PLANET
Networking & Communication

User's Manual

2-Port GEPON Managed OLT

► EPL-2000

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Trademarks

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FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at whose own expense.

CE Mark Warning

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Energy Saving Note of the Device

This power required device does not support Standby mode operation.

For energy saving, please remove the power cable to disconnect the device from the power circuit.

Without removing power cable, the device is will still consuming power from the power source. In the view of Saving the Energy and reduce the unnecessary power consuming, it is strongly suggested to remove the power connection for the device if this device is not intended to be active.

WEEE Warning

To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

Revision

PLANET GEPON OLT (2-PON Interface, 2 x GbE SFP, 1 x MGT Port) User's manual

FOR MODELS: EPL-2000

REVISION: 1.0 (NOV, 2012)

Part No.: EM-EPL-2000 (2080-BA0080-000)

TABLE OF CONETNTS

1. INTRODUTION

The PLANET GEPON OLT – EPL-2000 is GEPON Optical Line Terminal (OLT) which designed with two GEPON port, two Gigabit SFP Interfaces and one management port. Terms of "**GEPON OLT**" means the OLT mentioned titled in the cover page of this User's manual.

1.1 Packet Contents

Open the box of the GEPON OLT and carefully unpack it. The box should contain the following items:

Check the contents of your package for following parts:

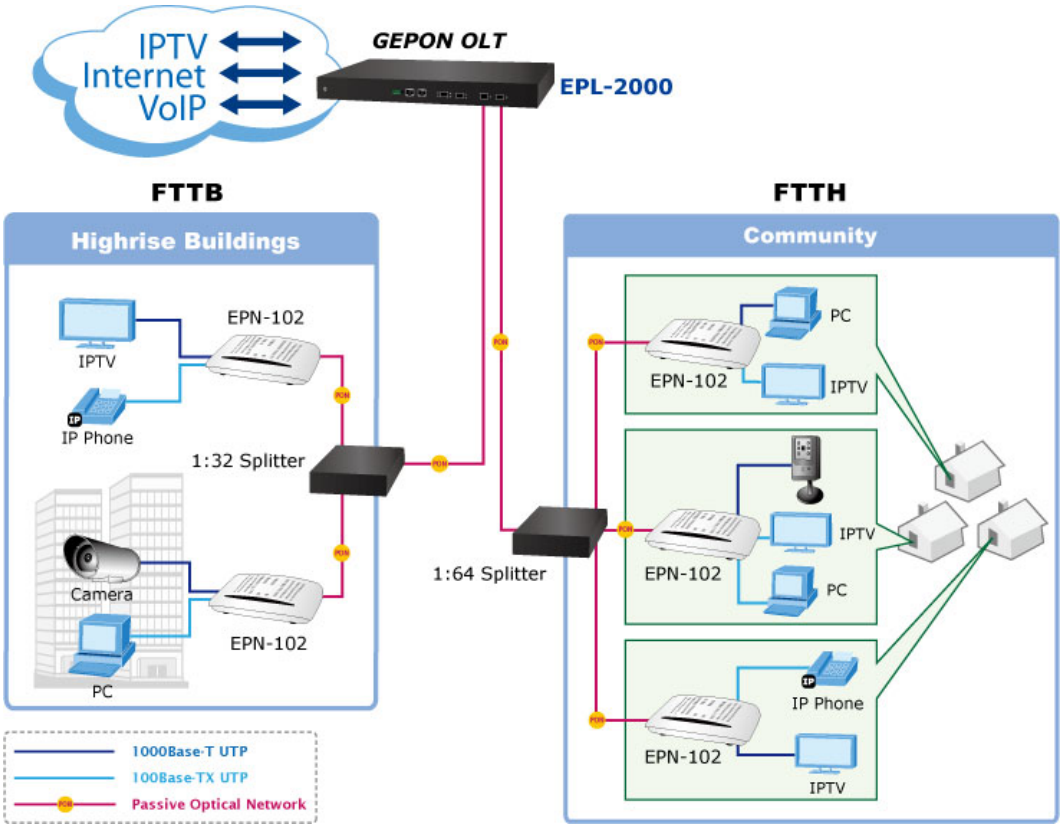
- ☑ **The GEPON OLT** x1
- ☑ **The MGB-PX20 SFP Transceivers** x2
- ☑ **User's Manual CD** x1
- ☑ **Quick Installation Guide** x1
- ☑ **19" Rack Mount Accessory Kit** x1
- ☑ **AC Power Cord** x1

If any of these are missing or damaged, please contact your dealer immediately, if possible, retain the carton including the original packing material, and use them against to repack the product in case there is a need to return it to us for repair.

1.2 Product Description

Perfectly Designed for FTTx Applications

PLANET EPL-2000 is a GEPON **Optical Line Terminal (OLT)** which designed with two GEPON ports, two Gigabit SFP Interfaces and one management port. It is easy installation and maintenance for GEPON deployment. Applications with PLANET GEPON **Optical Network Units (ONU)** EPN series, PLANET EPL-2000 can provide highly effective GEPON solutions and convenient management for Broadband network. PLANET GEPON technology provides the high bandwidth up to 1.25Gbps for both upstream and downstream, up to 20km Long-Distance Coverage between equipment nodes, Scalability and Flexibility for network deployment. It is a cost-effective access technology with reliable and scalable network for Triple-play service applications.



High Speed Connectivity for ISP / Triple Play Devices

With growing network services such as HDTV, IPTV, voice-over-IP (VoIP) and Multimedia broadband applications, and the demand of broadband rises quickly. The present Broadband environment has not already accorded with needing; however, **Passive Optical Network (PON)** would be the most promising NGN (Next Generation Networking) technology to fulfill the demand.

Robust Layer 2 Features

With high split ratio at 1:64 and supports the usage of PLANET ONUs, EPL-2000 can minimize the investment cost for carriers. By using the advanced technology in the telecommunication industry, the EPL-2000 will provide strong functionalities for Ethernet features such as VLAN, Multicast, DBA (Dynamic Bandwidth Allocation), and Access Control List. The EPL-2000 is an ideal solution for FTTx applications.

GEPON is a point to multipoint communications protocol based on Gigabit Ethernet. It allows a Gigabit Ethernet communications fiber to be shared by multiple end users using a passive optical splitter. GEPON communication takes place between an Optical Line Terminal (OLT) and multiple Optical Network Units (ONUs). Using standard terminology, downstream traffic flows from OLT to ONU, and upstream traffic flows from ONU to OLT. A protocol called Multi Point Control Protocol (MPCP) is used to arbitrate the channel between the ONU's so that no collisions will occur on the common fiber.

1.3 How to Use This Manual

This User Manual is structured as follows:

Section 2, Hardware INSTALLATION

The section explains the functions of the Switch and how to physically install the GEPON OLT.

Section 3, EMS Utility INSTALLATION

The section contains the information about how to install EMS Utility.

Section 4, EMS Utility CONFIGURATION

The section explains how to manage the GEPON OLT by EMS Utility.

Section 5, SWITCH OPERATION

The chapter explains how to does the switch operation of the GEPON OLT.

Appendix A

The section contains cable information of the GEPON OLT.

1.4 Product Features

- **GEPON Port**
  - 2 x SC type GEPON OLT Port
  - Up to 1.25Gbps Upstream and Downstream
  - Up to 20Km maximum distance
  - Each OLT port supports up to 64 ONUs
  - Fully compliant with IEEE 802.3ah
  - Point-to-multipoint network topology
  - LED indicators for link status
- **Uplink and Management Port**
  - 2 x 1000Base-SX/LX SFP Interface
  - Up to 120Km maximum distance
  - 1 x 10/100Base-TX RJ-45 management port

- **Layer 2 Features**
  - Dynamic bandwidth allocation (DBA) support
  - Support VLAN
    - IEEE 802.1Q Tagged VLAN
    - Up to 255 VLAN groups, out of 4094 VLAN ID
  - Support up to 8K MAC Address Table
  - Enhanced IGMP features
  - Support Link Aggregation on two uplink ports
- **OLT Management**
  - User-Friendly GUI Management
  - Up to 32 OLTs management through single GUI
  - SNMP v1 / v2c monitoring
  - Three users levels control
  - 2 control interfaces
    - Out-Band IP- the Management RJ port
    - In-Band IP – the two uplink ports
  - Support ONU authentication, avert illegal ONUs access to network
  - Event message logging to system log
  - SNMP trap for alarm notification
- **ONU Management**
  - IEEE 802.1w Rapid Spanning Tree
  - ONU Port control
  - ONU Loopback test
  - ONU IGMP Snooping
  - ONU Layer 3 Access Control List (ACL)

1.5 Product Specification

Product		EPL-2000
Hardware Specification		
Transmission speed		Downstream: 1.25 Gbps Upstream: 1.25 Gbps
Optical split ratio		Up to 1:64
Port	Uplink Port	2 x 1000Base-X SFP slot
	PON Port	2 x PON Port
	MGMT Port	1 x RJ-45 (10/100Base-TX)
LED Indicators		1 x Power LED 1 x System LED 4 x Uplink Port LED (ACT and Link) 2 x PON LED (Link)
EMS Utility Specification		
Switch Feature		MAC address learning and binding MAC Filtering Supports IGMP Proxy Support the VLAN division on the basis of port Up to 4096 VLAN support 8K MAC Addresses support ONU Service Level Agreement (SLA) support ONU Remote loop-back test ONU IGMP Snooping ONU Port Management
Management		User-Friendly GUI Utility Firmware and Configuration upgradeable via Utility Remote ONU Management
Standards Conformance		
Safety		FCC Part 15 Class A, CE
Standards Compliance		IEEE 802.3 10Base-T IEEE 802.3u 100Base-TX IEEE 802.3z Gigabit SX/LX IEEE 802.3x Flow Control and Back pressure IEEE 802.1w Rapid spanning tree protocol IEEE 802.1Q VLAN Tagging
Environment Specification		
Dimension (W x D x H)		441 x 206 x 44mm
Weight		2.31kg
Power		100 – 250V AC
Temperature		Operating temperature: 0 ~ 50 Degree C Storage temperature: -30 ~ 60 Degree C
Humidity		Operating Humidity: 10 ~ 90% non-condensing Storage Humidity: 5 ~ 95% non-condensing

2. HARDWARE INSTALLATION

This section describes the hardware features and installation of the GEPON OLT on the desktop or rack mount. For easier management and control of the GEPON OLT, familiarize yourself with its display indicators, and ports. Front panel illustrations in this chapter display the unit LED indicators. Before connecting any network device to the GEPON OLT, please read this chapter completely.

2.1 Hardware Description

2.1.1 OLT Front Panel

The unit front panel provides a simple interface monitoring the OLT. Figure 2-1 shows the front panel of the GEPON OLT.

EPL-2000 Front Panel

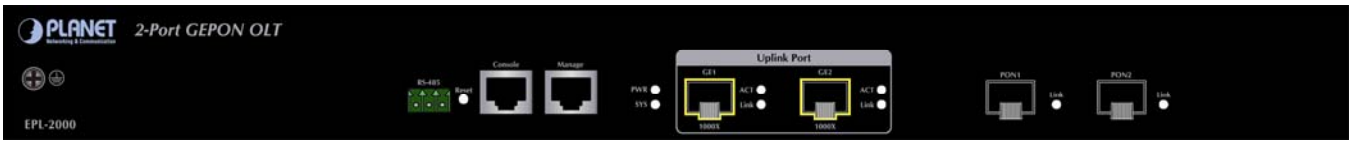


Figure 2-1 EPL-2000 Front Panel

■ **RS-485 and RJ-45 Console Connector**

This is just for Manufacturer Technical Use

■ **Reset button**

The reset button is designed for reboot the GEPON OLT without turn off and on the power. The following is the summary table of Reset button functions:

Reset Button Pressed and Released	Function
System reboot	Reboot the GEPON OLT

■ **Management Port**

10/100Base-TX Copper, RJ-45 Twist-Pair: Up to 100 meters

■ **Gigabit SFP Uplink Slots**

1000Base-SX/LX mini-GBIC slot, SFP (Small Form Factor Pluggable) transceiver module: From 550 meters (Multi-mode fiber), up to 10/30/50/70/120 kilometers (Single-mode fiber).

Note

GE1 & GE2 Gigabit SFP uplonk slots support **1000Mbps Forced Mode** only. The remote Gigabit switch or Media Converter's SFP Port must support 1000Mbps Forced Mode as well.

■ **Gigabit SFP PON Slots**

1000Base-PX20 mini-GBIC slot, SFP (Small Form Factor Pluggable) transceiver module: up to 20 kilometers (Single-mode fiber).

2.1.2 LED Indications

The front panel LEDs indicates instant status of port links, data activity and system power; helps monitor and troubleshoot when needed. Figure 2-2 shows the LED indications of these GEPON OLT.

EPL-2000 LED Indication

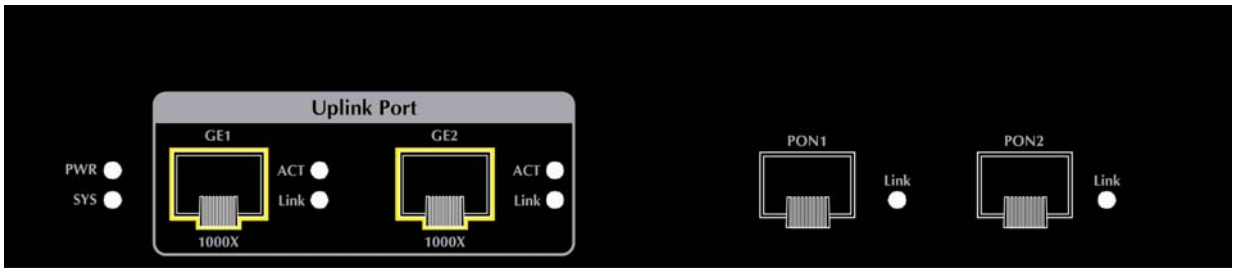


Figure 2-2 EPL-2000 LED Panel

■ **System**

LED	Color	Function
PWR	**Green**	**Lights:** To indicate that the Switch is powered on.
SYS	**Green**	**Blink:** The OLT is ready for management
		OFF: The OLT is abnormal system operation

■ **1000Base-SX/LX SFP interfaces (GE1 and GE2 Port)**

LED	Color	Function
LINK	**Green**	**Lights:** To indicate the link through that SFP port is successfully established.
		OFF: To indicate that the SFP port is link down.
ACT	**Green**	**Blink**: To indicate that the switch is actively sending or receiving data over that port.

■ **1000Base-PX20 SFP PON interfaces (PON1 and PON2 Port)**

LED	Color	Function
LINK	**Green**	**Lights:** To indicate the link through that PON port is successfully established.
		Off: To indicate that the PON port is link down.

2.1.3 OLT Rear Panel

The rear panel of the GEPON OLT indicates an AC inlet power socket, which accepts input power from 100 to 250V AC, 50-60Hz. Figure 2-3 shows the rear panel of this GEPON OLT.

EPL-2000 Rear Panel

Figure 2-3 Rear Panel of EPL-2000

■ **AC Power Receptacle**

For compatibility with electric service in most areas of the world, the GEPON OLT's power supply automatically adjusts to line power in the range 100-250VAC and 50/60 Hz.

Plug the female end of the power cord firmly into the receptalbe on the rear panel of the GEPON OLT. Plug the other end of the power cord into an electric service outlet then the power will be ready.

There is a power switch that is for AC power input using only. As DC power input has no power switch.

The device is a power-required device; if your networks should active all the time, please consider using UPS (Uninterrupted Power Supply) for your device. It will prevent you from network data loss or network downtime.

In some area, installing a surge suppression device may also help to protect your GEPON OLT from being damaged by unregulated surge or current to the Switch or the power adapter.

2.2 Install the OLT

This section describes how to install your GEPON OLT and make connections to the GEPON OLT. Please read the following topics and perform the procedures in the order being presented. To install your GEPON OLT on a shelf, simply complete the following steps.

2.2.1 Rack Mounting

To install the GEPON OLT in a 19-inch standard rack, please follows the instructions described below.

Step1: Place the GEPON OLT on a hard flat surface, with the front panel positioned towards the front side.

Step2: Attach the rack-mount bracket to each side of the GEPON OLT with supplied screws attached to the package.

Figure 2-4 shows how to attach brackets to one side of the GEPON OLT.

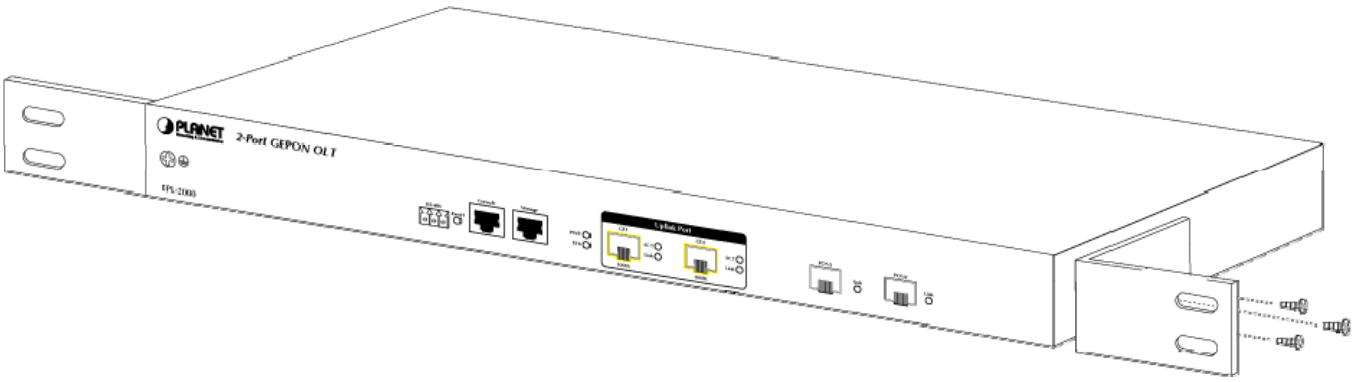


Figure 2-4 Attach Brackets to the GEPON OLT.

You must use the screws supplied with the mounting brackets. Damage caused to the parts by using incorrect screws would invalidate the warranty.

Step3: Secure the brackets tightly.

Step4: Follow the same steps to attach the second bracket to the opposite side.

Step5: After the brackets are attached to the GEPON OLT, use suitable screws to securely attach the brackets to the rack, as shown in Figure 2-5.

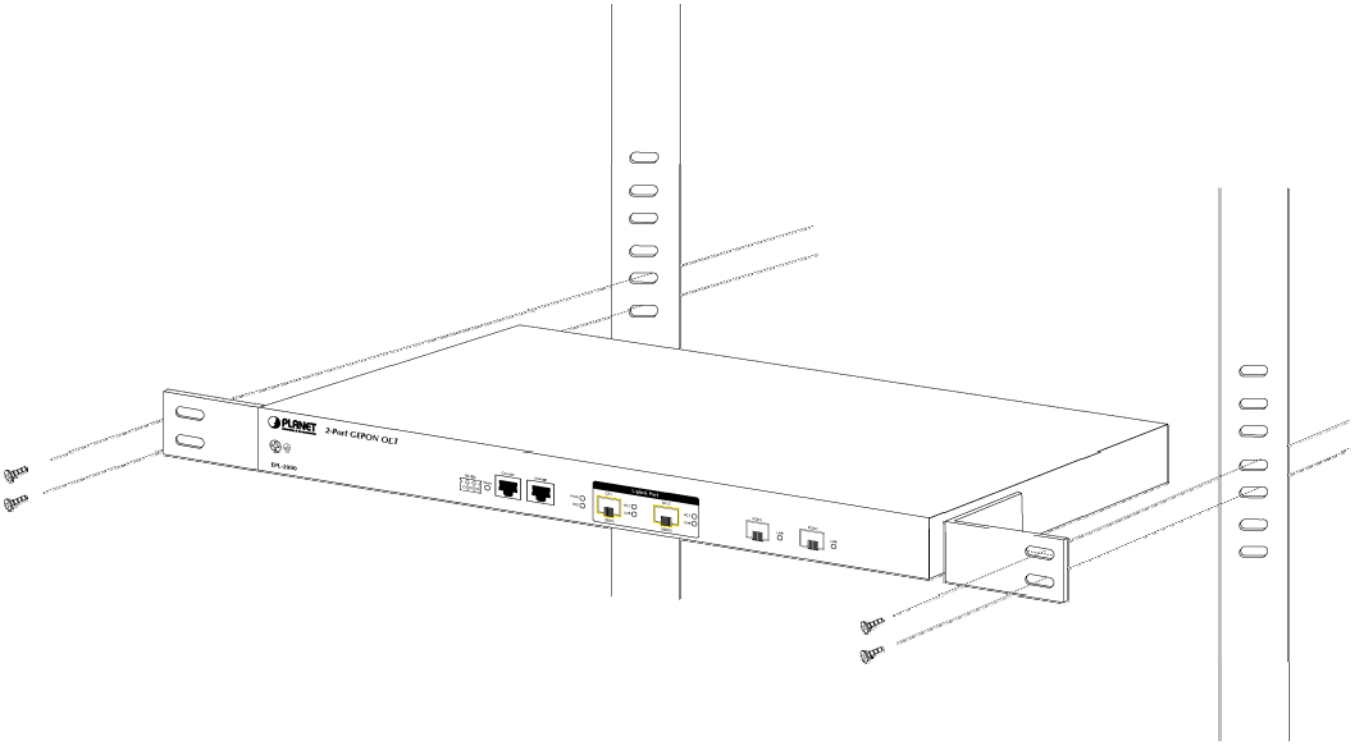


Figure 2-5 Mounting the GEPON OLT on a Rack

2.2.2 Installing the SFP transceiver

The sections describe how to insert an SFP transceiver into an SFP slot.

The SFP transceivers are hot-pluggable and hot-swappable. You can plug-in and out the transceiver to/from any SFP port without having to power down the GEPON OLT. As the Figure 2-6 appears.

