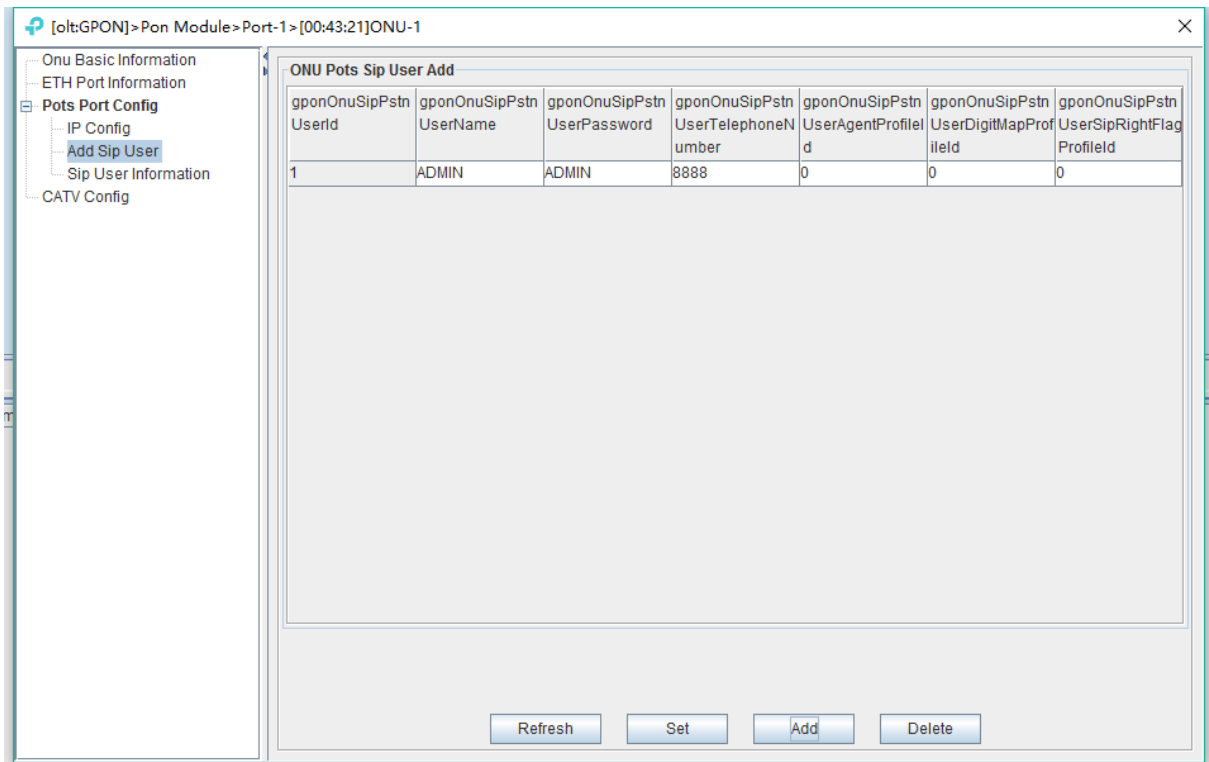
7.5.3 View ONU VOIP Registered State

It mainly introduces whether the ONU Pots service has been registered successfully and whether the Pots state is normal or not.

Double click ONU managed in the left of main page, entering ONU management page, and click **'Sip User Information'** to view ONU Pots Service registered state and phone state:
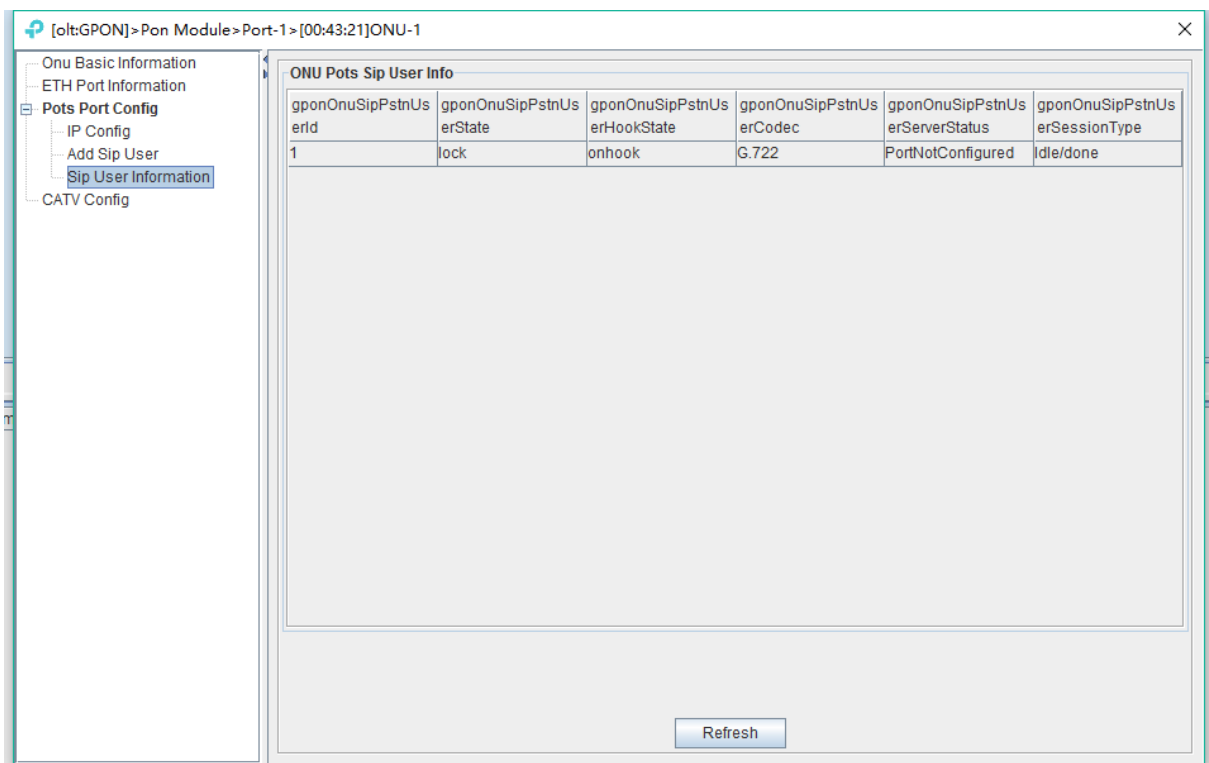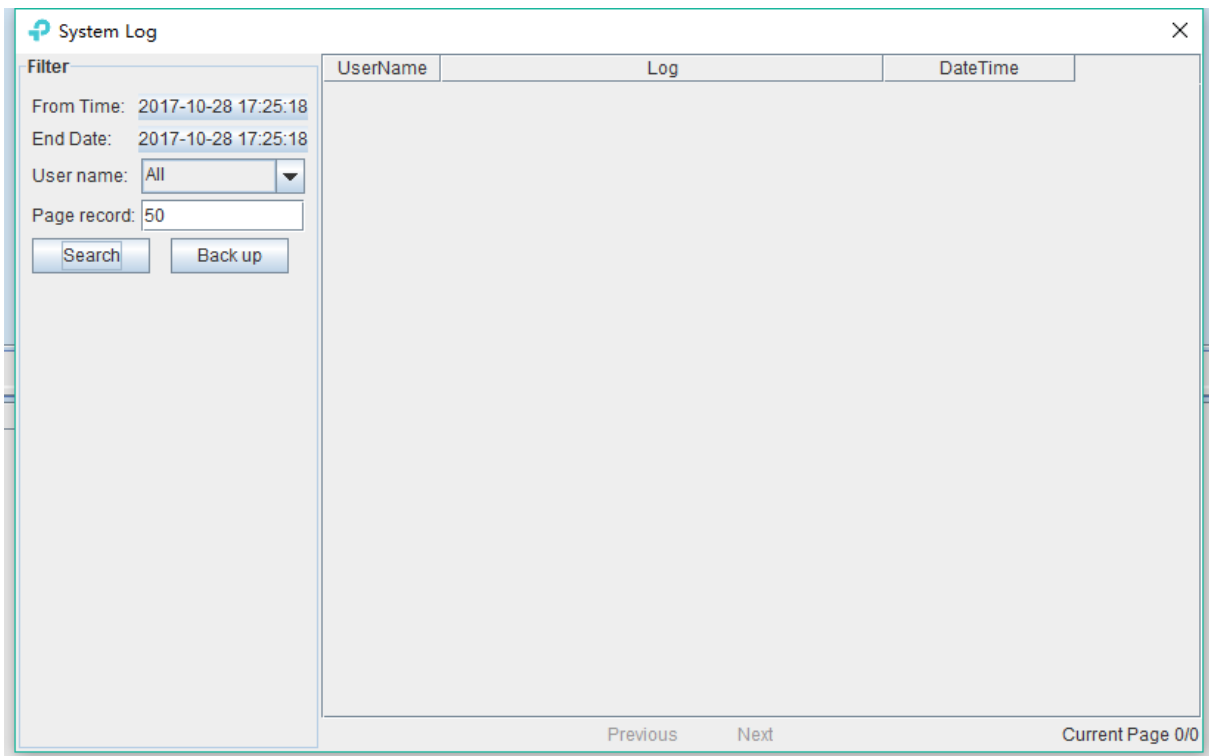
8 Operation Logs Management