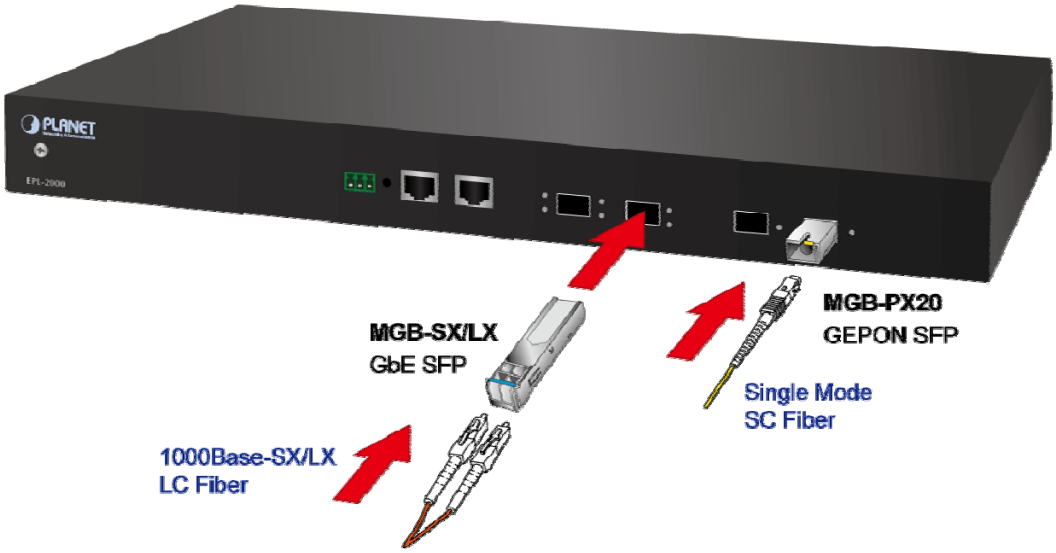


Figure 2-6 Plug-in the SFP Transceiver

■ Approved PLANET SFP Transceivers

PLANET GEPON OLT supports both Single mode and Multi-mode SFP transceivers. The following list of approved PLANET SFP transceivers is correct at the time of publication:

1000Base-X SFP modules:

- **MGB-SX** SFP (1000BASE-SX SFP transceiver / Multi-mode / 850nm / 220m~550m)
- **MGB-LX** SFP (1000BASE-LX SFP transceiver / Single mode / 1310nm / 10km)
- **MGB-L30** SFP (1000BASE-LX SFP transceiver / Single mode / 1310nm / 30km)
- **MGB-L50** SFP (1000BASE-LX SFP transceiver / Single mode / 1310nm / 50km)
- **MGB-LA10** SFP (1000BASE-LX SFP transceiver / WDM Single mode / TX: 1310nm, RX: 1550nm/ 10km)
- **MGB-LB10** SFP (1000BASE-LX SFP transceiver / WDM Single mode / TX: 1550nm, RX: 1310nm / 10km)
- **MGB-TSX** SFP (1000BASE-SX SFP transceiver / Multi-mode / 850nm / 220m ~550m; -40~75℃)
- **MGB-TLX** SFP (1000BASE-SX SFP transceiver / Signle mode / 1310nm / 10km; -40~75℃)
- **MGB-TL30** SFP (1000BASE-SX SFP transceiver / Signle mode / 1310nm / 30km; -40~75℃)
- **MGB-TL70** SFP (1000BASE-SX SFP transceiver / Signle mode / 1310nm / 70km; -40~75℃)

Note

Due to GEPON OLT EPL-2000 SFP Port of GE1 & GE2 are configured as 1000Mbps Forced Mode. If want to make the connection establish successfully, the switch's SFP Port should also change to be 1000Mbps Forced Mode. Otherwise, the connection might Link Fail.

Before connect the other GEPON OLT, workstation or Media Converter.

1. Make sure both side of the SFP transceiver are with the same media type, for example: 1000Base-SX to 1000Base-SX, 1000Bas-LX to 1000Base-LX.
2. Check the fiber-optic cable type match the SFP transceiver model.
   - To connect to 1000Base-SX SFP transceiver, use the Multi-mode fiber cable- with one side must be male duplex LC connector type.
   - To connect to 1000Base-LX SFP transceiver, use the Single-mode fiber cable-with one side must be male duplex LC connector type.

■ Connect the fiber cable

1. Attach the duplex LC connector on the network cable into the SFP transceiver.
2. Connect the other end of the cable to a device – switches with SFP installed, fiber NIC on a workstation or a Media Converter..
3. Check the LNK/ACT LED of the SFP slot on the front of the GEPON OLT. Ensure that the SFP transceiver is operating correctly.
4. Check the Link mode of the SFP port if the link failed. Co works with some fiber-NICs or Media Converters, set the Link mode to "1000 Force" is needed.

■ Remove the transceiver module

1. Make sure there is no network activity by consult or check with the network administrator. Or through the management interface of the switch/converter (if available) to disable the port in advance.
2. Remove the Fiber Optic Cable gently.
3. Turn the handle of the MGB module to horizontal.
4. Pull out the module gently through the handle.

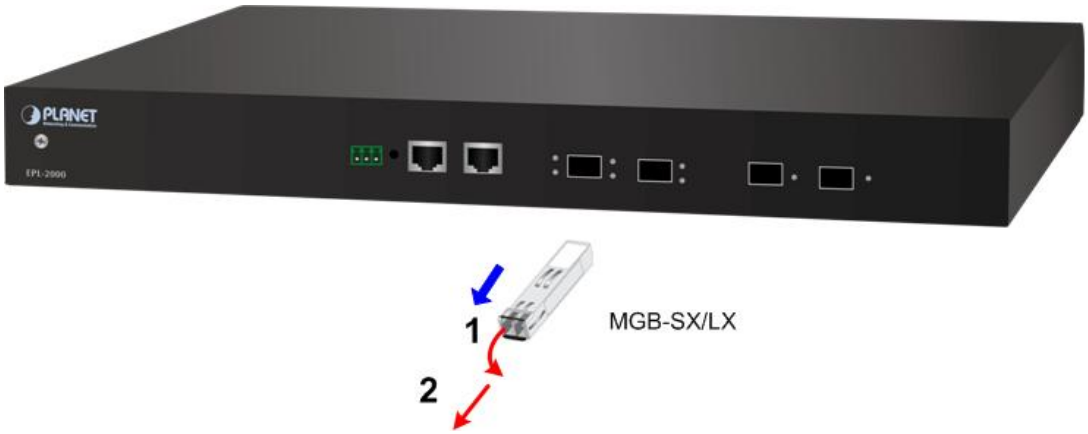


Figure 2-8 Pull out the SFP Transceiver

Note	Never pull out the module without pull the handle or the push bolts on the module. Direct pull out the module with violent could damage the module and SFP module slot of the GEPON OLT.

3. MANAGEMENT SOFTWARE INSTALLATION

This chapter explains the methods that you can use to configure management access to the GEPON OLT. It describes the types of management applications and the communication and management protocols that deliver data between your management device (workstation or personal computer) and the system. It also contains information about port connection options.

This chapter covers the following topics:

- Requirements
- Management Access Overview
- MySQL Installation
- EMS Utility Installation
- SNMP Access

3.1 Requirements

The GEPON OLT provides a GUI utility to manage the system; the following equipments are necessary for further management.

- Subscriber PC installed with Ethernet NIC (Network Card)
- **MySQL** Software (Windows Platform)
- **EMS** Software (Windows Platform)
- **Management Port** connects
  - Network cables - use standard network (UTP) cables with RJ45 connectors
- **PON Port** connects
  - Fiber Transceiver - Slot with a 1000Base-PX20 SFP PON transceiver
  - Fiber cable - Using single mode of Fiber (SC) cable

3.2 Management Access Overview

The GEPON OLT EPL-2000, supports 10/100Mbps Management interface and two 1000Base-X net interfaces for TCP/IP-Based GUI Management. The GEPON OLT gives you the flexibility to access and manage it using any or all of the following methods:

- **EMS (Element Management System) Utility**
- An external **SNMP-based network management application**

Each of these management methods has their own advantages. Table 3-1 compares the two management methods.

Method	Advantages	Disadvantages
EMS Utility	• Ideal for configuring the EPL-2000 • Compatible with most of popular Windows Base System • Most visually appealing	• Can't remote control over etherent
SNMP Agent	• Communicates with switch functions at the MIB level • Based on open standards	• Requires SNMP manager software • Least visually appealing of all three methods • Some settings require calculations • Security can be compromised (hackers need only know the community name)

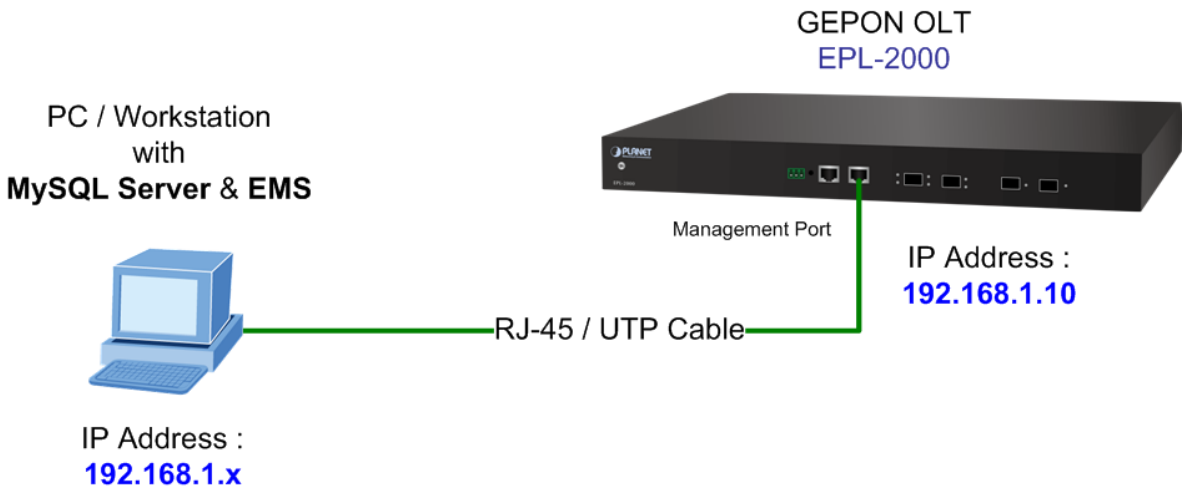
Table 3-1 Management Methods Comparison

3.3 EMS Utility Management

The **EMS (Element Management System)** Utility comes with sophisticated software Graphical User Interface (GUI). It is highly intuitive and allows the user to control the GEPON and set such things as SLAs, bridging and VLAN modes, static table entries, and to perform firmware upgrades etc. It is found in the Utility folder on the CD provided. There are to softwares need to be installing in your management PC:

- Microsoft MySQL Server
- EMS Utility

To install and use the GUI, do the following two sections.



3.3.1 MySQL Server Installation

1. Insert the bundled CD disk into the CD-ROM drive to launch the autorun program. Once completed, a welcome menu screen will appear. Click the "**MySQL**" hyperlink, the below InstallShield Wizard dialog box will appear.
2. Once the Setup program starts running, please click "**Next**" button for starting installation.

Figure 3-2 MySQL Installation Screen

3. The Setup Type window appears, the default is "**Typical**" mode. Please clicks "**Next**" button.

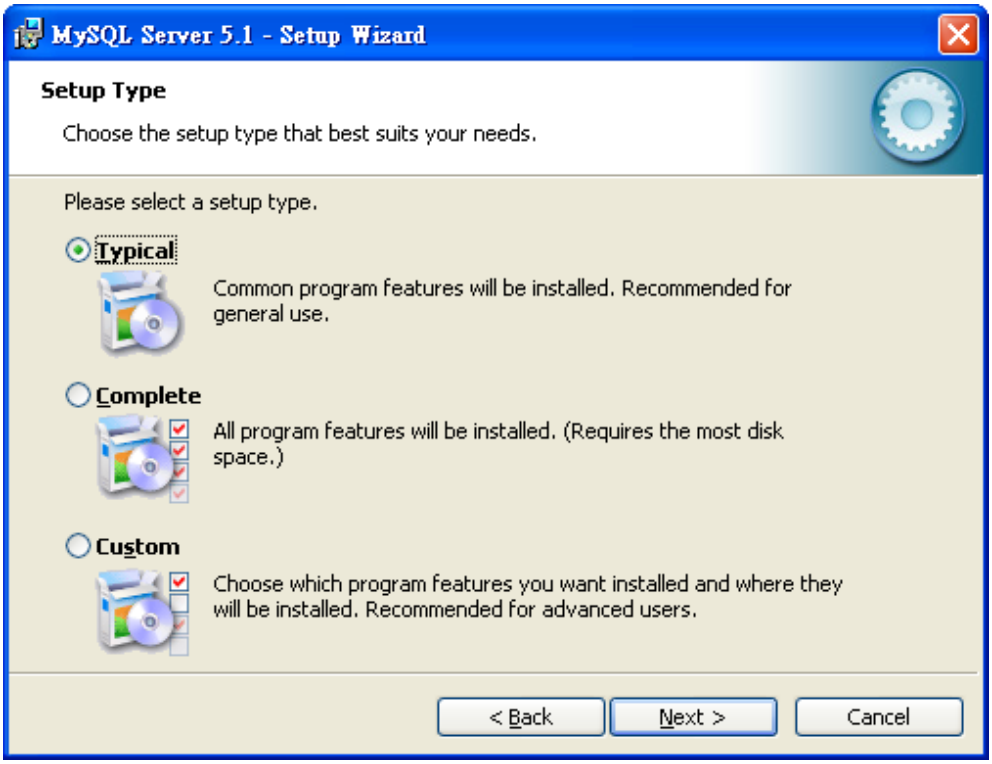


Figure 3-3 Setup Type Screen

4. The Ready for Installation window appears, please clicks "**Install**" button.

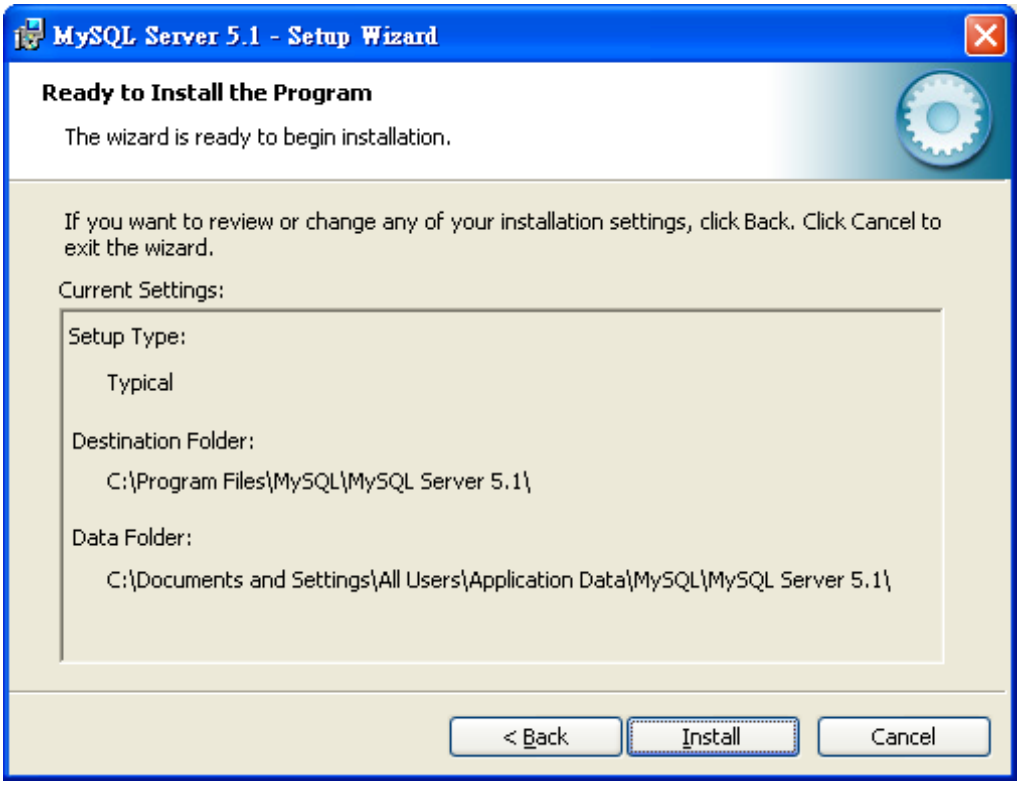


Figure 3-4 The Wizard of begin installation Screen

5. Finish the installation, the MySQL Enterprise window appears, please click "**Next**" button.

Figure 3-5 MySQL Enterprise Screen

6. The Wizard Completed window appears, it will ask for Configure the MySQL server and Register the MySQL Server now. Please clicks "**Finish**" button.

Figure 3-6 Wizard Completed Screen

7. The MySQL Server Instance Configuration Wizard window appears, please click "**Next**" button.

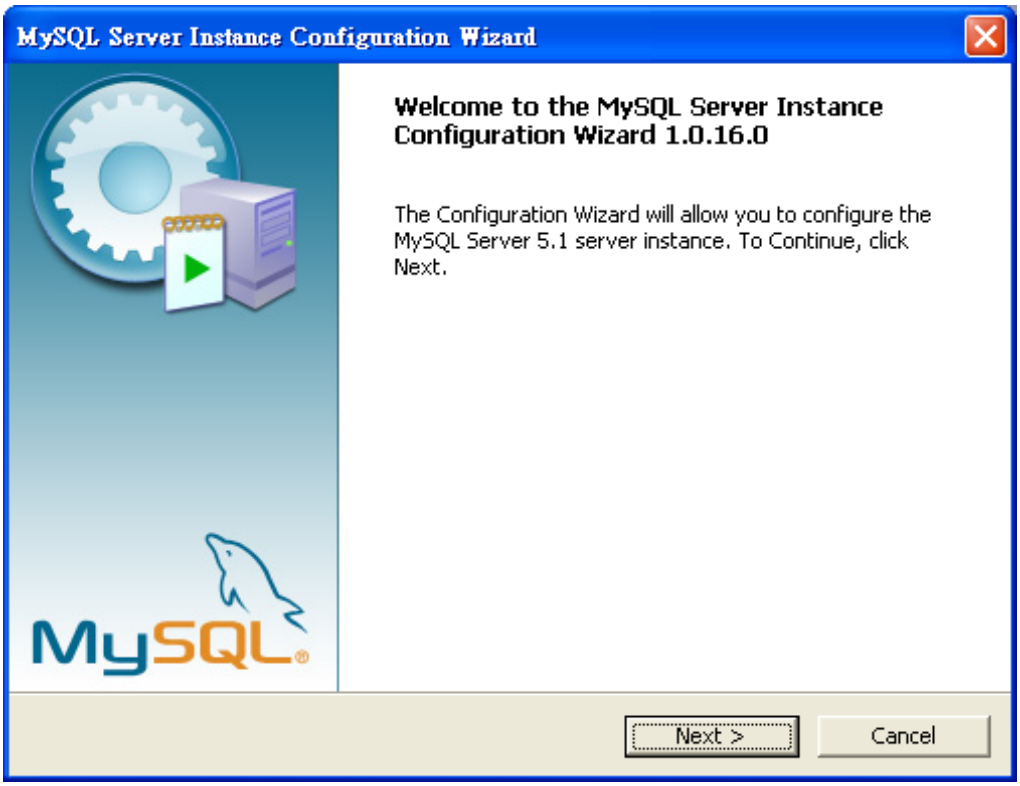


Figure 3-7 MySQL Configuration Wizard Screen

8. The MySQL Server Instance Configuration window appears, keeps the default setting of "**Detailed Configuration**" and clicks "**Next**" button.

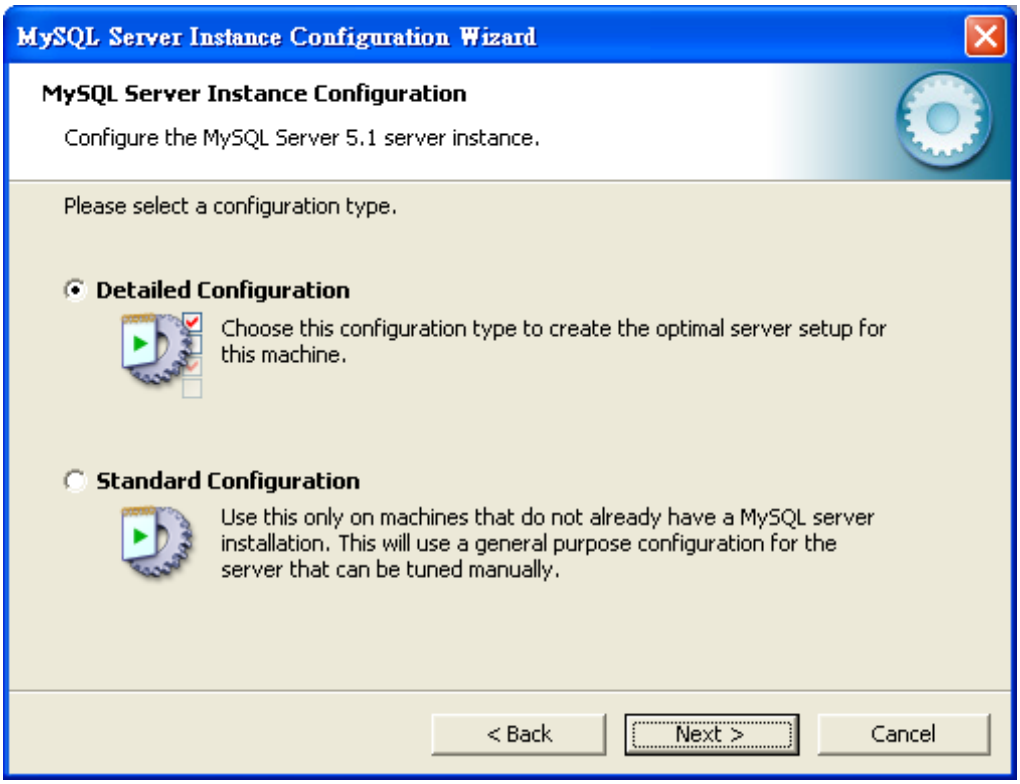


Figure 3-8 MySQL Server Instance Configuration (1) Screen

9. Please select a Server type, keeps the default setting of "**Developer Machine**" and clicks "**Next**" button.

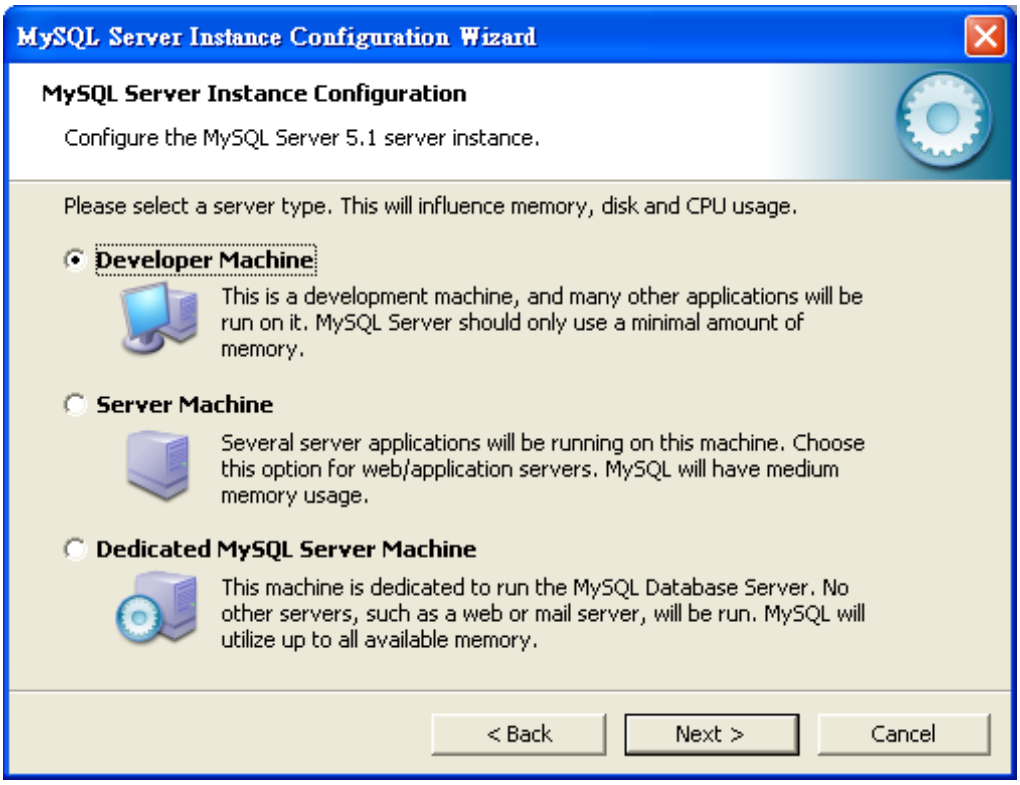


Figure 3-9 MySQL Server Instance Configuration (2) Screen

10. Please select the database usage, keeps the default setting of "**Multifunctional Database**" and clicks "**Next**" button.

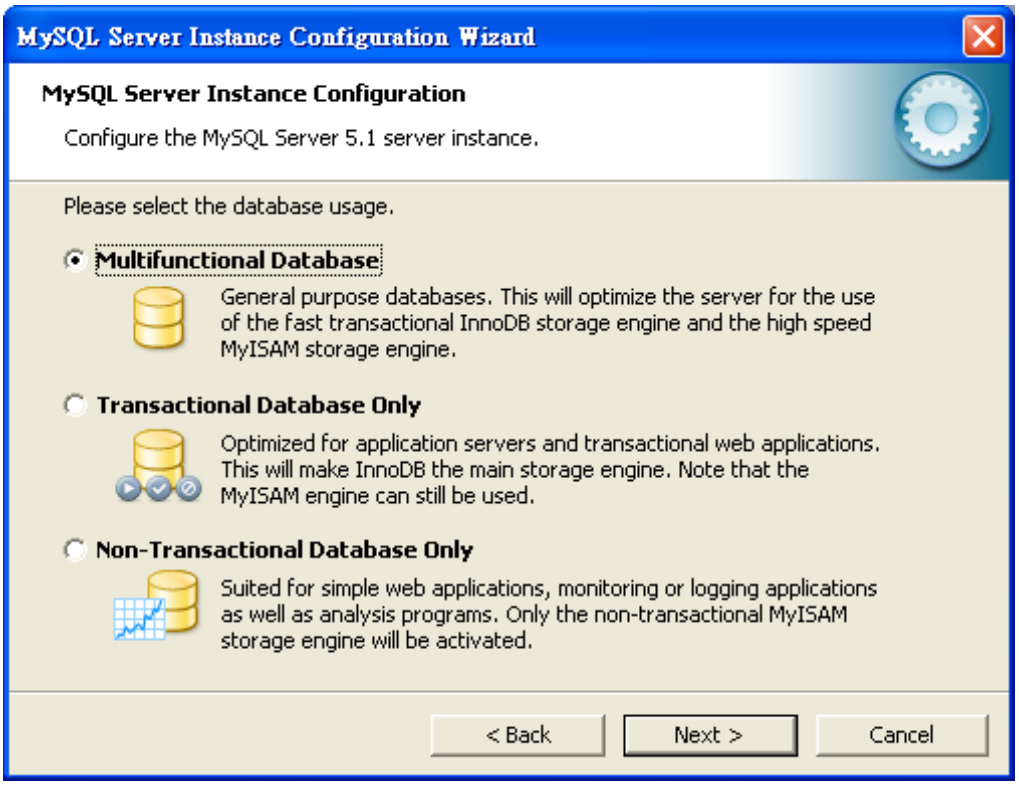


Figure 3-10 MySQL Server Instance Configuration (3) Screen

11. Chooses where you want to place the InnoDB Datafile. Here is remaining the default setting. Please clicks "**Next**" button.

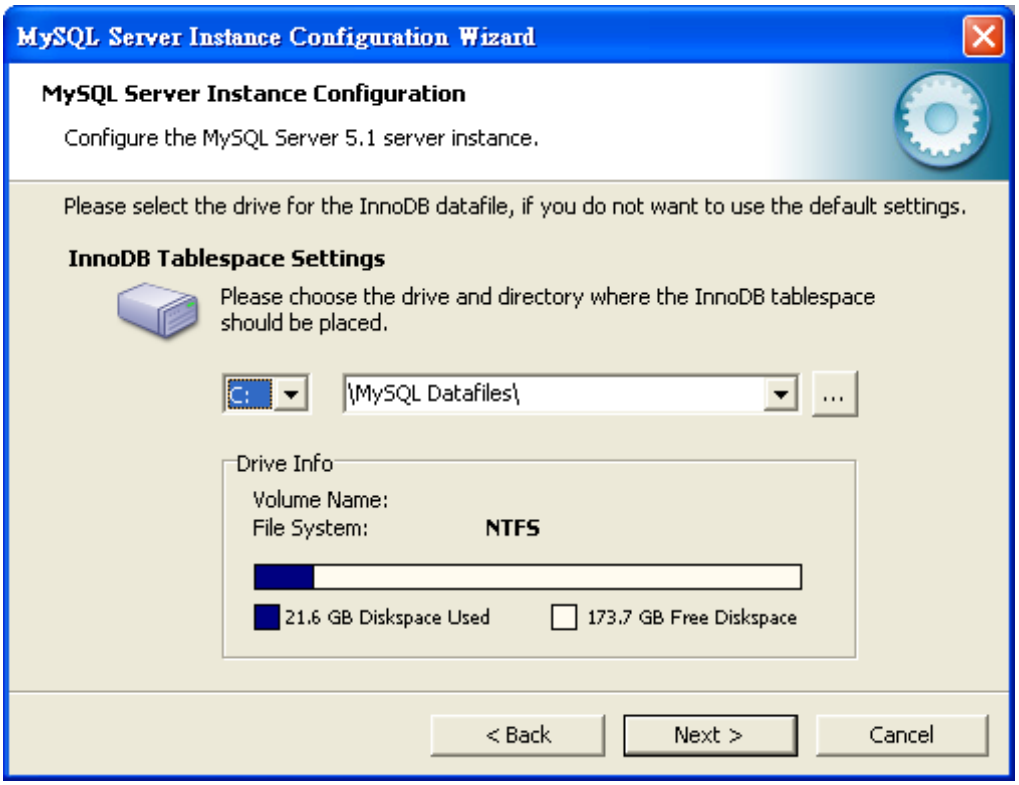


Figure 3-11 MySQL Server Instance Configuration (4) Screen

12. Please set the approximate number of concurrent connections, keeps the default setting of "**Decision Support (DSS)/OLAP**" and clicks "**Next**" button.

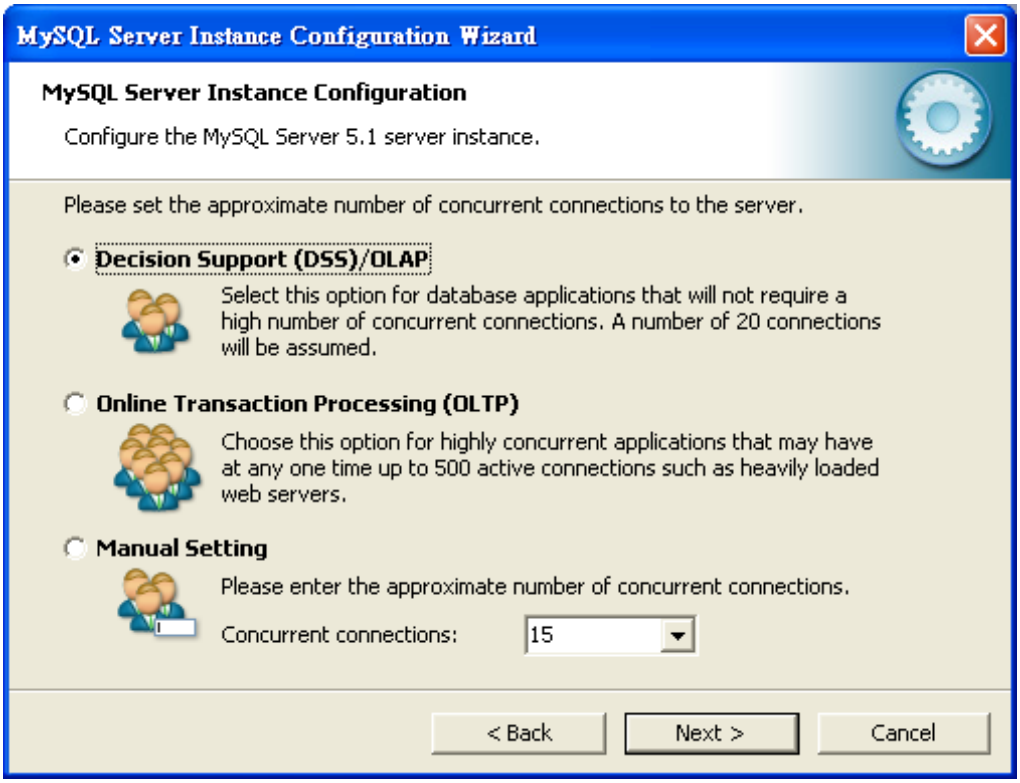


Figure 3-12 MySQL Server Instance Configuration (5) Screen

13. Please Set the Network options and Server SQL mode, keeps the default setting and click "**Next**" button.

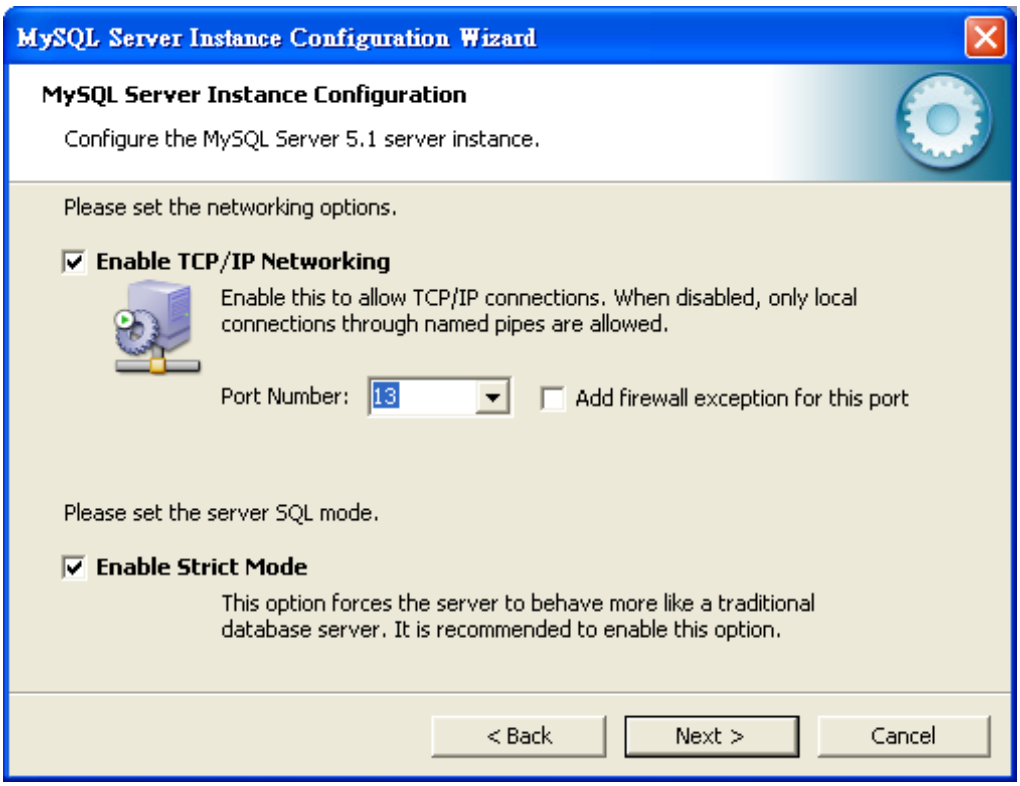


Figure 3-13 MySQL Server Instance Configuration (6) Screen

14. Please Select the default character set, keeps the default setting of "**Standard Character Set**" and clicks "**Next**" button.

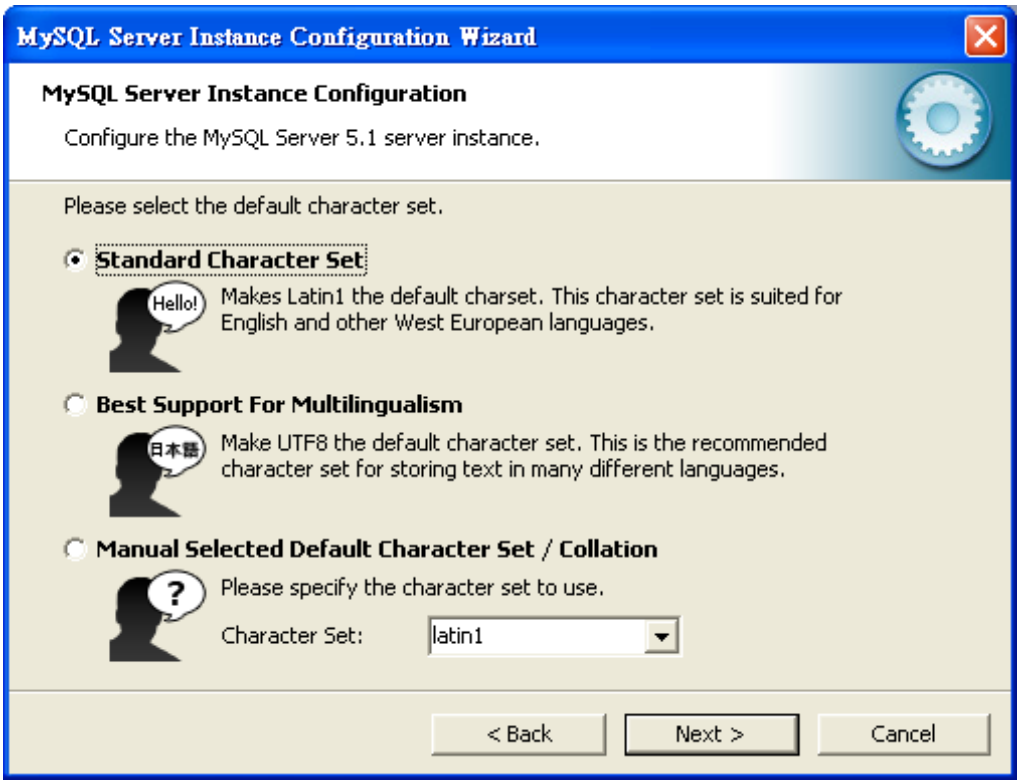


Figure 3-14 MySQL Server Instance Configuration (7) Screen

15. Please set the Windows options, keeps default setting and clicks "**Next**" button.

Figure 3-15 MySQL Server Instance Configuration (8) Screen

16. Please set the security options, types the passwords "1234" for Current root and new root. Clicks "**Next**" button.

Figure 3-16 MySQL Server Instance Configuration (9) Screen

17. Please Clicks "**Execute**" button for starting the configuration.

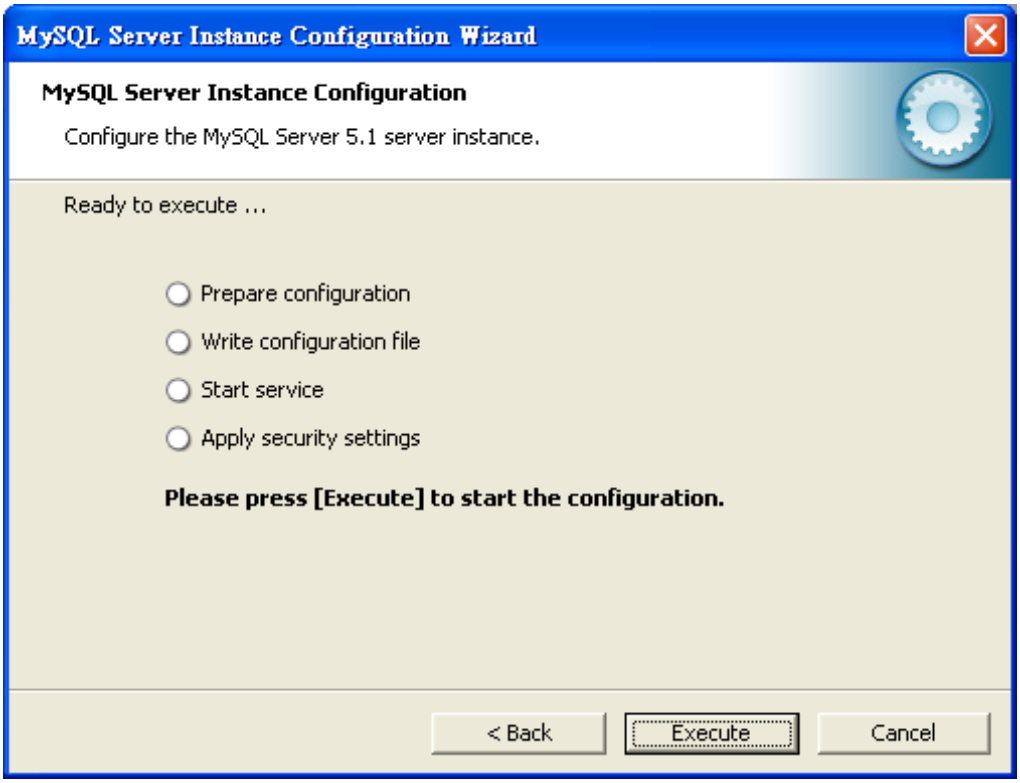


Figure 3-17 MySQL Server Instance Configuration (10) Screen

18. It will appear Configuration file created, Windows service MySQL installed, Service started successfully and Security applied. Please click "**Finish**" button.

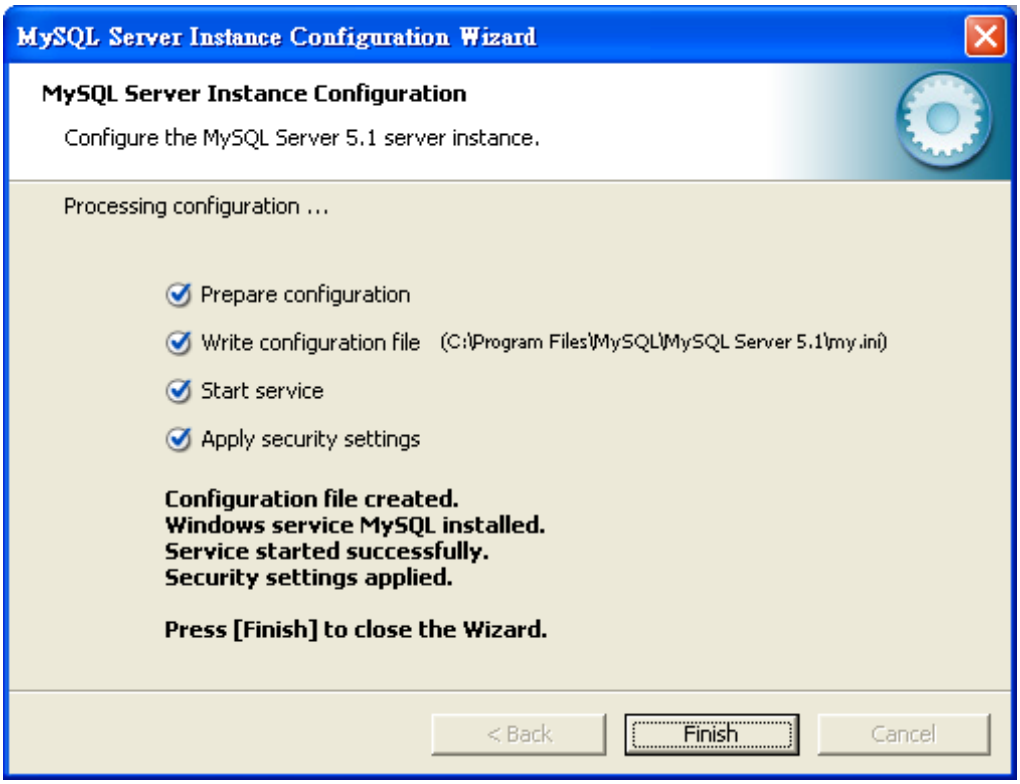


Figure 3-18 MySQL Server Finish Screen

3.3.2 EMS Utility Installation

1. Insert the bundled CD disk into the CD-ROM drive to launch the autorun program. Once completed, a welcome menu screen will appear. Click the "PL-EMS" hyperlink, the below InstallShield Wizard dialog box will appear.
2. Once the Setup program starts running, please click "**Next**" button for starting installation.

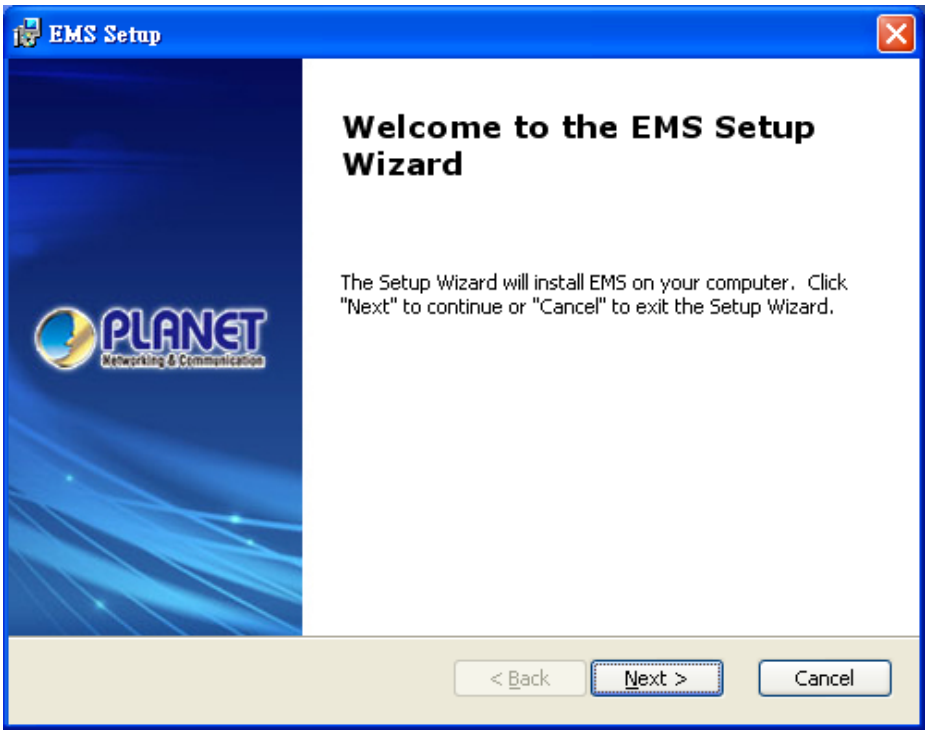


Figure 3-19 PL-EMS Setup Wizard screen

3. During the installation, it will ask for the place to put the PL_EMS folder. The default is C:\Program Files\PLANET\EMS\.