It's convenient for administrator to view historic records of EMS operation. EMS provides operation logs query function. Open **'Operation Logs'** window of **'Alarm'** menu to view historic operation records. The typical interface is shown below:
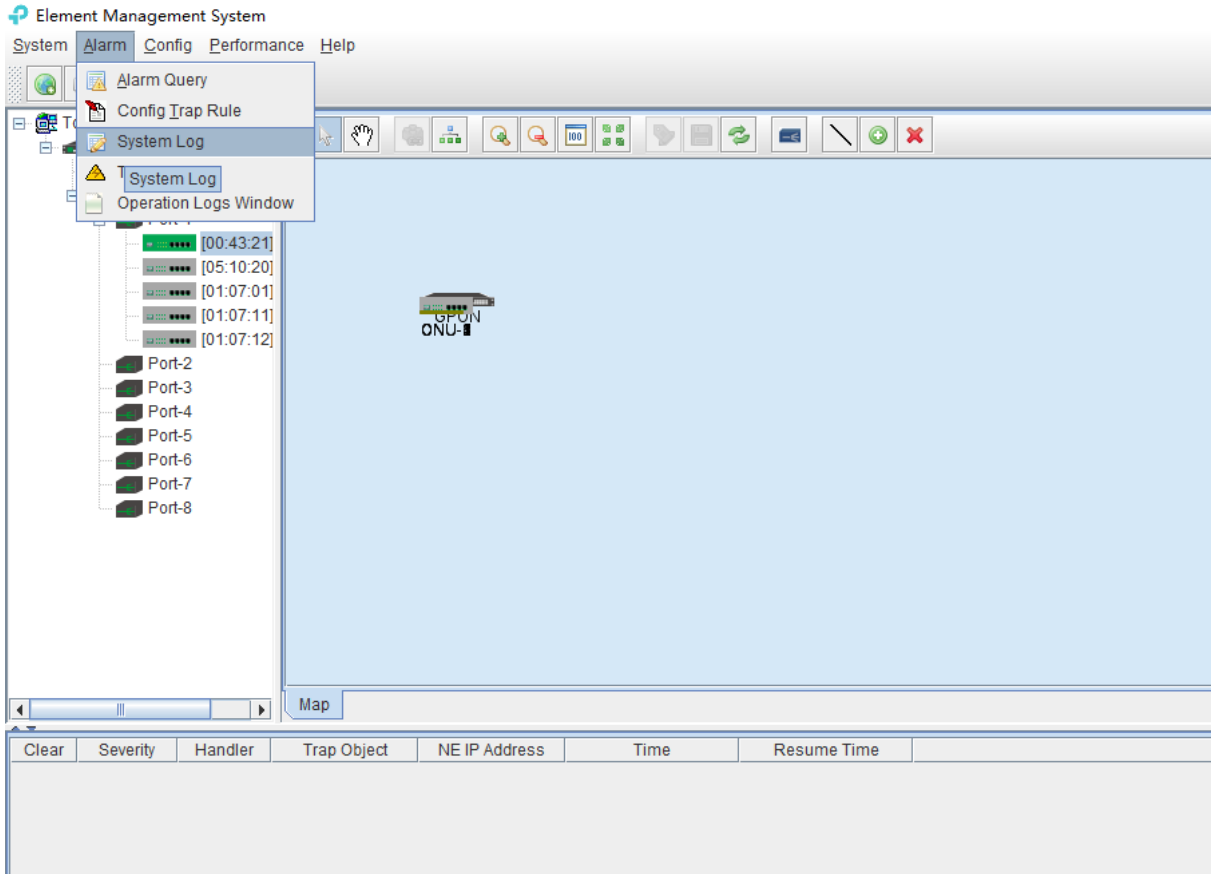
The following **'Operation Logs '** window shows :

As pictured above, inquiring operation logs according to operation period and operation users, the result of query can be saved as a single file.

[Example of operation logs management]

Example：Inquire and save admin user's operation event from June 21,2017 10:13:58 to August 21,2017 10:13:58.

Step 1：

Choose specified time from left drop-down menu of From Time and End Date. User name chooses 'Admin' . page record chooses '50' , then click 'Search' button, displaying log events in the right, and click 'Back up' .
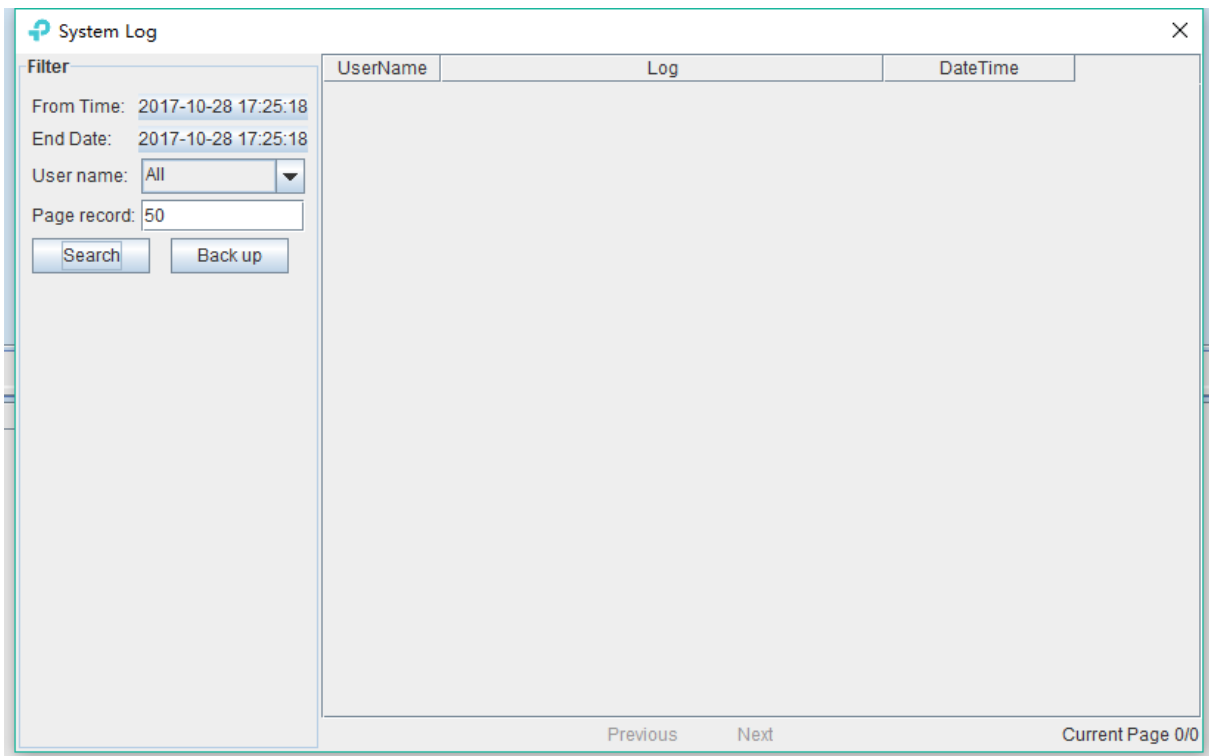
Step 2：

Choose specified dictionary to make a backup of admin user's operation logs.
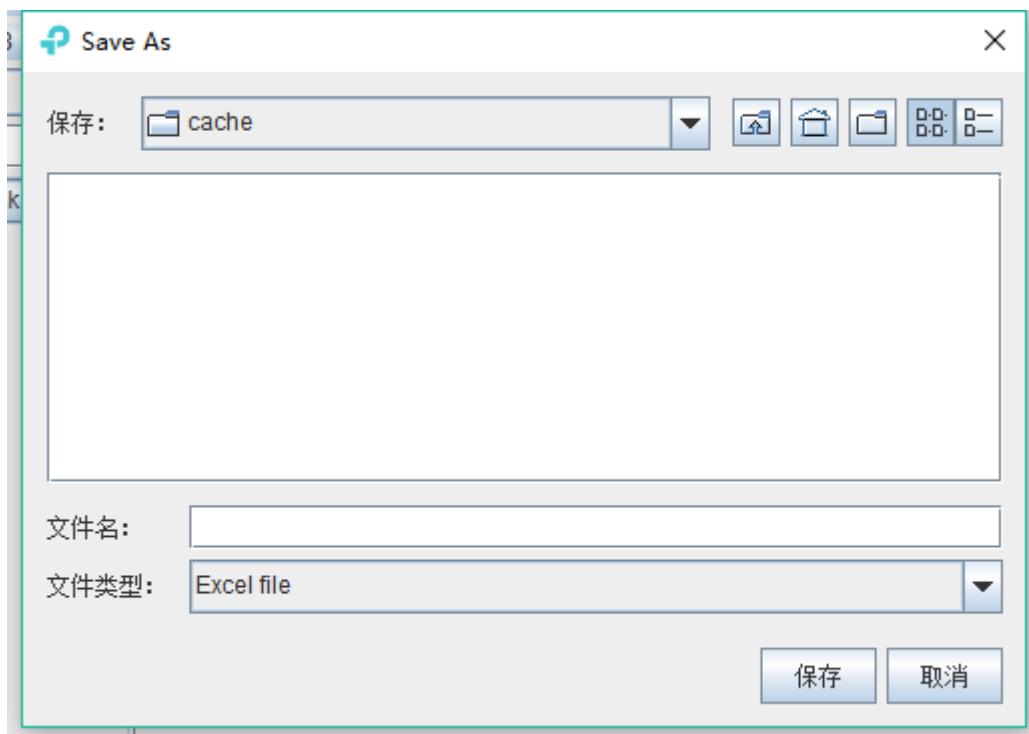

9 Alarm Logs Management

It's convenient for administrator to search alarm record of EMS operation. EMS provides alarm filter , backup and query function.