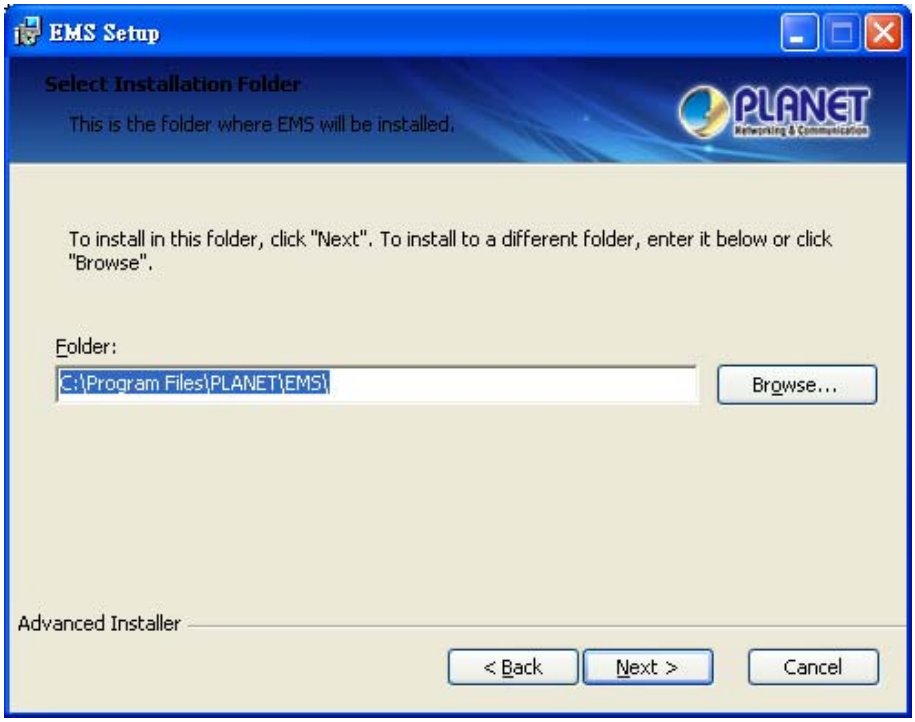


Figure 3-20 PL-EMS folder installation screen

4. Clicks "**Install**" for starting installation.

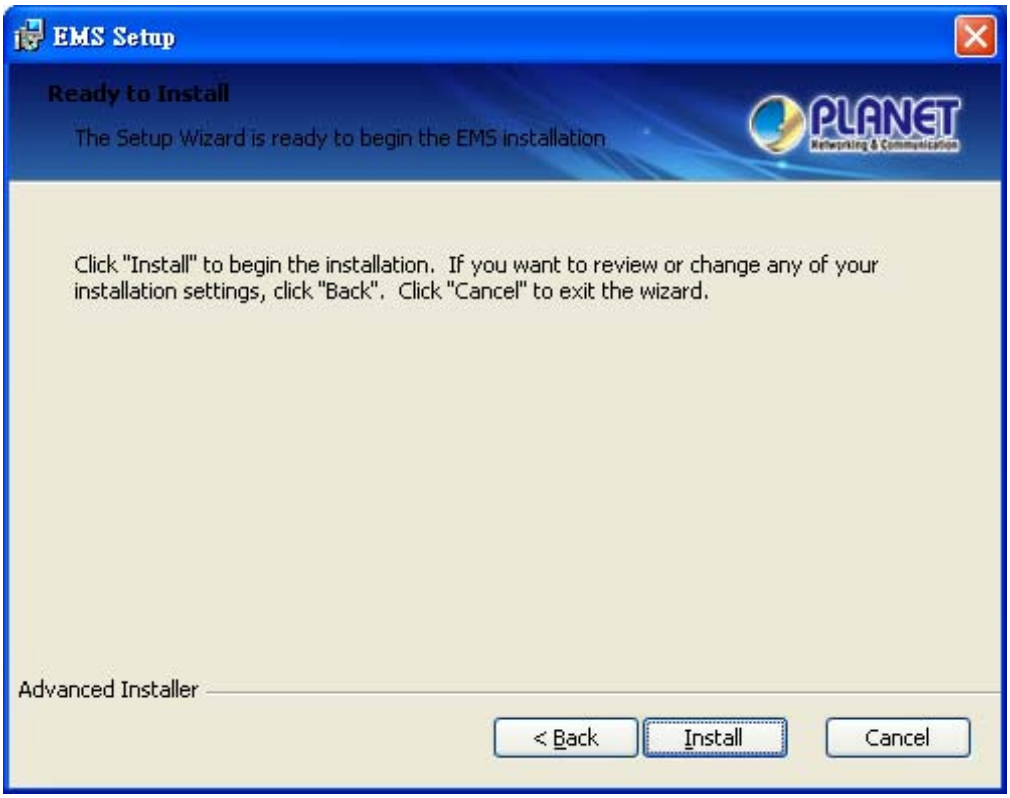


Figure 3-21 PL-EMS Installation screen

5. Clicks "**Finish**" button for completing the EMS Setup.

Figure 3-22 PL-EMS Installation Completing screen

6. Finish the PL-EMS installation, the desktop will appear two icons;

   PL Server and **PL Client**.

3.3.3 Start PLANET EMS Management

The following shows how to startup the **PL-EMS Management** on the management PC.

1. Double Click the **PL Server** icon on the PC desktop. After couple of seconds, the lower-right corner of system tray will appear EMS icon.

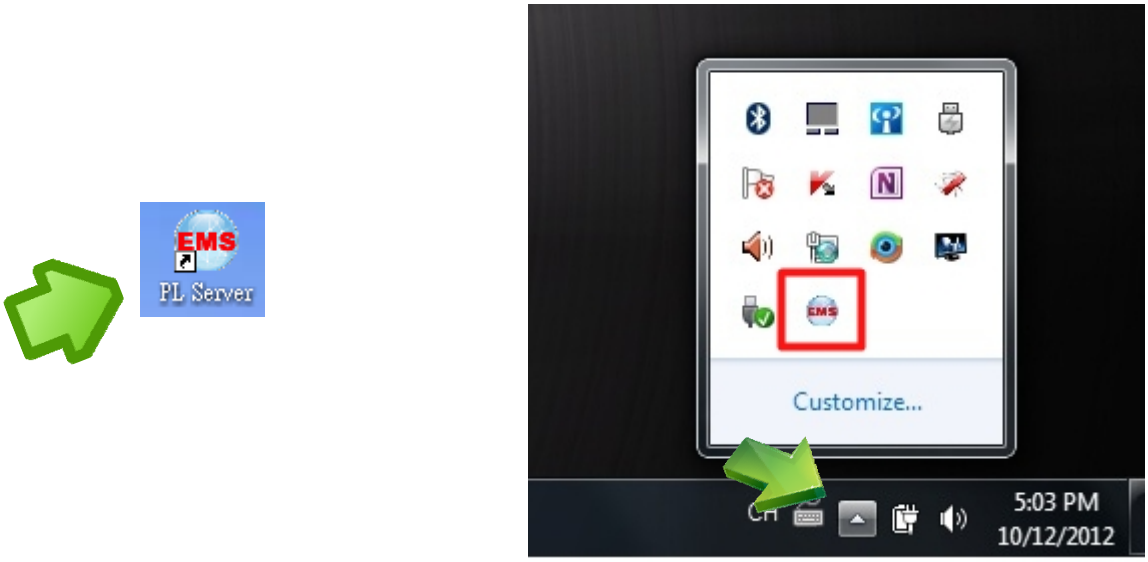


Figure 3-23 PL Server Icon

2. Double clicks the **PL Client** icon on the PC desktop, it will pop-up a window to enter the User name and Passwords. Please enter the default User name "**admin**" and Password "**admin**". The login screen in Figure 3-24 appears.

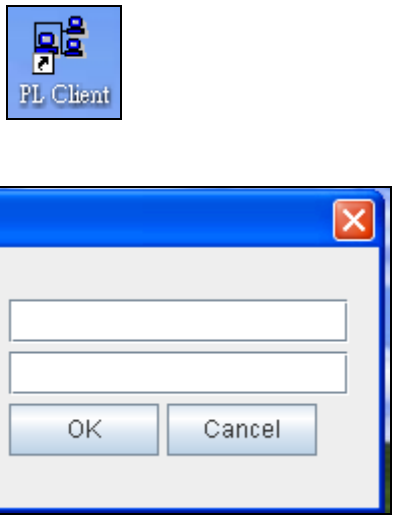


Figure 3-24 PL Client Icon and Login Window

3. After entering the User name and Password**,** the PL-EMS main screen appears as Figure 3-25.

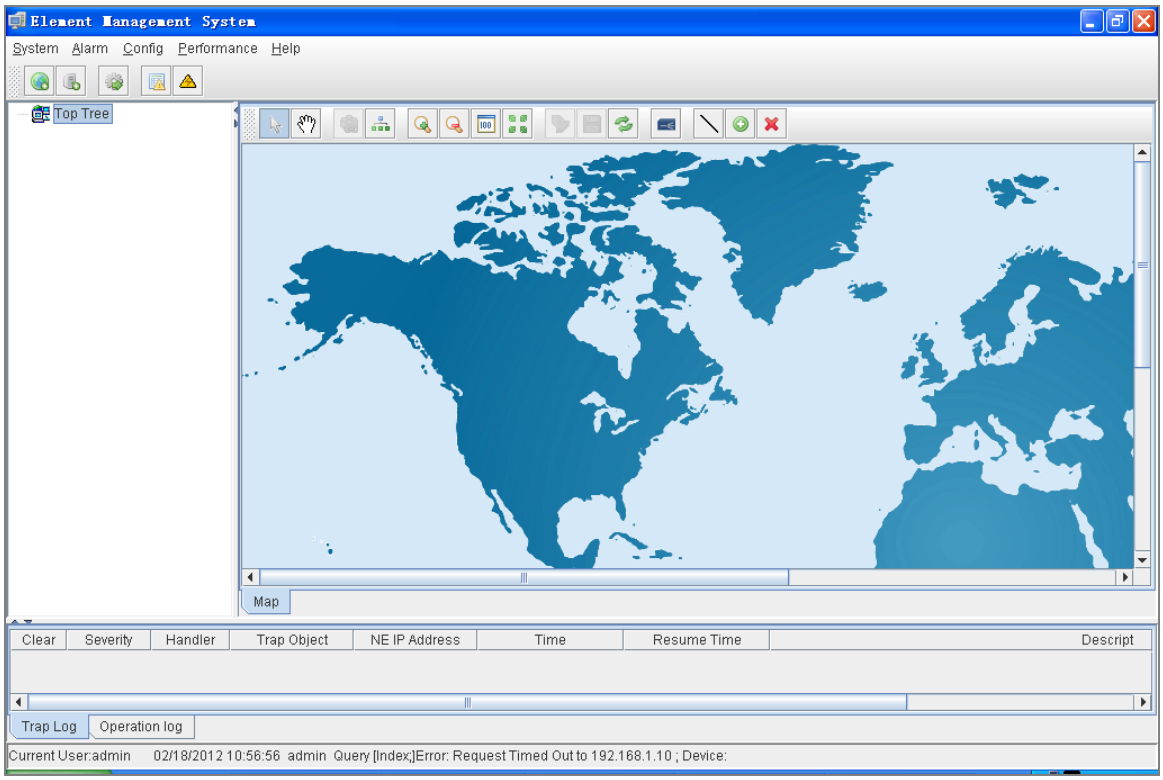


Figure 3-25 Main Screen of EPL-2000 GEPON OLT

3.4 SNMP-Based Network Management

You can use an external SNMP-based application to configure and manage the GEPON OLT, such as SNMPc Network Manager, HP Openview Network Node Management (NNM) or What's Up Gold. This management method requires the SNMP agent on the switch and the SNMP Network Management Station to use the **same community string**. This management method, in fact, uses two community strings: the **get community** string and the **set community** string. If the SNMP Net-work management Station only knows the set community string, it can read and write to the MIBs. However, if it only knows the get community string, it can only read MIBs. The default gets and sets community strings for the GEPON OLT are public.

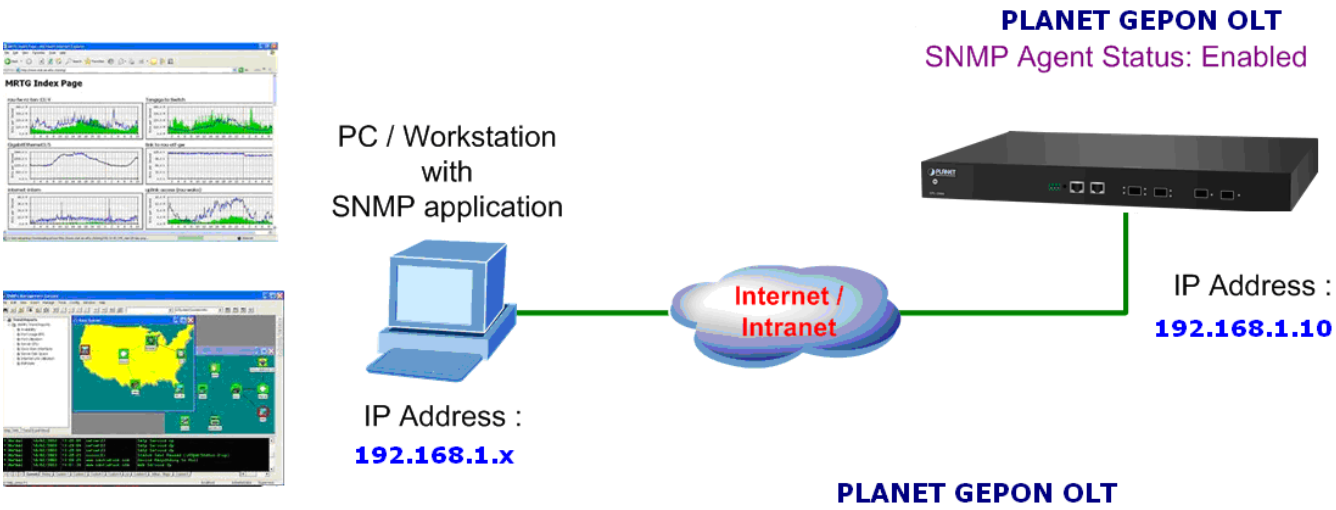


Figure 3-26 SNMP Management Diagram

4. EMS Management System

The PLANET GEPON solution, including the OLT EPL-2000 and ONUs - EPN-102 and EPN-103. For inconvenience, following information will introduce the software configuration.

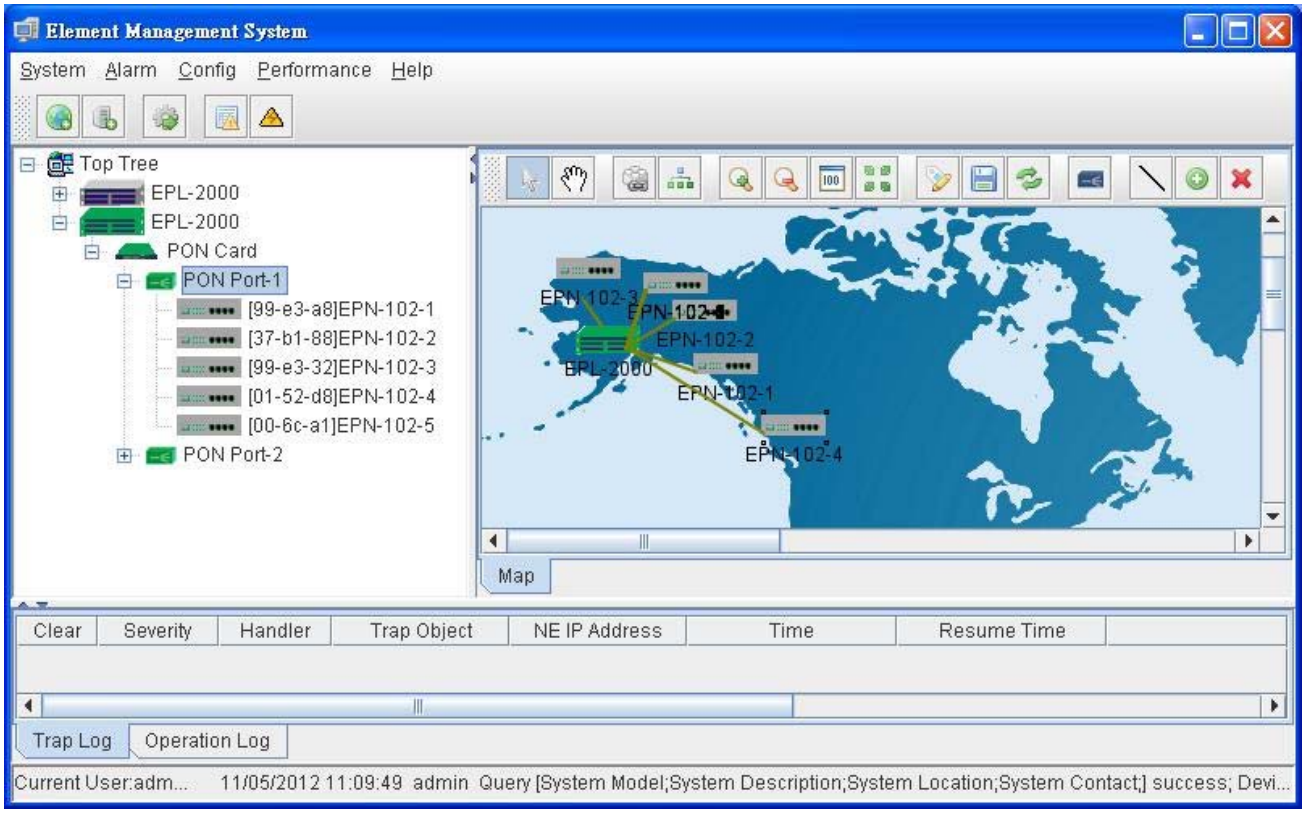
This document explains how to use the EMS Utility, for the purpose of evaluating the functionality and usability of Host Interface Protocol. This manual assumes that the reader has a technical background and a base level of understanding regarding the basic operation of PON equipment. The EMS Utility is a demonstration package, intended for evaluation purposes only.

Organization of the EMS Utility

The screen real estate used by the EMS Utility is divided into three sash windows and one EMS Toolbar.

- The upper left panel displays the entities that may be managed by the Host Interface, including the OLT, ONUs and Logical Links. This sash window shall be referred to as the **Element Status Window**.
- Left clicking on an entity with the mouse will open a tabbed panel in the upper right sash window that may be used to manage the entity. This sash window shall be referred to as the **Entity Management Window**.
- The bottom sash window is used for the purpose of logging the host interface message that are sent and received by the EMS Utility, and shall be referred to as the **Message Log**.

If the OLT is running normally and the ONUs register each of their LLIDs, you should see something similar to the figure. The left hand pane shows the MAC addresses of the OLT and the ONU's LLIDs. Depending on the number of ONUs, LLIDs, MAC addresses etc you may see something slightly different. If the GUI fails to connect to the OLT, check the IP addresses of the Host PC and the management port. Make sure you can ping the IP address assigned to the management port or uplink port. Also verify that the Host and management IP addresses match in the GUI's Utilities.



4.1 EMS Toolbar

The toolbar includes **System**, **Alarm**, **Config**, **Performance** and **Help** features which allows users to do advanced setting.

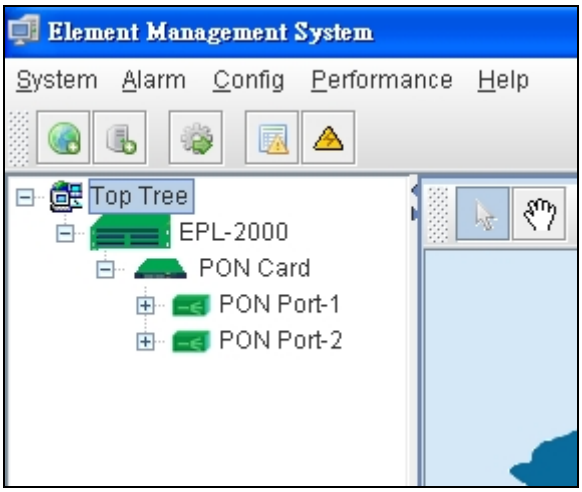


Figure 4-1 EPL-2000 GEPON OLT Toolbar

4.1.1 System:

Includes System Config, Mib Browser, Database Mainteance, User Manage and Exit.