As shown below, open **'Alarm Query'** window of **'Alarm'** menu to search alarm information.   You

can set alarm filter conditions in the left page, including alarm time, alarm status, alarm severity, alarm element, alarm page record count and alarm type. Clicking **'Filter'** menu can view alarm information meeting filter conditions in the right. Clicking **'Reset'** menu can reset filter conditions. Clicking **'Save As'** menu can save query information to chosen dictionary.
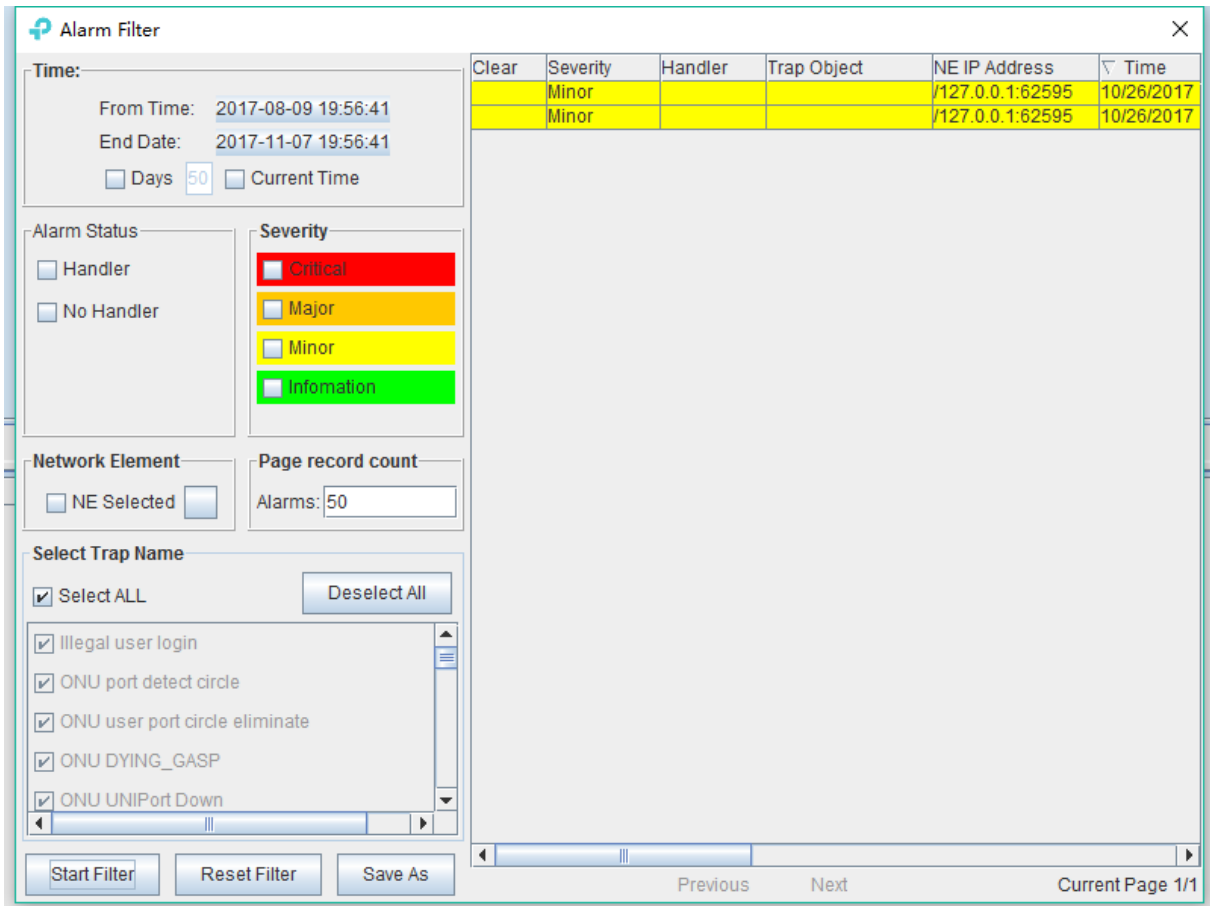
As shown below, open **'Config Trap Rule'** window of **'Alarm'** menu to configure alarm rule. Choose device type in the left. On the right is corresponding alarm rule information. Firstly , You can choose **'Yes'** or **'No'** of filter menu to modify alarm rules. Secondly, click **'Apply'** menu. Finally, choose **'Yes'** button from the pop-up menu. Clicking **'Refresh'** button can update alarm rule information. Clicking **'Close'** button can close current page.
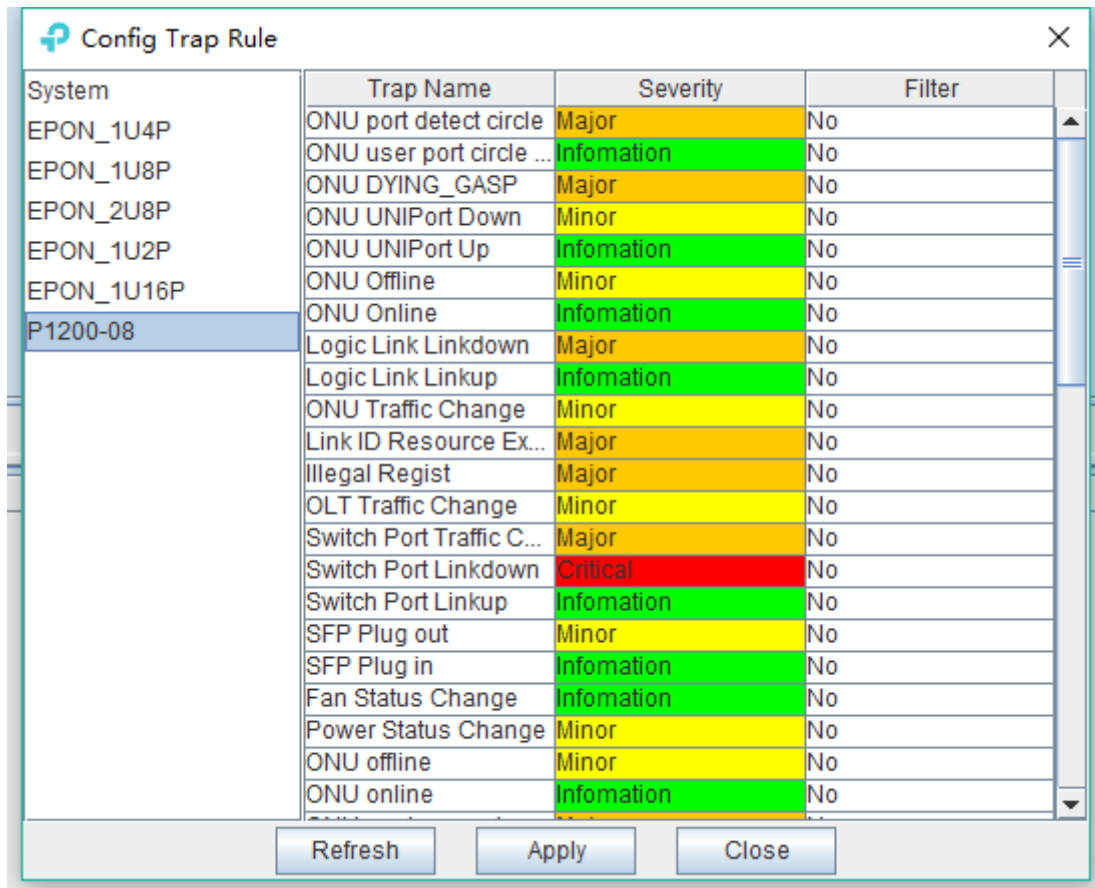
As shown below, open **'Trap Window'** of **'Alarm'** menu to inquire all alarm information. You can set alarm From Time, End time and Page record. Clicking **'Search'** button can view alarm information on the right. Clicking **'Backup'** button can save alarm information to chosen dictionary.
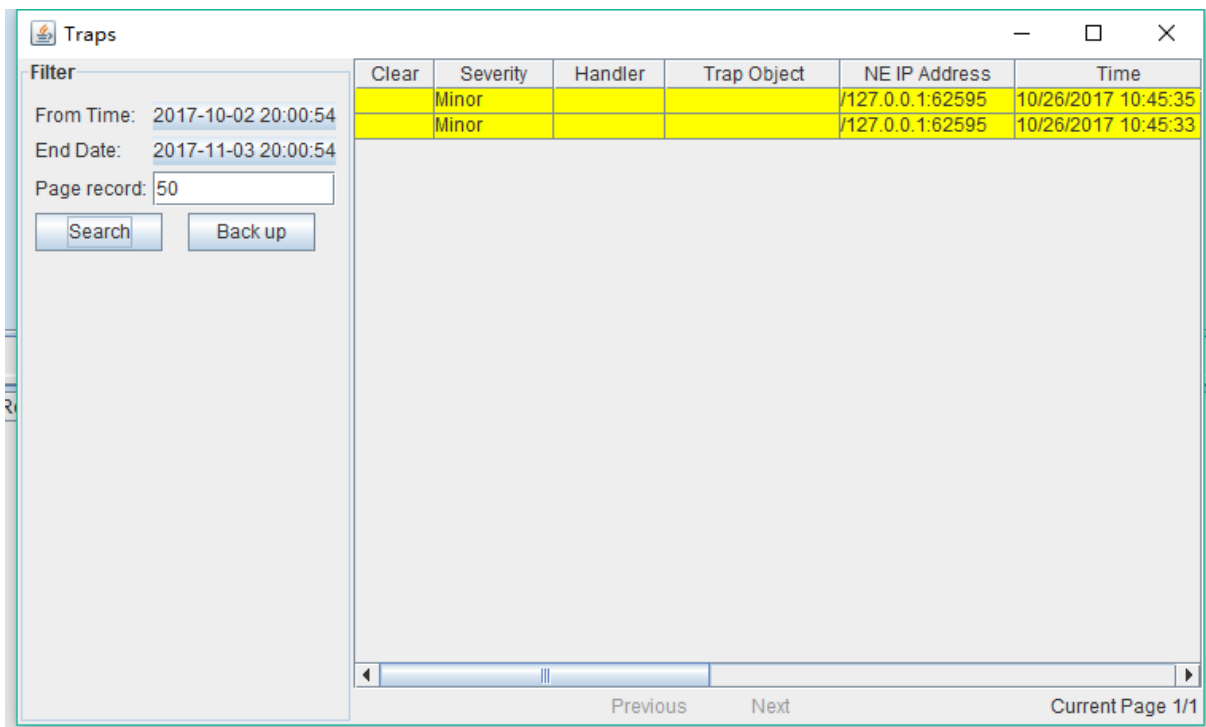
10 Database Management