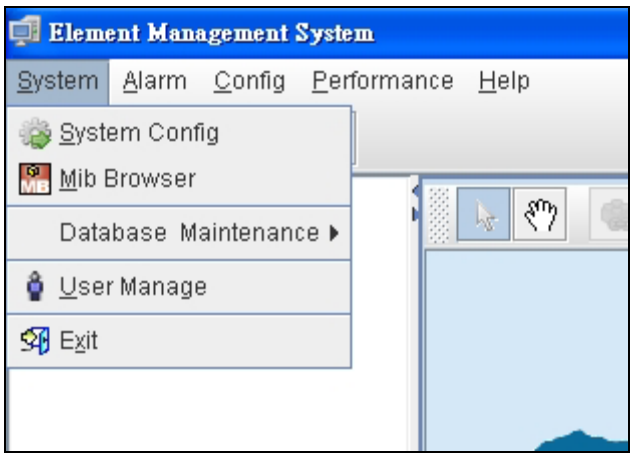


Figure 4-2 Toolbar of System screen

4.1.1.1 System config

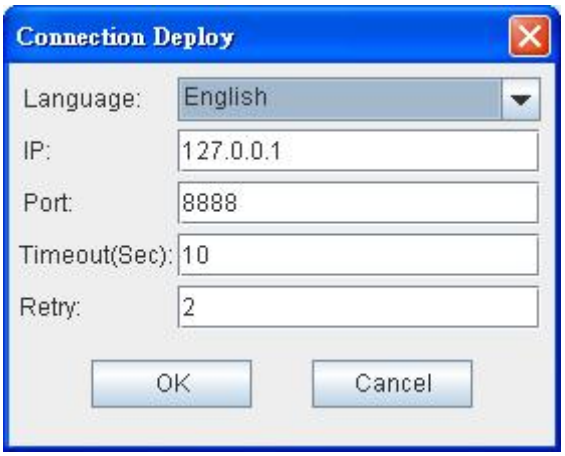


Figure 4-3 System Config screen

The popup window includes the following fields:

Object	Description
Language:	Allows user for selecting the language: English and Simplified Chinese.
IP:	Enter the IP Address which allows user to remote cnotorl from other PC with same IP subnet address. The Default IP is 127.0.0.1.
Port:	Enter the UDP port number. The Default Port is 8888.
Timeout(Sec):	Enter Relay time. The Default Timeout is 10 Sec.
Retry:	Reconnection Times. The Default Retry is 2.

4.1.1.2 Mib Browser

A **management information base (MIB)** is a virtual database used for managing the entities in a communications network.

A built-in trap receiver can receive SNMP traps and handle trap storm.

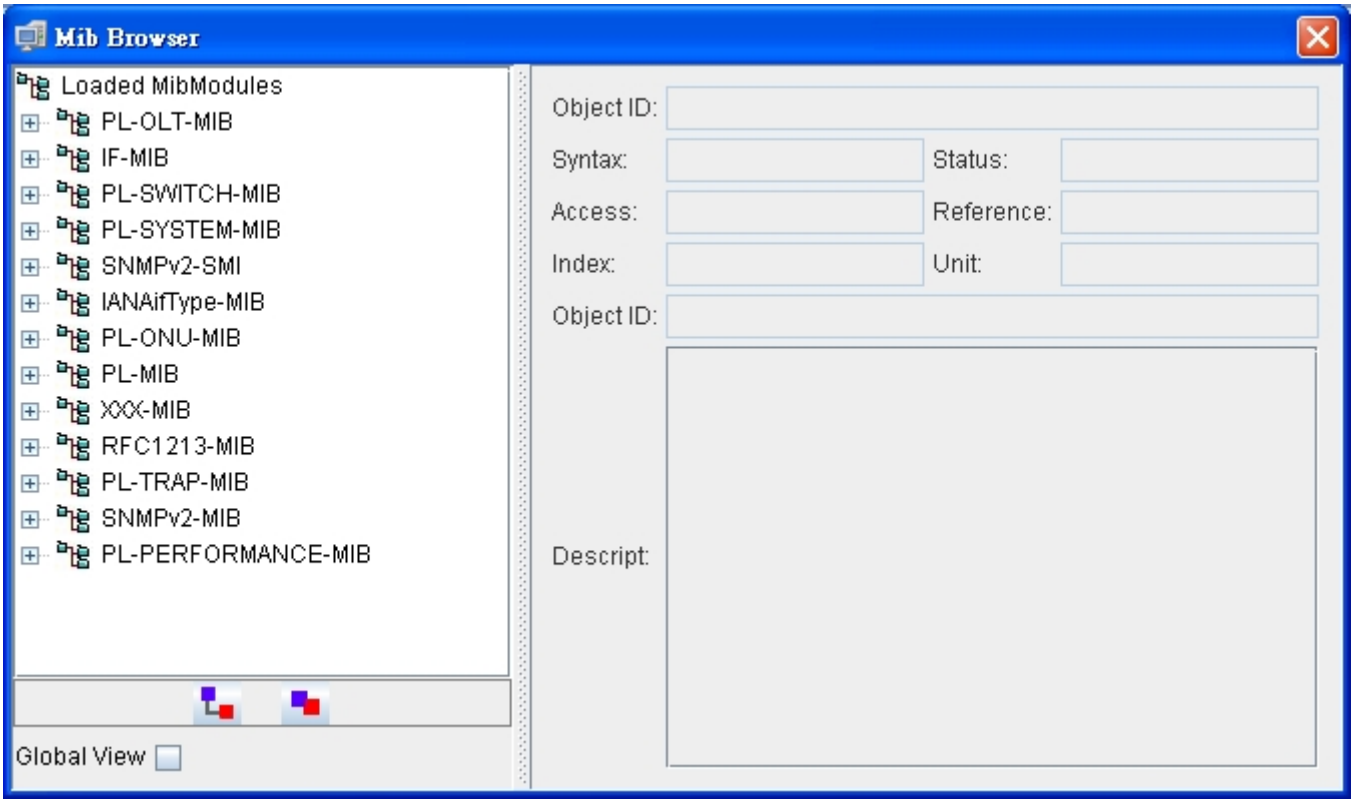


Figure 4-4 Mib Browser screen

4.1.1.3 Database Maintenance

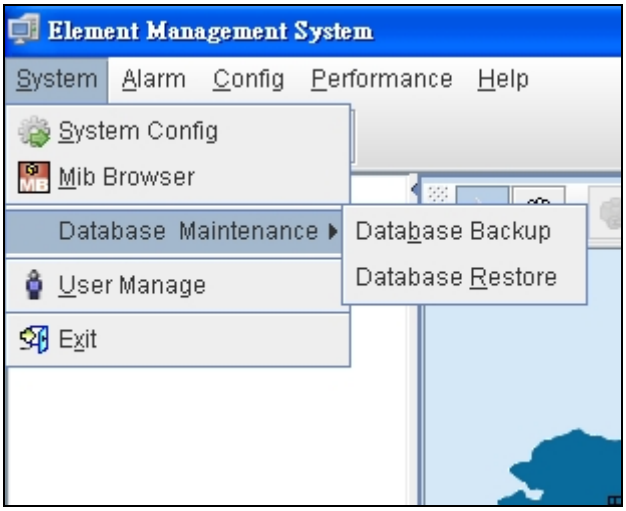


Figure 4-5 Database Maintenance screen

The popup window includes the following fields:

Object	Description
Database Backup:	Save the current data
Database Restore:	Restore the previous backup data

4.1.1.4 User Manage

It is allowed to configure the GEPON OLT to authenticate users logging into the system for management access using local authentication methods. The EPL-2000 provides totally three different security levels for local user management.

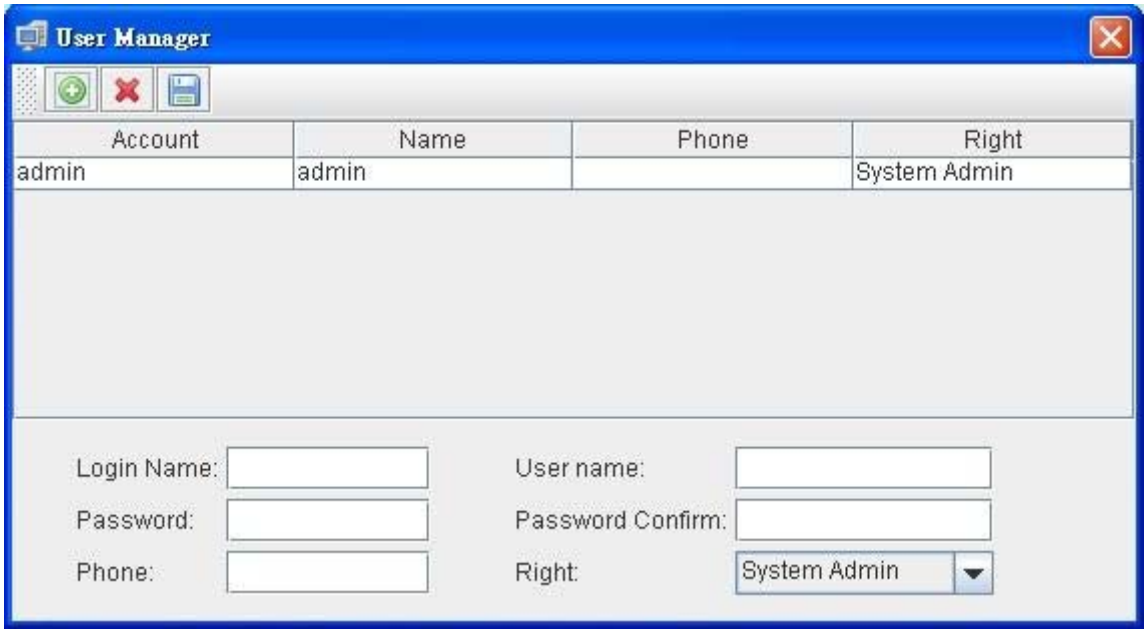


Figure 4-6 User Manager screen

The popup window includes the following fields:

Object	Description
:	Add New Account
:	Delete Account
:	Save Account
Login Name:	Enter the Name for login
User name:	Enter the Name for user
Password:	Enter the Password
Password Confirm:	Enter the Password for confirming again
Phone:	Enter the Phone No.(Optional)
Right:	Allows user for choosing rights - System Admin - Net Manager - Comm User

4.1.1.5 Exit

Exit the Element Management System

4.1.2 Alarm:

Includes Alarm Query, Config Trap Rule, System Log and Trap Window.

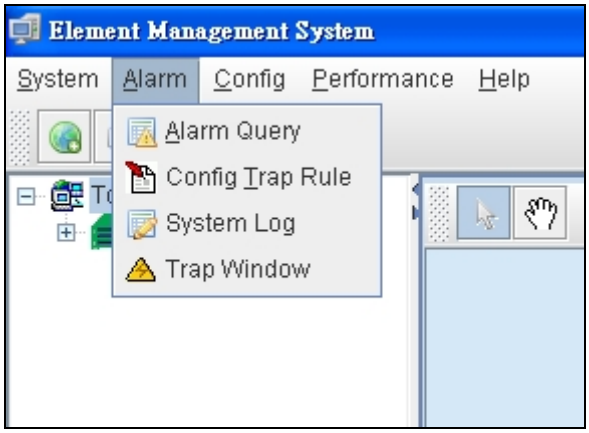


Figure 4-7 Toolbar of Alarm screen

4.1.2.1 Alarm Query

The OLT alarms manger works in concert with the ONUs to provide enhanced management capabilities and complementary set of OLT specific alarms.

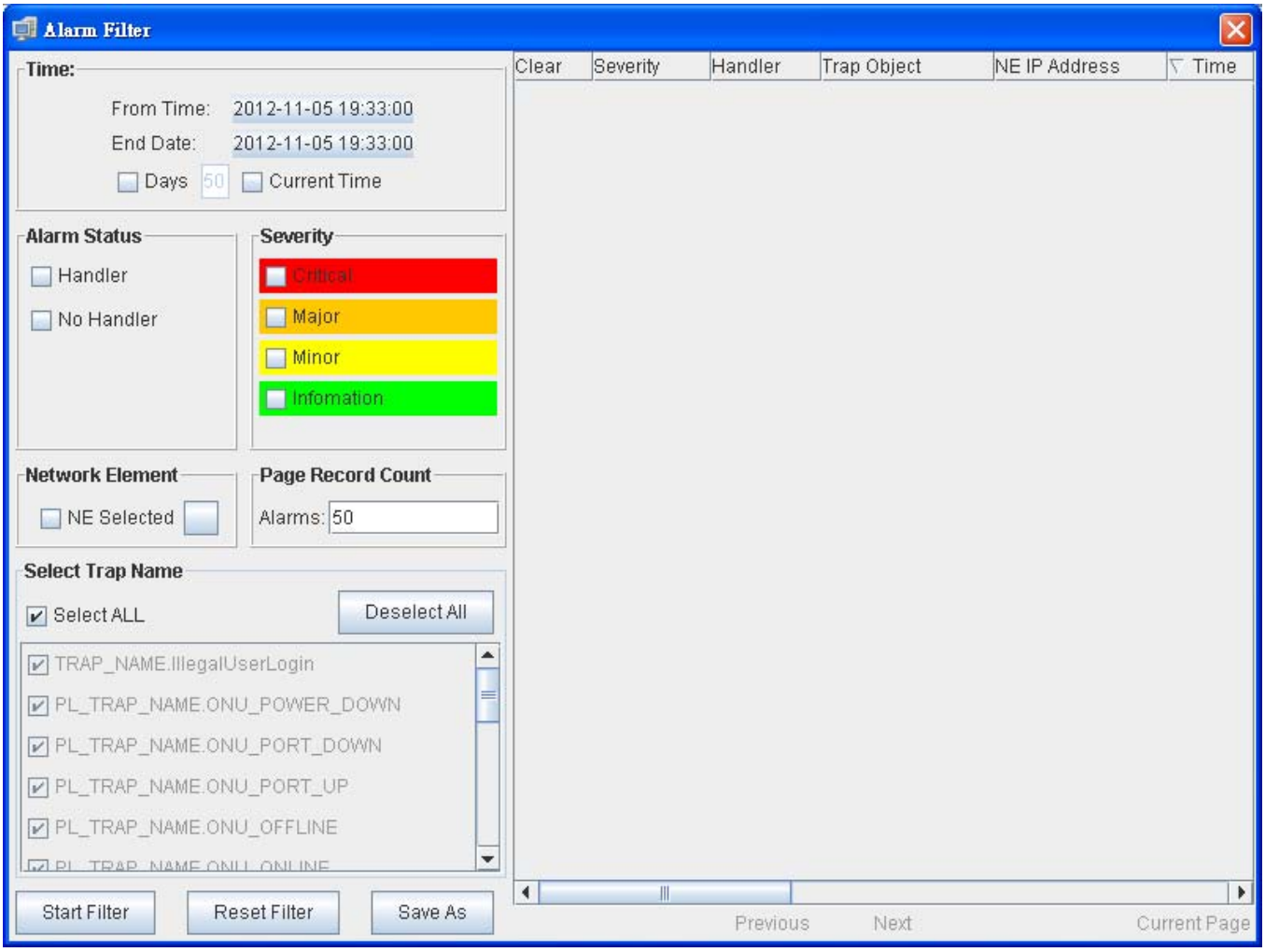


Figure 4-8 Alarm Query screen

The popup window includes the following fields:

Object	Description
Time:	Select the Range of time for filtering.
Alarm Status:	Allows user to choose Handler or No Handler.
Severity:	Allows user to choose the Level of Alarm.
Network Element:	Allows user to choose the Element of devices.
Page Record Counts:	Allows user to edit the number of events for per page.
Select Trap Name:	Allows user to choose the Traps

4.1.2.2 Config Trap Rule

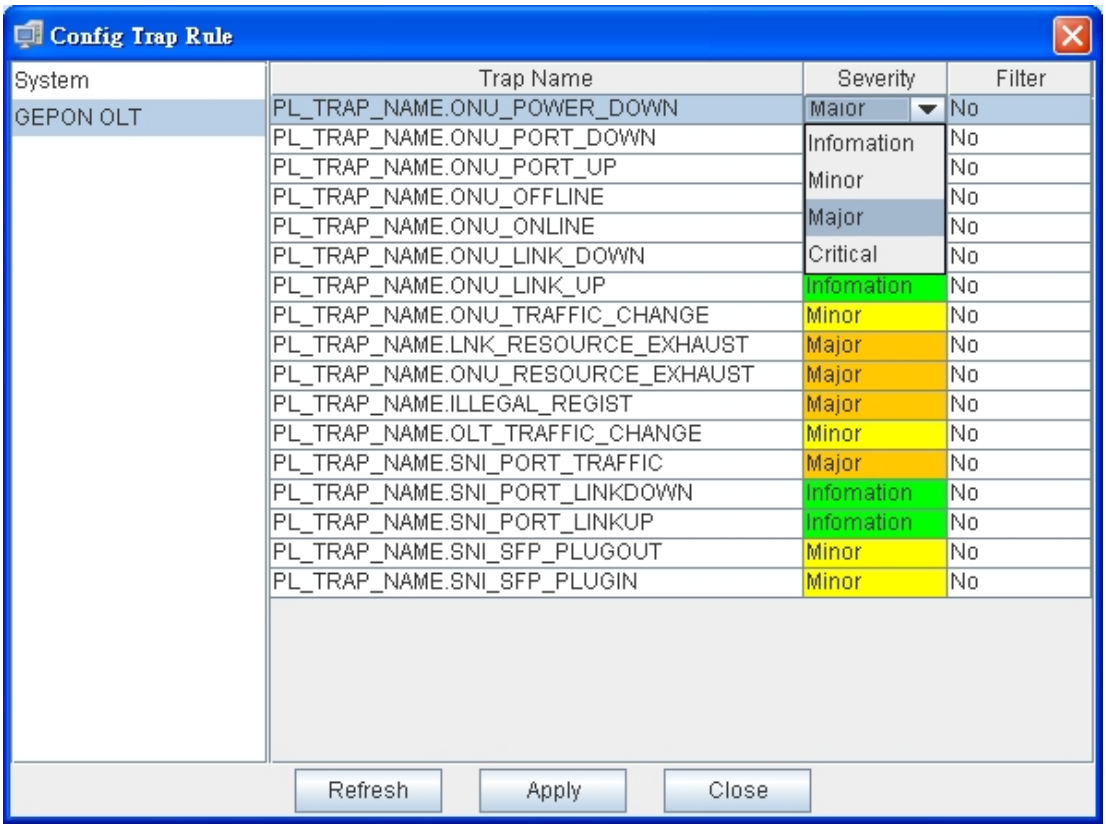


Figure 4-9 Config Trap Rule screen

The popup window includes the following fields:

Object	Description
Refresh:	Refresh the Configuration.
Apply:	Apply the configuration.
Close:	Close the Alarm Filter.

4.1.2.3 System Log

The GEPON EMS system log information is provided here. This window allows you to log the messages happened in this system for later reference.

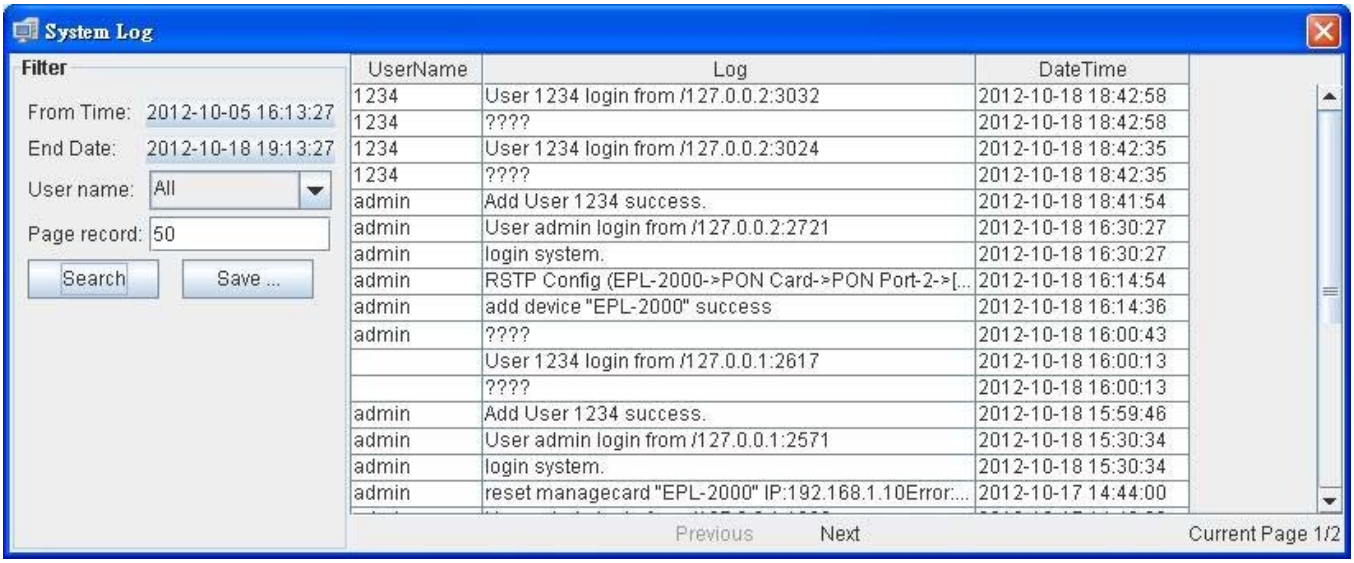


Figure 4-10 System Log screen

The popup window includes the following fields:

Object	Description
From Time:	Chooses the time which wants to Start.
End Time:	Chooses the time which wants to End
User name:	Chooses the user.
Page Record:	Allows user to edit the number of logs for per page.
Search:	Start for searching the logs.
Save:	Save the Logs.

4.1.2.4 Trap Window

This function displays the EPL-2000 trap; include **Severity, Handler, Trap Object and more.**

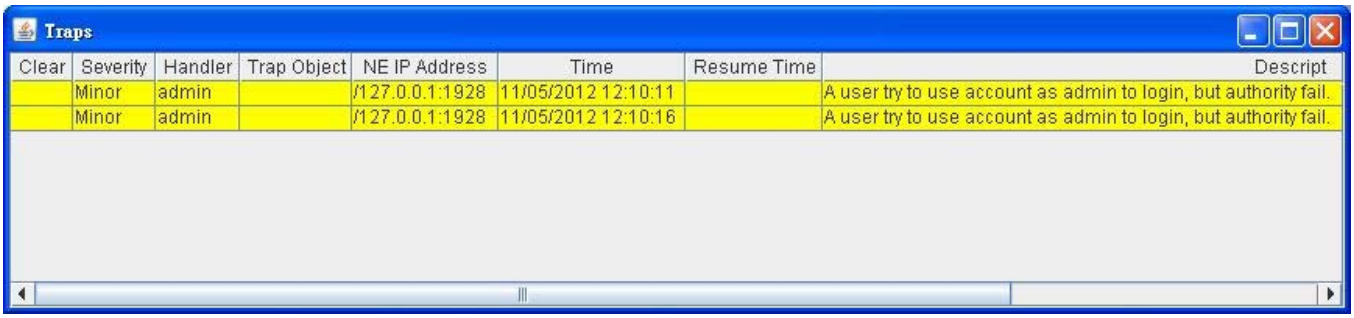


Figure 4-11 Trap Window screen

4.1.3 Config

This feature allows user to configure the Top Tree, EPL-2000, PON Card and ONU property.

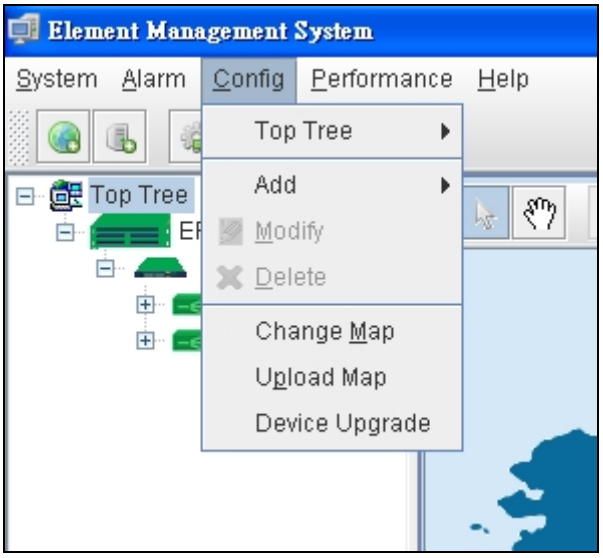


Figure 4-12 Toolbar of Config screen

The popup window includes the following fields:

Object	Description
Add:	Allows user to add Location and Device
Modify:	Allows user to modify the property of Devices like: EPL-2000 and PON Card.
Delete:	Allows user the delete the Devices.
Change Map:	Allows user to change the background Map.
Upload:	Allows user to upload new Map.
Device Upgrade:	Allows user to upgrade firmware for EPL-2000 or ONU For more detail, please refer to Chapter 4.5 "How to upgrade EPL-2000"

4.1.4 Performance

This performance function helps user to verify the OLT connection. This window allows user to issue ICMP PING packets to troubleshoot IP connectivity issues.

Once you select the target OLT in the Top Tree and click Perofmance\Ping from the Tool bar, ICMP packets are transmitted. The report windows popup automatically until responses to all packets are received, or until a timeout occurs. The Ping screen in Figure 4-13 appears.

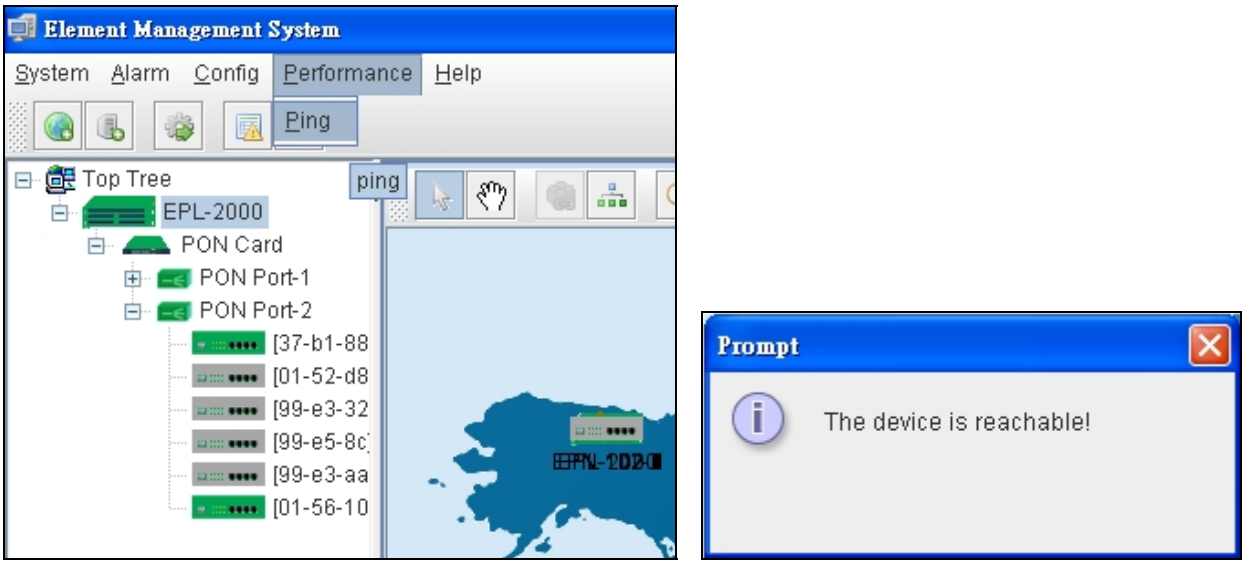


Figure 4-13 Toolbar of Perofrmance screen

Be sure the target OLT's IP Address is within the same network subnet of the EMS workstation, or you had setup the correct gateway IP address.

4.1.5 Help

Allows user to change the color of window and lauange.

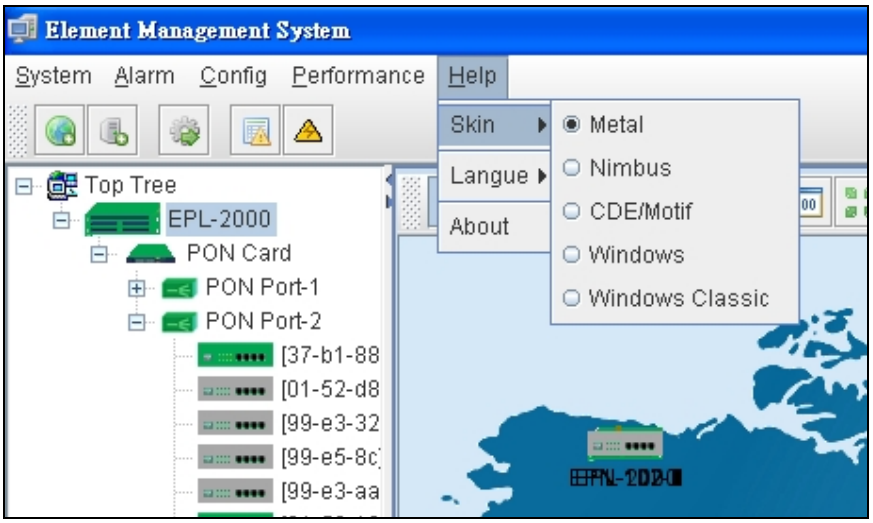


Figure 4-14 Skin screen

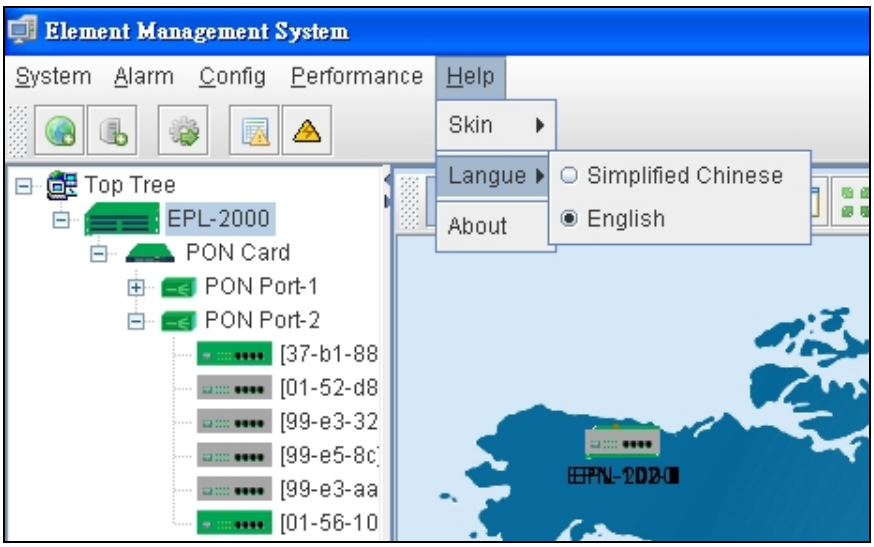


Figure 4-15 Language screen

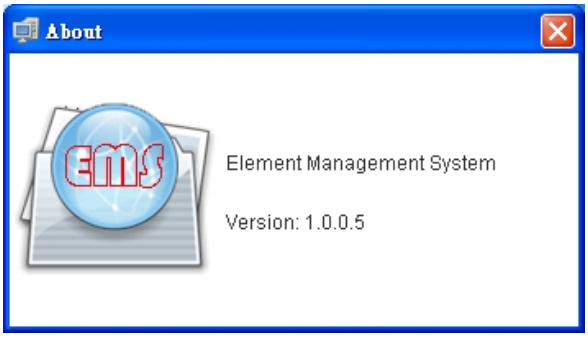


Figure 4-16 About screen

Object	Description
Skin:	Allows user to change the colour of window
Lauange:	Allows user for choosing two kind of language: English and Simplified Chinese.
About:	Shows the version of EMS utility

4.2 OLT Management

To manage EPL-2000, EMS manager needs to add EPL-2000 device. They can add and management the EPL-2000 from the two types of interfaces:

- **Management Port** – the 10/100Base-TX RJ-45 interface
- **Uplink ports** – the two 1000Base-X SFP interfaces

The EPL-2000 is shipped with default IP addresses as following.

Management Port: IP Address: **192.168.1.10**
Subnet Mask: **255.255.255.0**

Uplink Ports: IP Address: **192.168.10.10**
Subnet Mask: **255.255.255.0**

Clicks the Right mouse button on Top Tree and clicks [**Add Device**] in the interface, you will find the picture as follow:

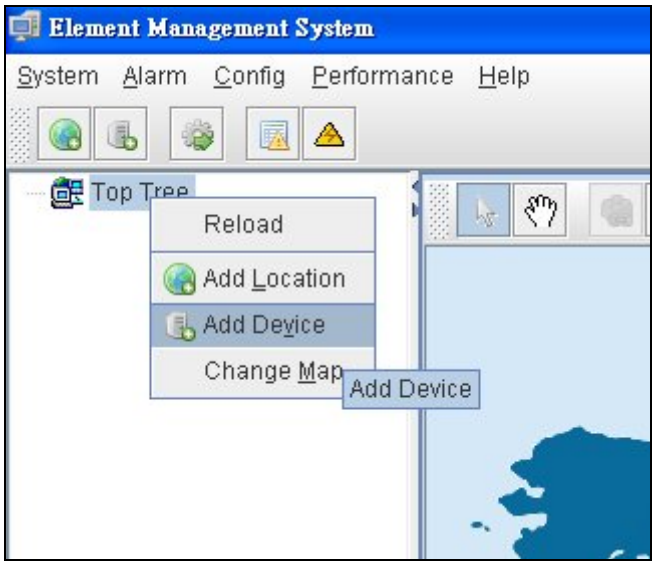


Figure 4-17 Top Tree interface screen

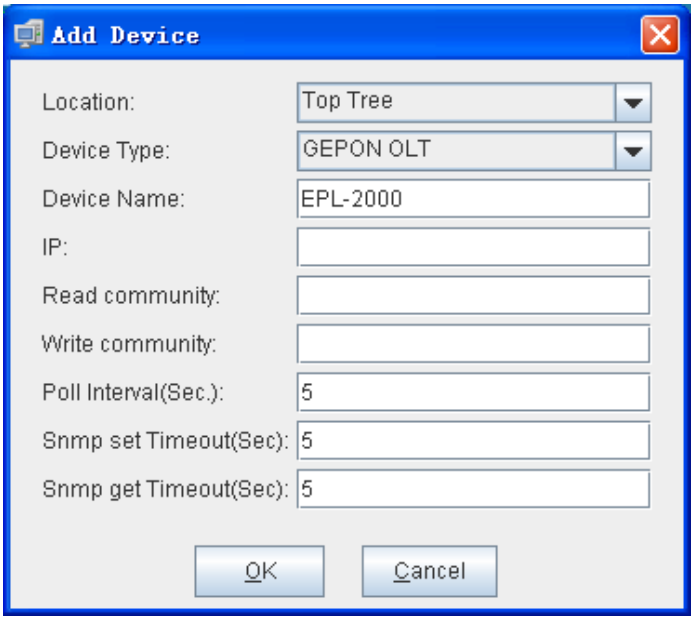


Figure 4-18 Add Device screen

■ **Example - Add EPL-2000 through Management Port connection**

Please enter the EPL-2000 default IP address **"192.168.1.10"**, Read Community **"public"** and Write Community **"private"** of the management port.

Double click the EPL-2000 device node unit in the topology tree or clicks the Right mouse button on EPL-2000 and clicks [Chassis Management] in the interface, you will find the picture as follow:

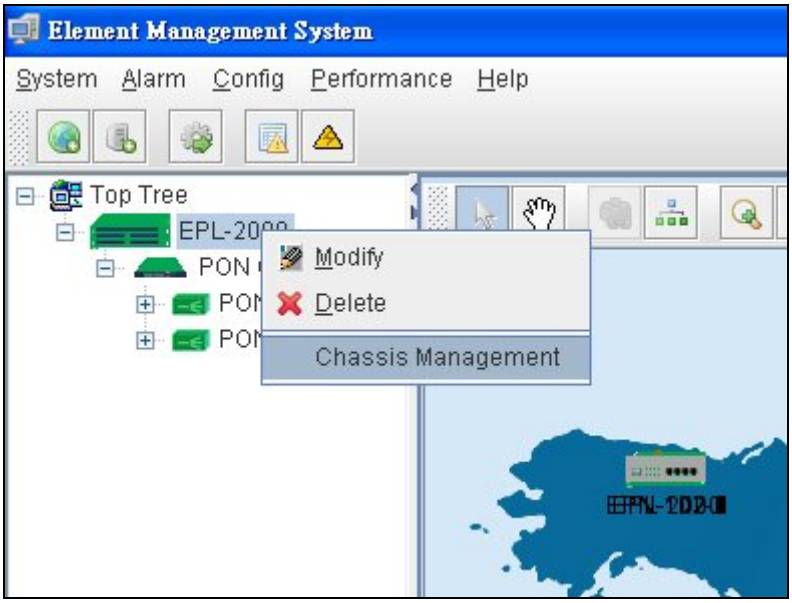


Figure 4-19 EPL-2000 interface screen

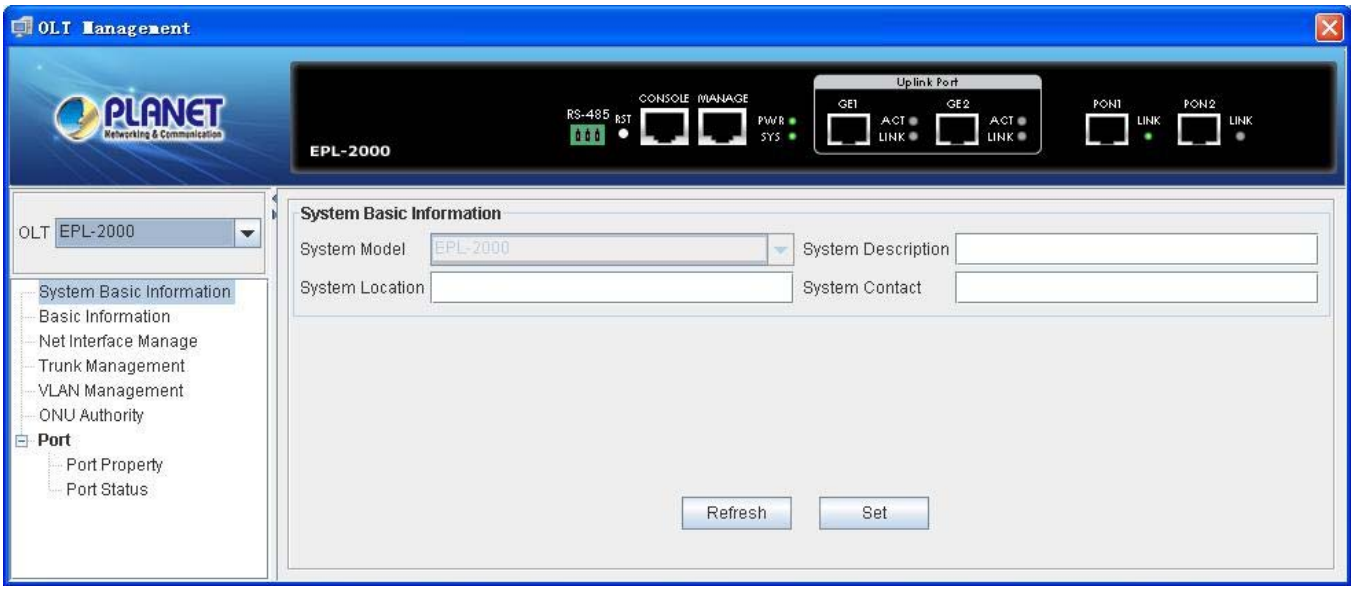


Figure 4-20 EPL-2000 OLT Management screen

4.2.1 System Basic Information

The Basic System Information page provides information for the current device information. Basic System Information page helps an OLT administrator to identify the model name, System Description, System Location and System Contact.

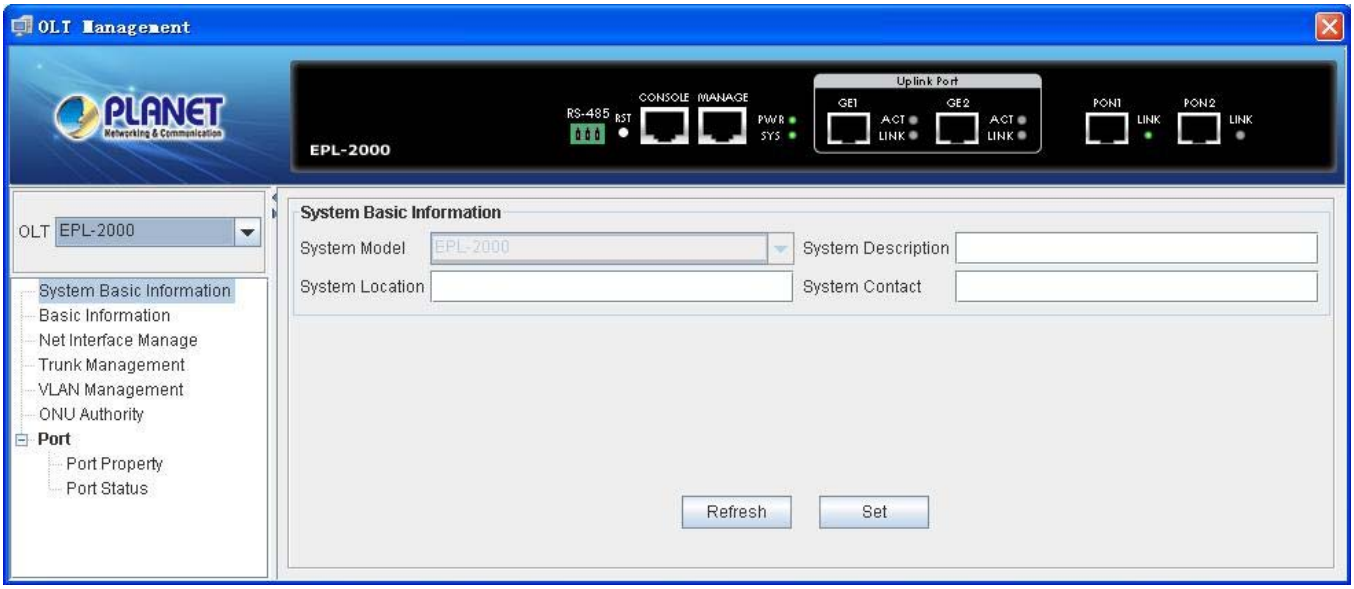


Figure 4-21 System Basic Information screen

The popup window includes the following fields:

Object	Description
System Model:	Model name of OLT
System Location:	Allows user to fill in the words where is the location of system
System Description:	Allows user to fill in the words for system description
System Contact:	Allows user to fill in the words for system contact

4.2.2 Basic Information

The Basic System Info page provides information for the current device information. Basic System Info page helps an OLT administrator to identify the firmware / hardware version, System Config and Switch Mode Configure.

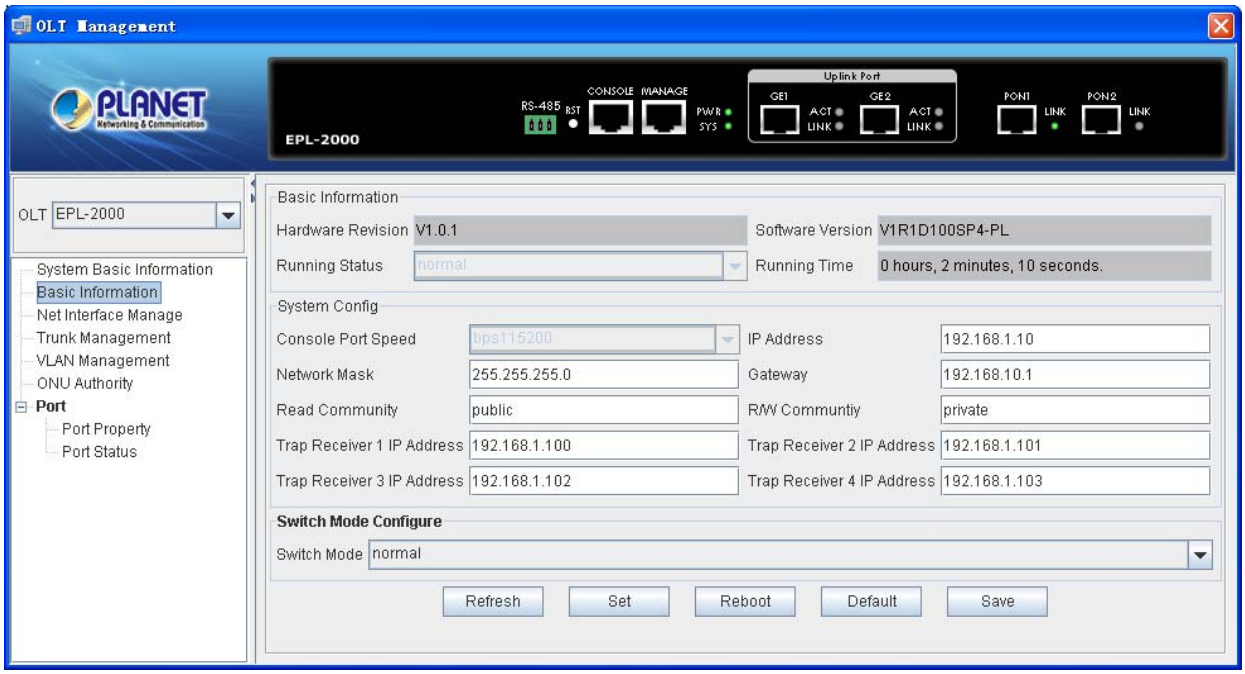


Figure 4-22 Basic Information screen

The window includes the following fields:

Object	Description
Hardware Version:	The version of Current Hardware.
Software Version:	The version of Current Software.
Running Status:	Status of EPL-2000.
Running Time:	The period of time the device has been operational.
Console Port Speed:	The baud rate of Console Port. (Only for Manufacturer uses)
IP Address:	Provide the IP address of this OLT in dotted decimal notation. The default IP address of the management interface is **192.168.1.10**.
Network mask:	Provide the IP mask of this OLT dotted decimal notation. The default Network mask of the management interface is **255.255.255.0.**
Gateway:	Provide the IP Gateway of this OLT dotted decimal notation. The default Gateway of the management interface is **192.168.1.1**.
Read Community:	Indicates the community read access string to permit access to SNMP agent.
Write Community:	Indicates the community write access string to permit access to SNMP agent.
Trap Receiver	Assign IP address of host to receive trap from the device.