EMS database management function includes database backup ,database restore, ONU name backup, ONU name restore .

EMS configuration information, such as added device node, device port id name, user name and so on, is saved in EMS database file. In order to configurations not to be lost when system is abnormal, users can backup database regular intervals. Users have access to past configuration information via restoring database in case of software upgrade, operation system installation, system error or management server change.
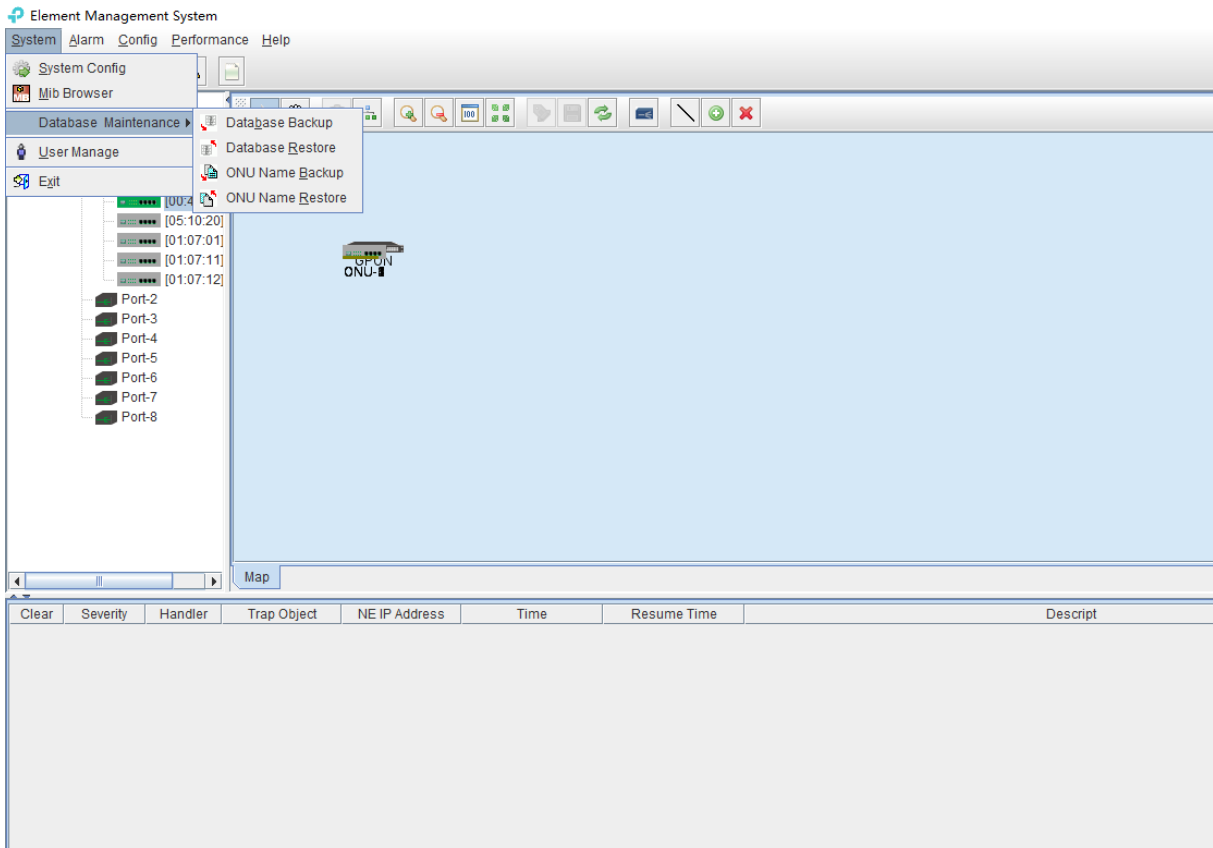
Choose **'Database Backup/Restore'** bar of **'System'** menu to execute database backup and restore operation. Database backup by fault database filename

Backup database file type is **'.sql'** file. Filename by system auto-generated, and file is saved fault database document folder. After database backup, users can copy those database files to other location.

Open **'Database Restore'** window when database restore, as shown below:
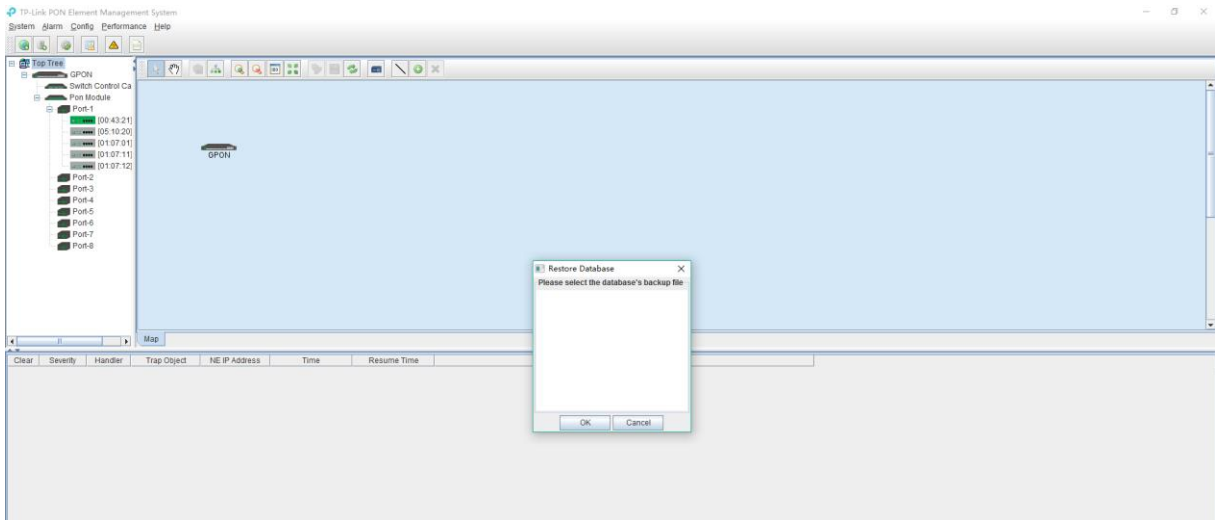
This window lists all database files by user backup before, choose a database file to execute database restore operation. If user's backup database is not in fault location, user need to copy the file to EMS fault saving path, then restore database file. EMS fault database saving path is **'..\EMS\EMS Server\backup DB'** dictionary.

ONU name backup and restore method is the same as database backup and restore method.

11 User Management

EMS support multi-user operation and set different operation rights for different users, thus improving system operation security. By user management operation, administrator can add, delete and modify existing user information.

Open **'User Manager'** window of **'System'** menu to execute user information management.
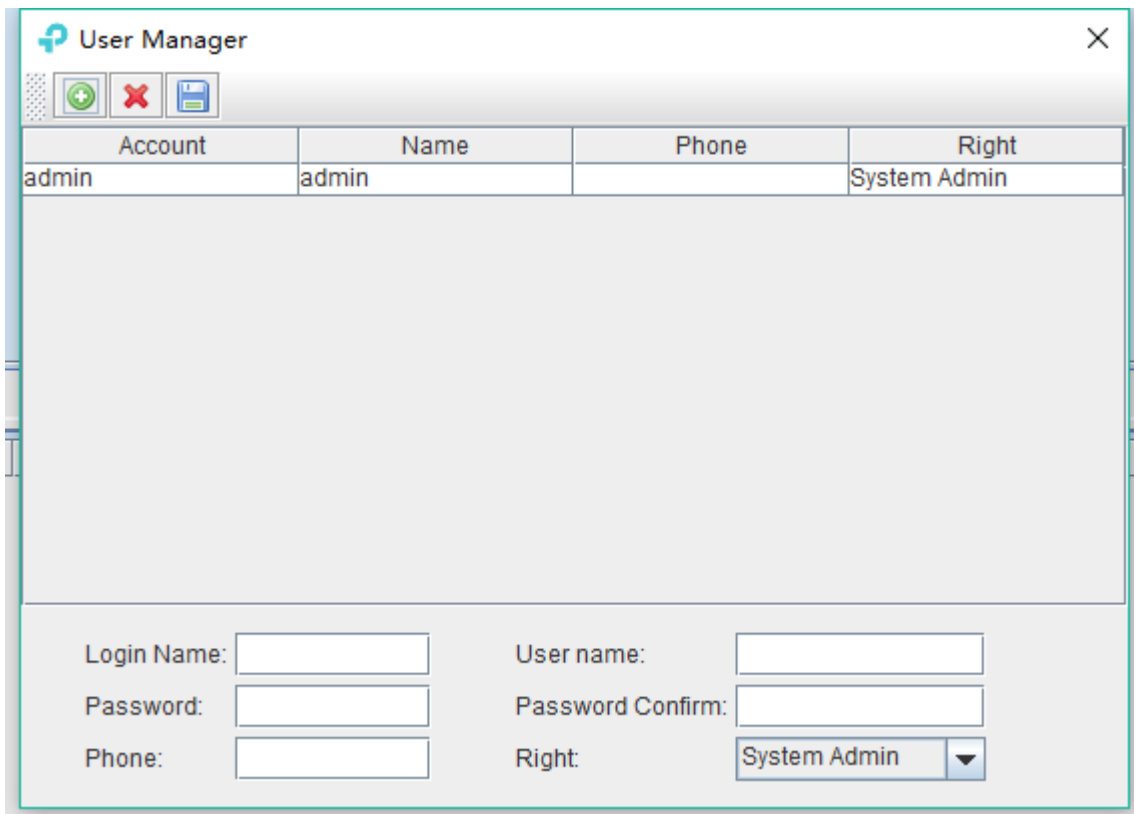
As shown above, the following is user management operations:

Add user

Input login name, user name and password into text-box at the bottom of window, and choose operation right, then click **'Add User'** button , thus account set up successfully. Click **'Save'** button to save updated user information.