1~4 IP Address:	
Switch Mode:	Three switch modes explanation is as follows: ■ **Normal Mode(Normal):** This is OLT board's default working mode including 2 uplink GE ports and 2 PON networking sideline port compliant with 802.1 switch. In this mode, PON networking's user data could reach any one of 2 GE uplink ports. ■ **Port Designated Mode (sniDestinated)** Under this mode, user should choose one fixed GE port as uplink port .All PON's networking data could be connected with uplink networking through this port. When the switch mode is set port mode as sniDestinated, one of these 2 uplink ports must be used as uplink port. ■ **Transparent Transmission Mode(transparent)** Under this mode, 2 PON ports and 2 uplink GE ports are trunk ,meaning PON port 1(OLT) correspond with GE1, PON port 2 correspond with GE2 .The case is the same with other PON ports .

4.2.3 Net Interface Management

The system support two IP ports: **in-band IP** and **out-band IP ports**.

Example: In-band IP makes up with "MgtW". MgtW is the only in-band IP port. Out-band IP is composed with "MgtL". MgtL is the only one out-band IP port. Change the parameters, users can change in-band IP, MgtW's IP address, mask, broadcasting IP address, enable or disable in-band IP management port compellingly.

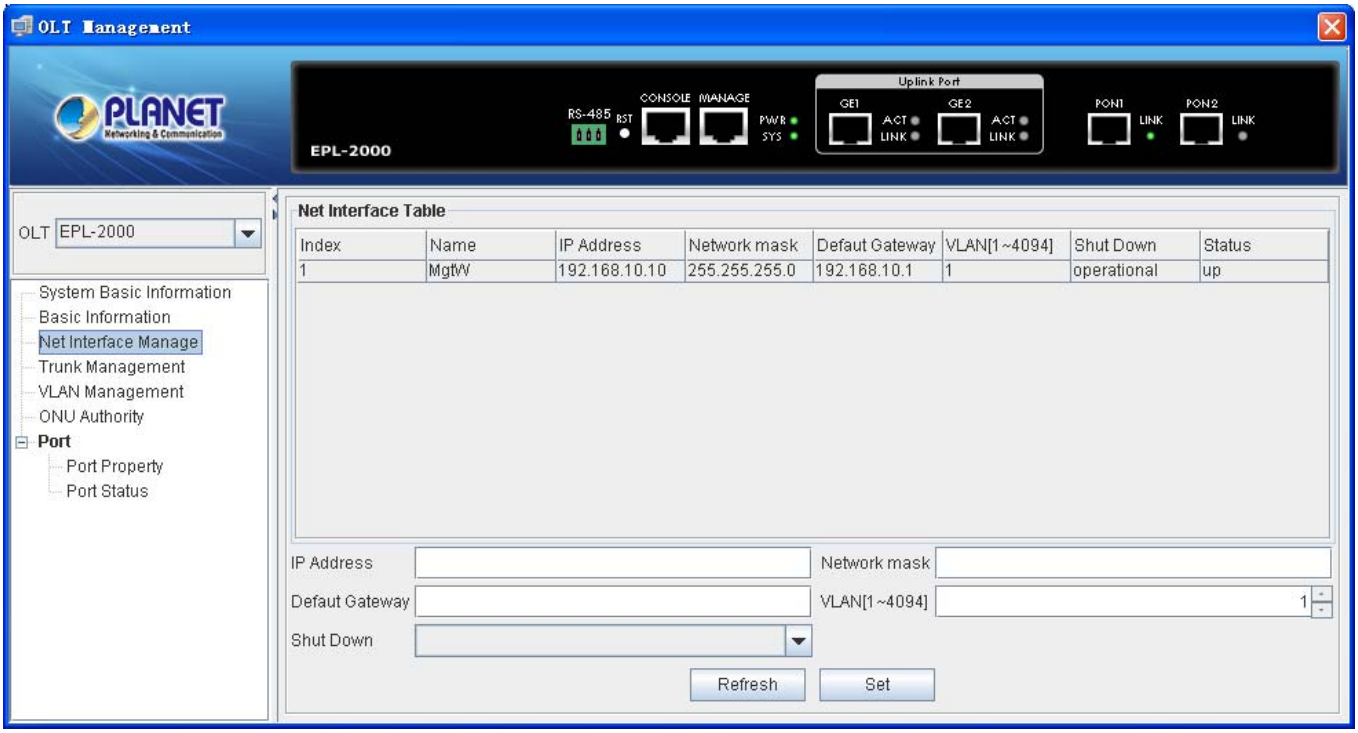


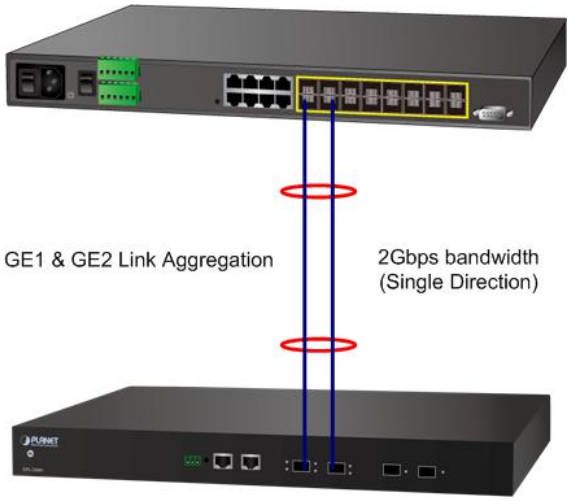
Figure 4-23 Net Interface Management screen

The window includes the following fields:

Object	Description
IP Address:	Allows user to change the IP Address. The default IP address of Net interface is **192.168.10.10**
Network Mask:	Allows user to change the Network Mask. The default Network Mask of Net interface is **255.255.255.0**
Default Gateway:	Allows user to change the Default Gateway. The default IP address of Net interface is **192.168.10.1**
VLAN[1~4094]	Allows user to change the VLAN ID. Default VLAN ID: **1**
Shut Down:	Two options: Operational or Shut Down mode.

4.2.4 Trunk Management

Trunk Management optimizes port usage by linking 2 GE ports together to form a single **Link Aggregated Groups (LAGs)**. Trunk multiplies the bandwidth between the devices, increases port flexibility, and provides link redundancy.



Note

Due to GEPON OLT EPL-2000 SFP Port of GE1 & GE2 is configure as 1000Mbps Forced Mode. If want to make the connection establish successfully, the switch's SFP Port should also change to be 1000Mbps Forced Mode. Otherwise, the connection might Link Fail.

The window includes the following fields:

Figure 4-24 Trunk Management screen

The window includes the following fields:

Object	Description
Up Trunk:	**Enable**: Trunk function Enable. **Disable**: Trunk function Disable.

4.2.5 VLAN Management

4.2.5.1 VLAN Overview

A Virtual Local Area Network (VLAN) is a network topology configured according to a logical scheme rather than the physical layout. VLAN can be used to combine any collection of LAN segments into an autonomous user group that appears as a single LAN. VLAN also logically segment the network into different broadcast domains so that packets are forwarded only between ports within the VLAN. Typically, a VLAN corresponds to a particular subnet, although not necessarily. VLAN can enhance performance by conserving bandwidth, and improve security by limiting traffic to specific domains.

■ IEEE 802.1Q Standard

IEEE 802.1Q (tagged) VLAN are implemented on the Switch. 802.1Q VLAN require tagging, which enables them to span the entire network (assuming all switches on the network are IEEE 802.1Q-compliant).

VLAN allow a network to be segmented in order to reduce the size of broadcast domains. All packets entering a VLAN will only be forwarded to the stations (over IEEE 802.1Q enabled switches) that are members of that VLAN, and this includes broadcast, multicast and unicast packets from unknown sources.

VLAN can also provide a level of security to your network. IEEE 802.1Q VLAN will only deliver packets between stations that are members of the VLAN. Any port can be configured as either **tagging** or **untagging**.:

- The untagging feature of IEEE 802.1Q VLAN allows VLAN to work with legacy switches that don't recognize VLAN tags in packet headers.
- The tagging feature allows VLAN to span multiple 802.1Q-compliant switches through a single physical connection and allows Spanning Tree to be enabled on all ports and work normally.

Some relevant terms:

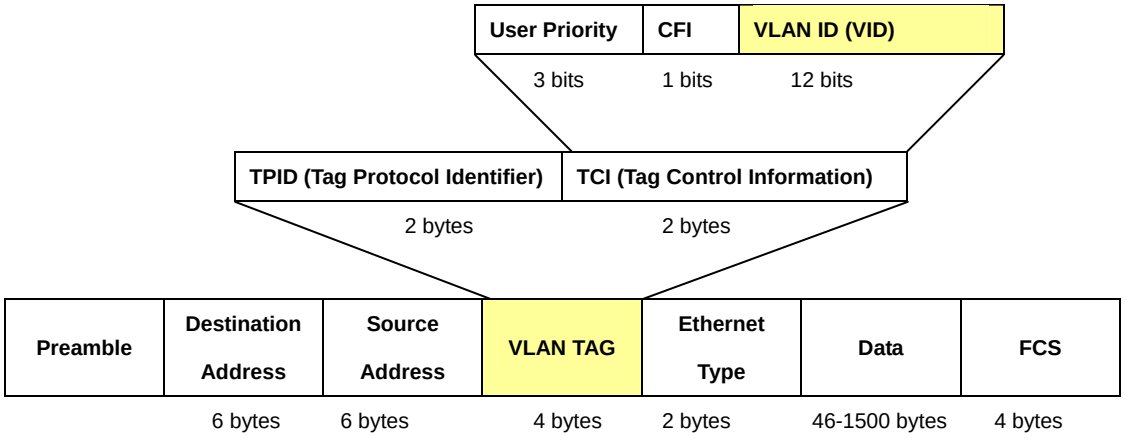
- **Tagging** - The act of putting 802.1Q VLAN information into the header of a packet.
- **Untagging** - The act of stripping 802.1Q VLAN information out of the packet header.

■ 802.1Q VLAN Tags

The figure below shows the 802.1Q VLAN tag. There are four additional octets inserted after the source MAC address. Their presence is indicated by a value of **0x8100** in the Ether Type field. When a packet's Ether Type field is equal to 0x8100, the packet carries the IEEE 802.1Q/802.1p tag. The tag is contained in the following two octets and consists of 3 bits of user priority, 1 bit of Canonical Format Identifier (CFI - used for encapsulating Token Ring packets so they can be carried across Ethernet backbones), and 12 bits of **VLAN ID (VID)**. The 3 bits of user priority are used by 802.1p. The VID is the VLAN identifier and is used by the 802.1Q standard. Because the VID is 12 bits long, 4094 unique VLAN can be identified.

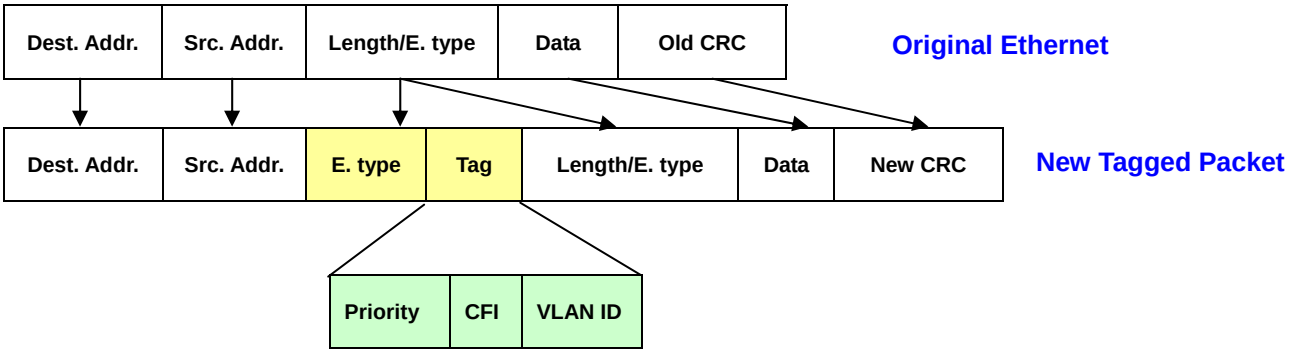
The tag is inserted into the packet header making the entire packet longer by 4 octets. All of the information originally contained in the packet is retained.

802.1Q Tag



The Ether Type and VLAN ID are inserted after the MAC source address, but before the original Ether Type/Length or Logical Link Control. Because the packet is now a bit longer than it was originally, the Cyclic Redundancy Check (CRC) must be recalculated.

Adding an IEEE802.1Q Tag



■ Port VLAN ID

Packets that are tagged (are carrying the 802.1Q VID information) can be transmitted from one 802.1Q compliant network device to another with the VLAN information intact. This allows 802.1Q VLAN to span network devices (and indeed, the entire network – if all network devices are 802.1Q compliant).

Every physical port on a switch has a PVID. 802.1Q ports are also assigned a PVID, for use within the switch. If no VLAN are defined on the switch, all ports are then assigned to a default VLAN with a PVID equal to 1. Untagged packets are assigned the PVID of the port on which they were received. Forwarding decisions are based upon this PVID, in so far as VLAN are concerned. Tagged packets are forwarded according to the VID contained within the tag. Tagged packets are also assigned a PVID, but the PVID is not used to make packet forwarding decisions, the VID is.

Tag-aware switches must keep a table to relate PVID within the switch to VID on the network. The switch will compare the VID of a packet to be transmitted to the VID of the port that is to transmit the packet. If the two VID are different the switch will drop the packet. Because of the existence of the PVID for untagged packets and the VID for tagged packets, tag-aware and tag-unaware network devices can coexist on the same network.

A switch port can have only one PVID, but can have as many VID as the switch has memory in its VLAN table to store them.

Because some devices on a network may be tag-unaware, a decision must be made at each port on a tag-aware device before packets are transmitted – should the packet to be transmitted have a tag or not? If the transmitting port is connected to a tag-unaware device, the packet should be untagged. If the transmitting port is connected to a tag-aware device, the packet should be tagged.

Default VLANs

The Switch initially configures one VLAN, VID = 1, called **"default."** The factory default setting assigns all ports on the Switch to the **"default"**. As new VLAN are configured in Port-based mode, their respective member ports are removed from the "default."

Assigning Ports to VLANs

Before enabling VLANs for the switch, you must first assign each port to the VLAN group(s) in which it will participate. By default all ports are assigned to VLAN 1 as untagged ports. Add a port as a tagged port if you want it to carry traffic for one or more VLANs, and any intermediate network devices or the host at the other end of the connection supports VLANs. Then assign ports on the other VLAN-aware network devices along the path that will carry this traffic to the same VLAN(s), either manually or dynamically using GVRP. However, if you want a port on this switch to participate in one or more VLANs, but none of the intermediate network devices nor the host at the other end of the connection supports VLANs, then you should add this port to the VLAN as an untagged port.

Tagged and Untagged

Every port on an 802.1Q compliant network device can be configured as tagged or untagged.

- **Tagged:** Ports with tagging enabled will put the VID number, priority and other VLAN information into the header of all packets that flow into those ports. If a packet has previously been tagged, the port will not alter the packet, thus keeping the VLAN information intact. The VLAN information in the tag can then be used by other 802.1Q compliant devices on the network to make packet-forwarding decisions.

- **Untagged:** Ports with untagging enabled will strip the 802.1Q tag from all packets that flow into those ports. If the packet doesn't have an 802.1Q VLAN tag, the port will not alter the packet. Thus, all packets received by and forwarded by an untagging port will have no 802.1Q VLAN information. (Remember that the PVID is only used internally within the Switch). Untagging is used to send packets from an 802.1Q-compliant network device to a non-compliant network device.

Frame Income / Frame Leave	Income Frame is **tagged**	Income Frame is **untagged**
Leave port is tagged	Frame remains tagged	Tag is inserted
Leave port is untagged	Tag is removed	Frame remain untagged

Table 4-2-5 Ingress/Egress port with VLAN VID Tag/Untag table

4.2.5.2 VLAN Configuration

To completely configure the VLAN functions on the GEOPN OLT, two of the following sub-menus are need to be well configured.

- **OLT Management \ VLAN Management**
- **OLT Management \ Port \ Port Property**

■ OLT Management \ VLAN Management

This page is used for configuring the OLT port VLAN. The VLAN Management page contains fields for managing ports that are part of a VLAN.

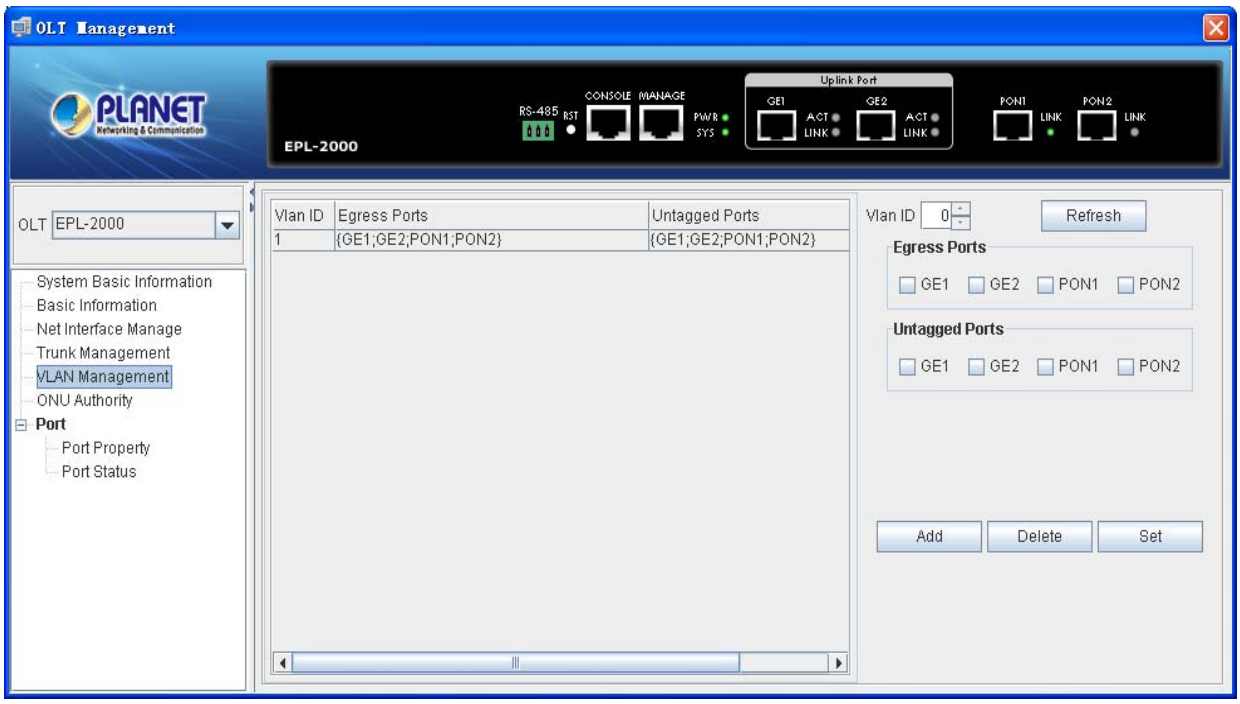
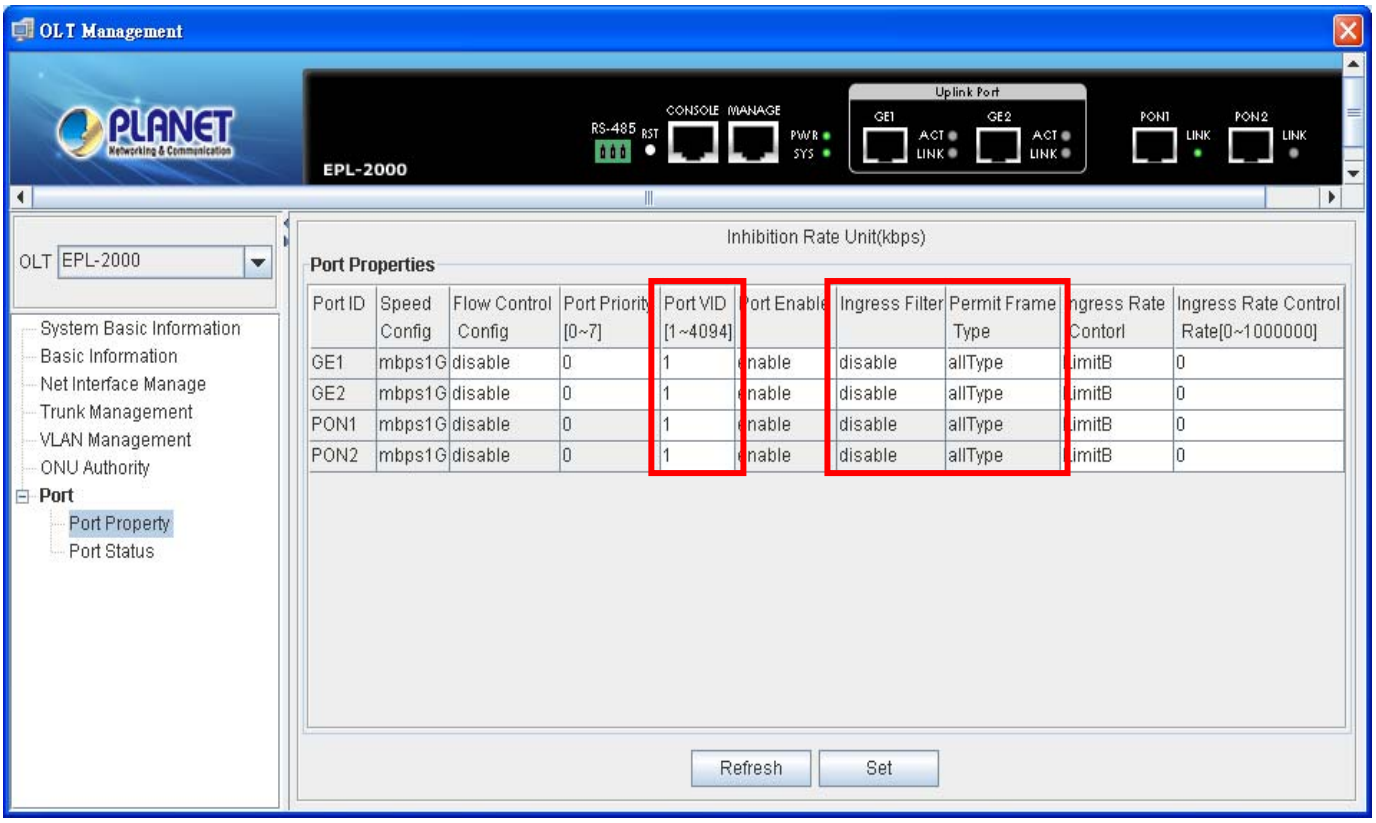


Figure 4-25 VLAN Management screen

The window includes the following fields:

Object	Description
VLAN ID:	Indicates the ID of this particular VLAN.
Egress Ports:	Selects spific port for VLAN group.
Untagged Port:	Select spific port for this check box to transmit outgoing frames without VLAN-Tagged.
Refresh:	Refresh the VLAN status.
Add:	Add new VLAN ID configuration.
Delete:	Delete VLAN ID.
Set:	Set VLAN configuration.