Delete user

Choose a user account which needs to delete from current user lists, click **'Delete User'** button to delete the user.

Modify user information

Choose a user account which needs to modify from current user lists, and can view current the user's information at the bottom of window. After modifying user information, clicking **'Save User'** button to save changed user information.

User account privilege

EMS Support **'System Admin'**, **'Net Manager'** and **'Comm User'** three user rights. **'System Admin'** level is the highest privilege, has all the operation rights of EMS software. **'Net Manager'** level has all of operation rights, expect of user account management function. **'Comm User'** is the lowest privilege, the users with this privilege only can view management information and have not the rights to do any set operations.
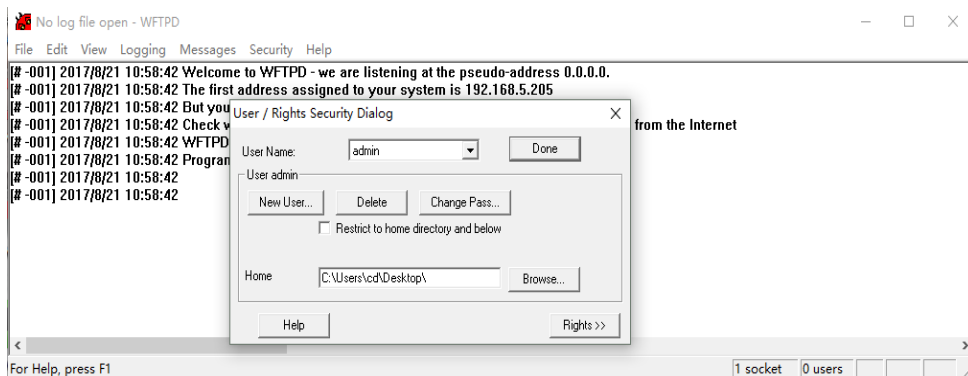
12 Device Upgrade

EMS software support device firmware on-line upgrade. The main procedure for device upgrade has two step. First, download firmware files to target device via FTP server to be upgraded. The target device will go through the whole firmware upgrade process according to upgrade commands received from EMS.

Device upgrade steps are introduced as follows：

1. FTP Server configure

First open FTP server, then configure file path and IP address. IP address and OLT mgmt port's IP address should in the same network segment.
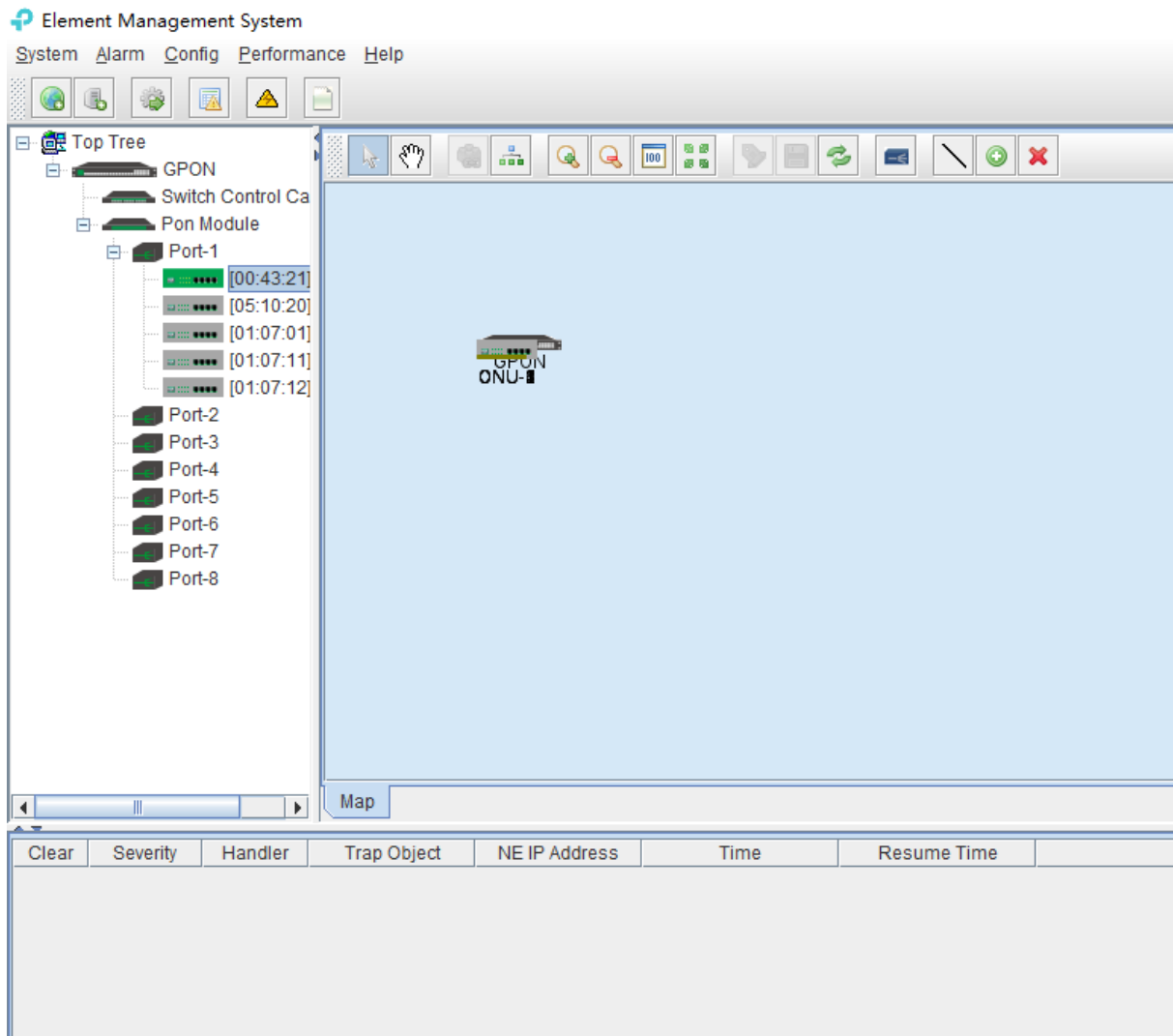
As shown below：

2. Copy upgrade file to root dictionary of FTP Server

3. Parameter configure

1） Choose **'Configure' -> 'Device Upgrade'** from main interface, as shown below：
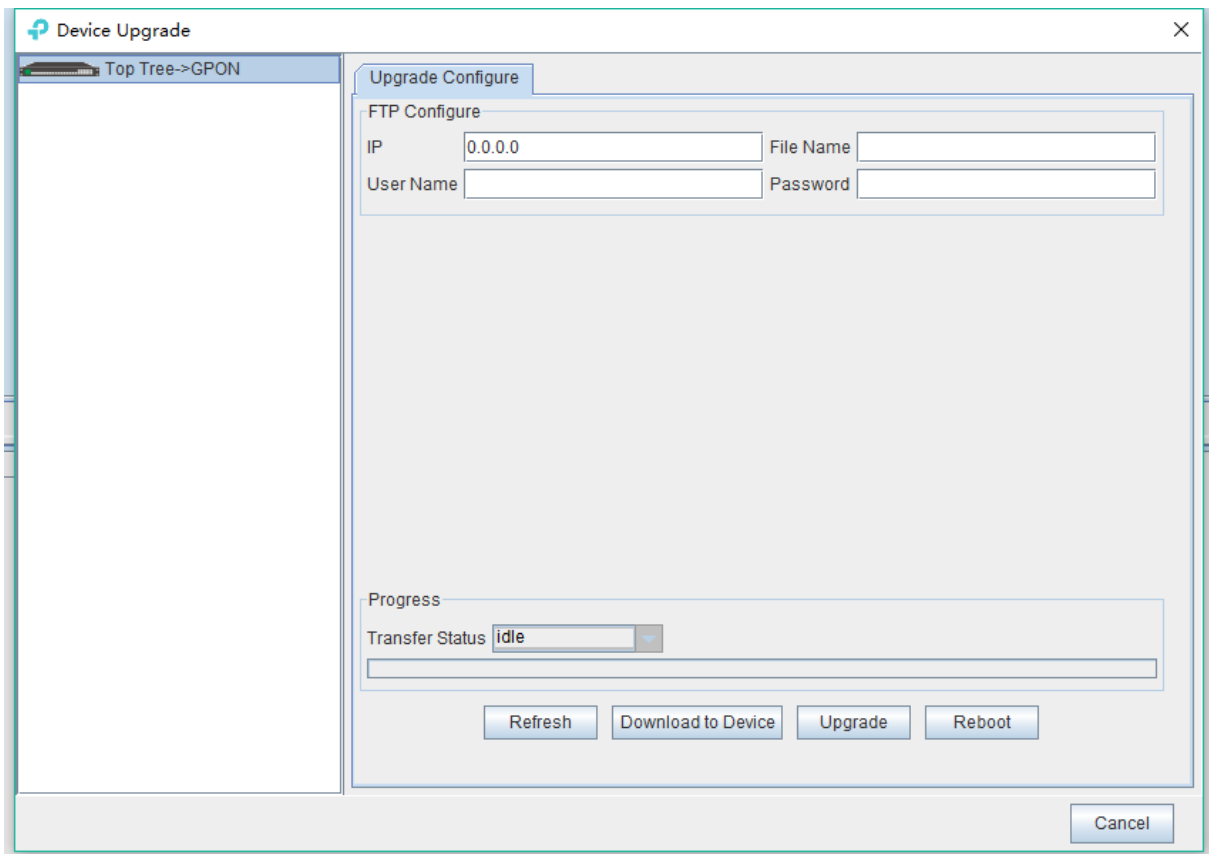
Figure 1: Device upgrade

2） Input FTP Server's IP address and upgrade filename in the interface.

3） Input FTP Server's user name and password.

4） Click **'Download Device'** button , **'Upgrade'** button and **'Reboot'** button in turn, completing OLT's upgrade.

13 Device Search Function

EMS support device search function. When there are more OLT and ONU devices connected EMS, we can find a device from a number of devices via EMS 's search function.

The specific operation method is as follows:

Right-click **'Top Tree'** of EMS main page , and click **'Search'** , then input device name in **'Key Word'** of pop-up **'Search Box'**.
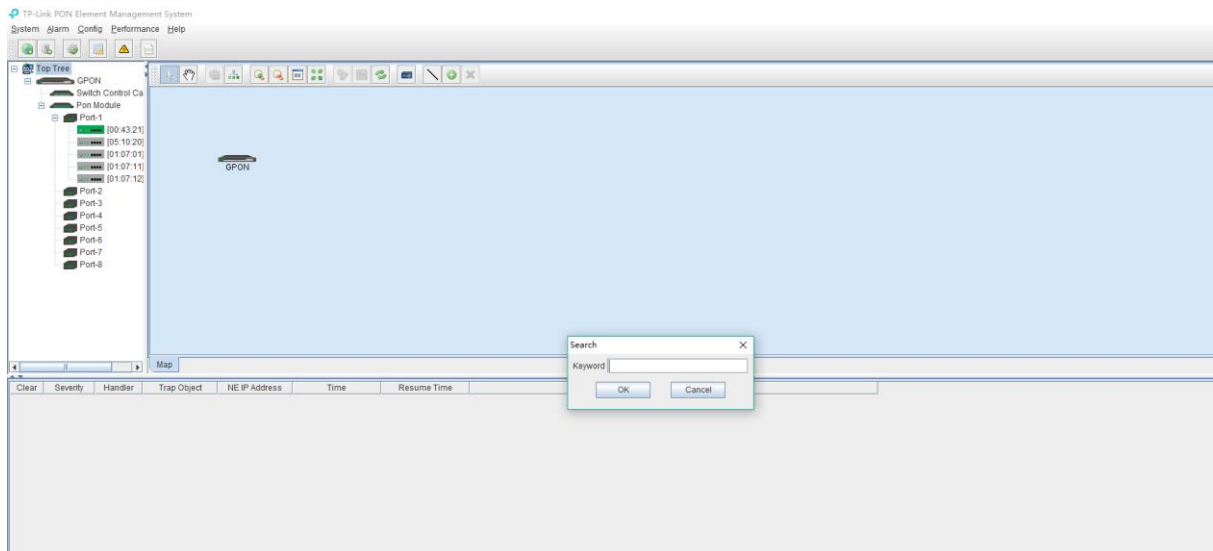
14 End

Thanks for choosing our company products!