■ OLT Management \ Port \ Port Property



The window includes the following fields:

Object	Description
Port ID:	This is the logical port name for this row.
Port VID:	Allow assign PVID for selected port. The range for the PVID is 1-4094. The PVID will be inserted into all untagged frames entering the ingress port. The PVID must as same as the VLAN ID that the port belong to VLAN group, or the untagged traffic will be dropped.
Ingress Filter:	Enable ingress filtering for a port by checking the box. This parameter affects VLAN ingress processing. If ingress filtering is enabled and the ingress port is not a member of the classified VLAN of the frame, the frame is discarded. ■ **Enabled** ■ **Disabled** By default, ingress filtering is disabled (no checkmark).
Permit Frame Type:	Determines whether the port accepts all frames or only VLAN tagged frames. This parameter affects VLAN ingress processing. If the port only accepts tagged frames, untagged frames received on the port are discarded. Options: ■ **allType** ■ **tagged** By default, the field is set to **allType**.

4.2.6 ONU Authorization

The ONU Authorization prevents the given Logical Link (MAC address) from registering on the GEPON. The OLT will simply ignore registration requests from the ONU in Black List. If the given ONU is already registered, the Logical Link will be deregistered, causing the ONU to depart from the network. All further requests to register from the ONU are ignored until the Host issues a White List or Non-authority command.

ONU Authorization is intended to be a temporary measure used to suspend service for reasons such as late payments or a troublesome customer. When the issue has been resolved, or the ONU has been physically removed from the network and no longer requests service, it can be removed from the Black List or add to the White List. If the ONU is still connected to the network and attempting to register, the ONU will be once again allowed onto the network.

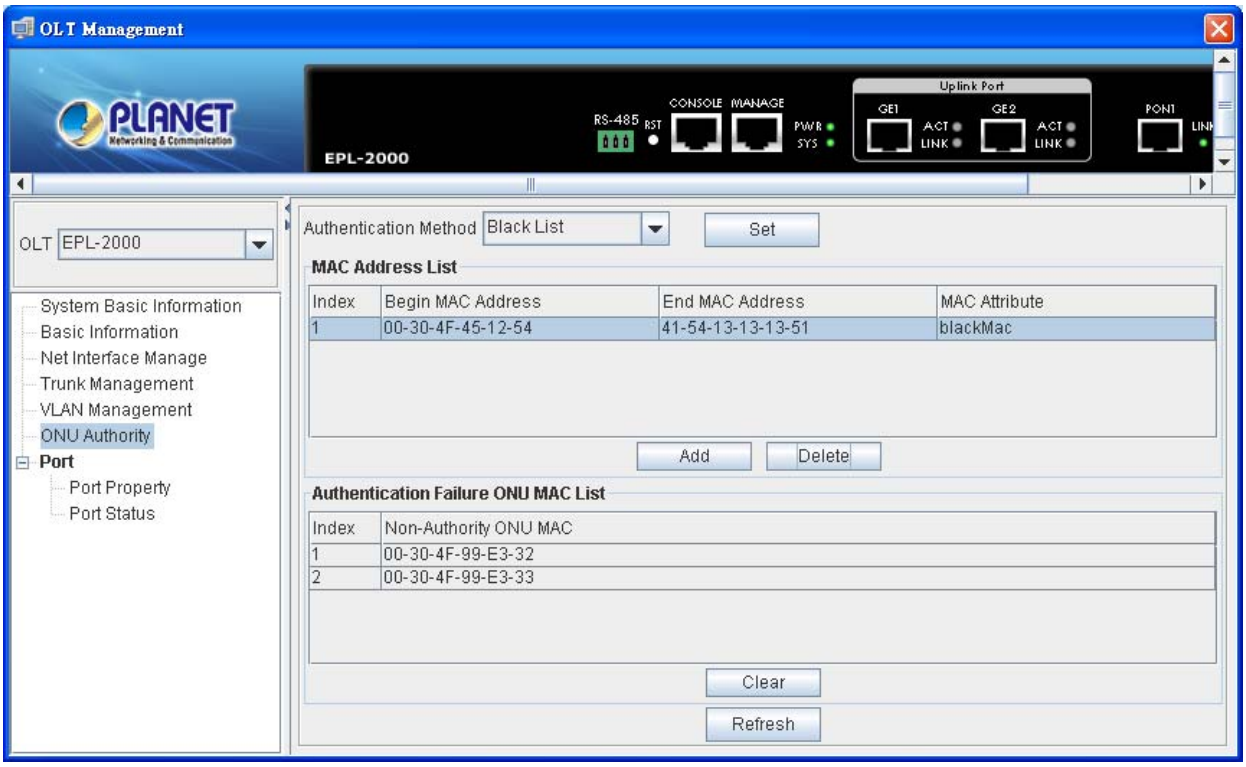


Figure 4-26 ONU Authority screen

The popup window includes the following fields:

Object	Description
Authentication Method:	To execute which kind of authentication mode: there are three modes: ■ White List ■ Black List ■ Non-authority
MAC Address List:	Allows user to add/set range of MAC Address.
Authentication Failure ONU MAC List:	Shows the list of MAC Address who is fail for authority.

4.2.7 Port Property

In Port Property you can configure the settings of each port to control the connection parameters, and the status of each port is listed beneath.

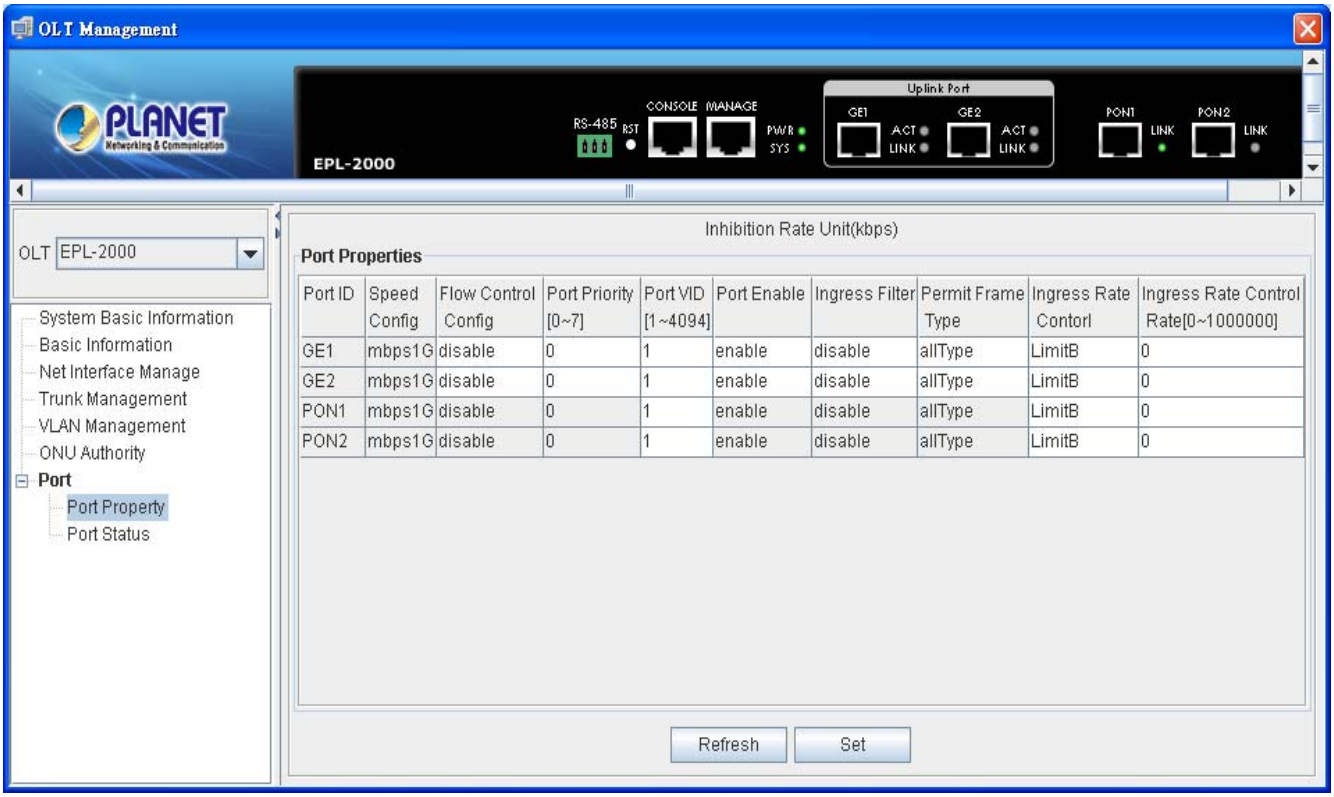


Figure 4-27 Port Property screen

The popup window includes the following fields:

Object	Description
Port ID:	This is the logical port name for this row.
Speed Config:	That is only one speed 1000Mbps for SFP transcivers.
Flow Control Config:	Whether or not the receiving node sends feedback to the sending node is determined by this item. When enabled, once the device exceeds the input data rate of another device, the receiving device will send a PAUSE frame which halts the transmission of the sender for a specified period of time. When disabled, the receiving device will drop the packet if too much to process.
Port Priority:	Set up the Port priority level 0~7.
Port VID:	Allow assign PVID for selected port. The range for the PVID is 1-4094. The PVID will be inserted into all untagged frames entering the ingress port. The PVID must as same as the VLAN ID that the port belong to VLAN group, or the untagged traffic will be dropped.
Port Enable:	The port can be set to disable or enable mode. If the port is set as 'Disable', it will not receive or transmit any packet.

Ingress Filter:	Enable ingress filtering for a port by checking the box. This parameter affects VLAN ingress processing. If ingress filtering is enabled and the ingress port is not a member of the classified VLAN of the frame, the frame is discarded. ■ **Enabled** ■ **Disabled** By default, ingress filtering is disabled (no checkmark).
Permit Frame Type:	Determines whether the port accepts all frames or only VLAN tagged frames. This parameter affects VLAN ingress processing. If the port only accepts tagged frames, untagged frames received on the port are discarded. Options: ■ **allType** ■ **tagged** By default, the field is set to **allType**.
Ingress Rate Control:	There are four kind of Limit Rate: 1. LimitAll 2. LimitB 3. LimitM 4. LimitBMUC
Ingress Rate Control Rate [0~1000000]	Set up the Rate of Ingress Rate.

Note

Due to GEPON OLT EPL-2000 SFP Port of GE1 & GE2 are configured as **1000Mbps Forced** Mode. If want to make the connection establish successfully, the switch's SFP Port should also change to be 1000Mbps Forced Mode. Otherwise, the connection might Link Fail.

4.2.8 Port Status

This page displays current port configurations and operating status – it is a ports' configurations summary table. Via the summary table, you can know status of each port clear at a glance, like Port Link Up/Link Down status, Link Speed, Duplex mode and Flow Control.

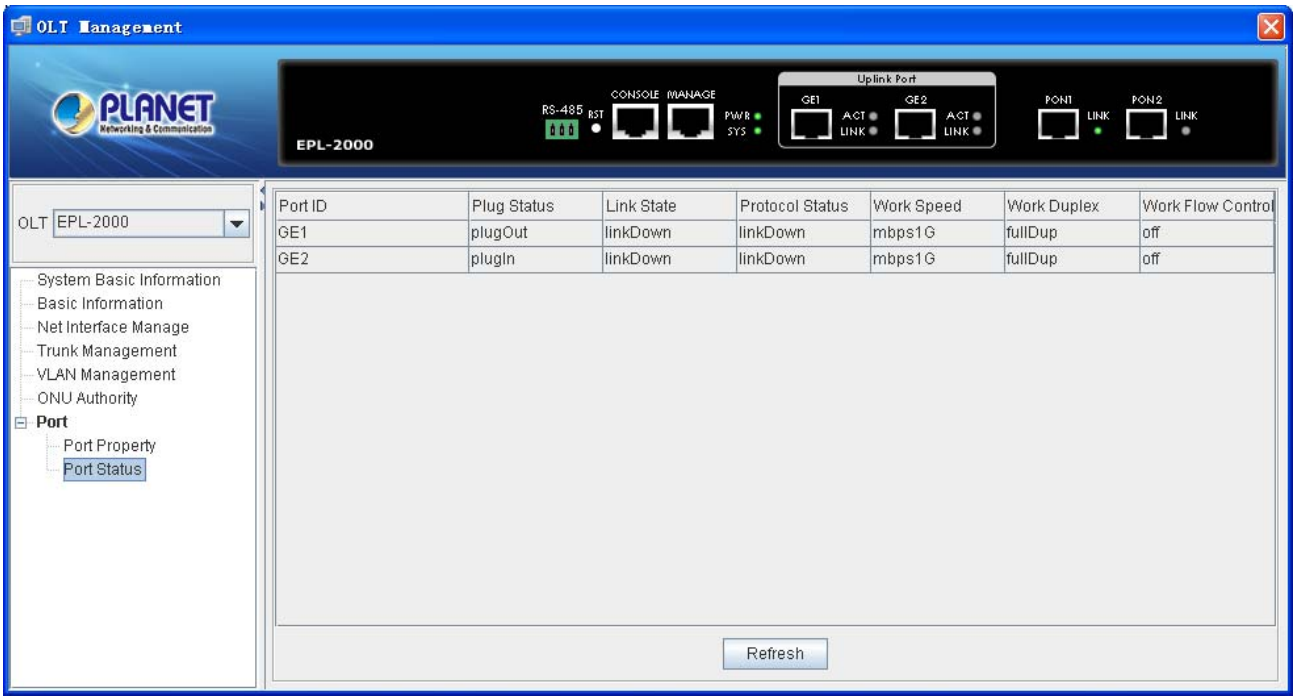


Figure 4-28 Port Status screen

4.3 PON Card Management

Double click the PON Card device node unit in the topology tree or clicks the Right mouse button on EPL-2000 and clicks [PON Card Management] in the interface, you will find the picture as follow:

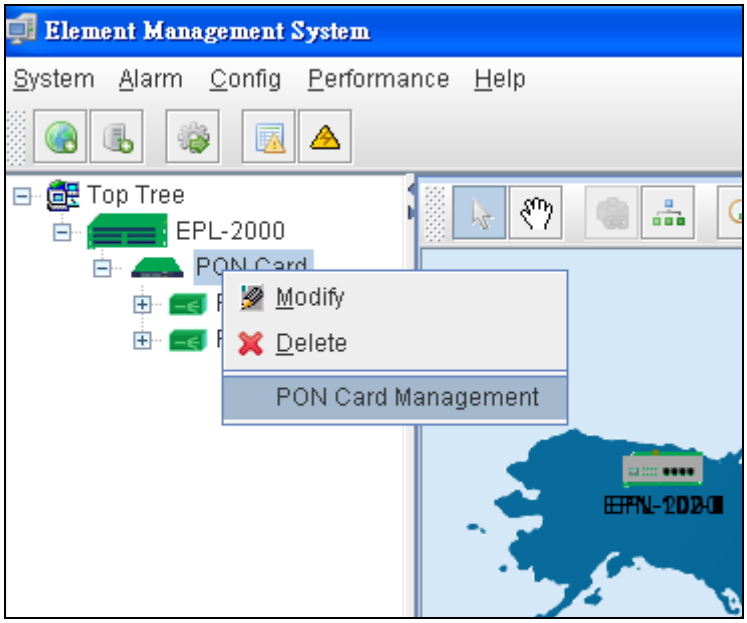


Figure 4-29 PON Card interface screen

4.3.1 Basic Information

This page displays current PON Card Information – it is a PON Card summary table. Via the summary table, you can know like Serial Number, PON Card firmware version, Running Status, Running Time and etc..

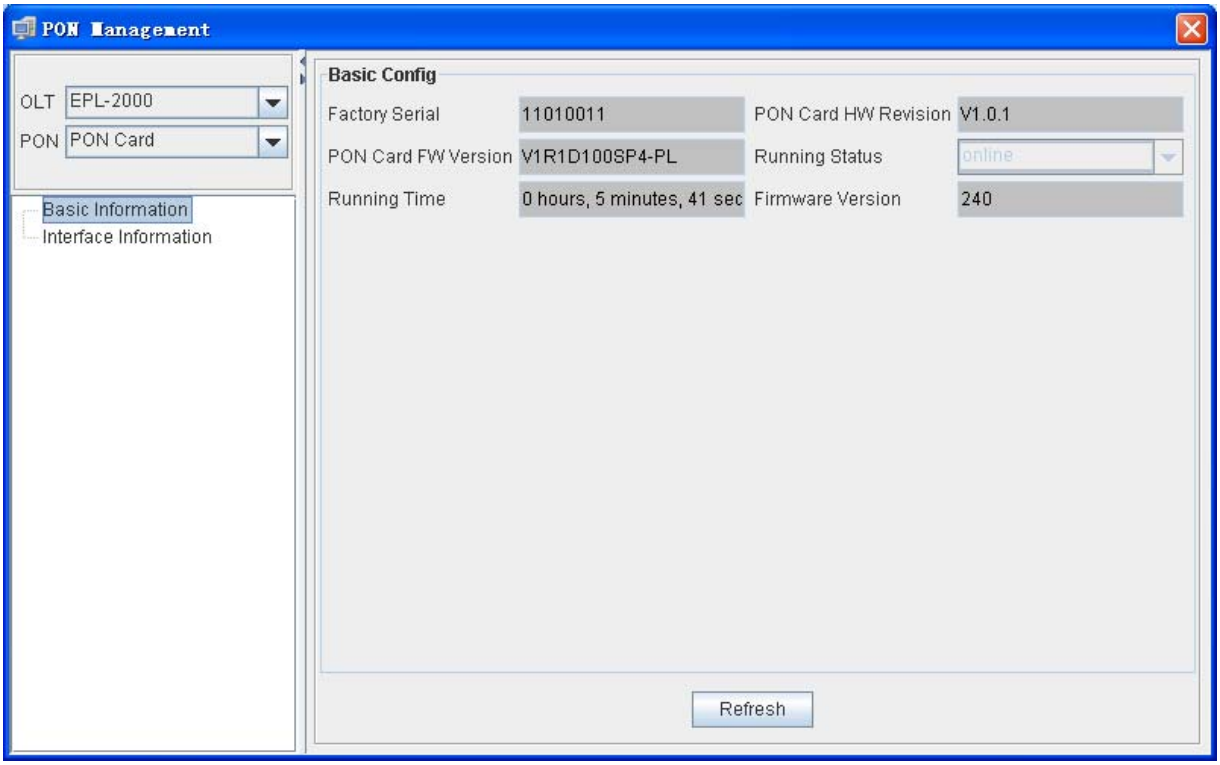


Figure 4-30 Basic Information screen

4.3.2 Interface Information

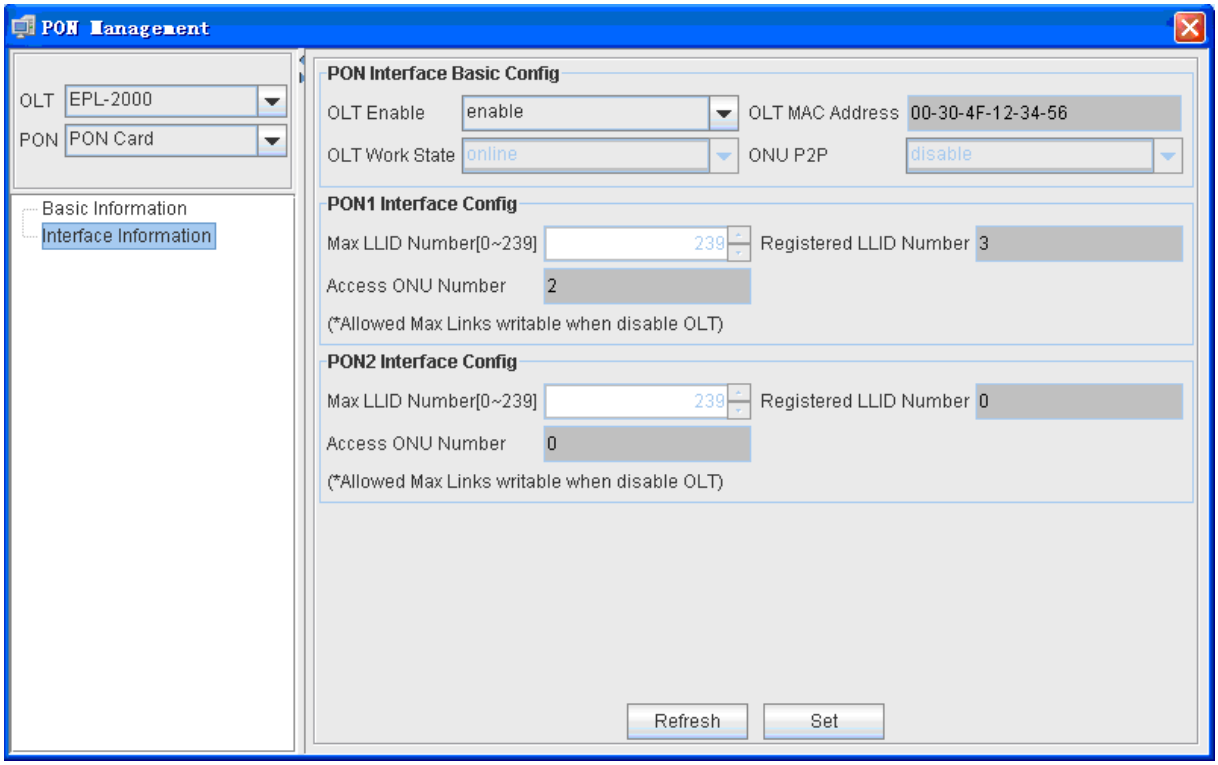


Figure 4-31 Interface Information screen

The popup window includes the following fields:

Object	Description
Port Interface Basic Config:	**OLT Enable:** The OLT can be set to disable or enable mode. If the OLT is set as 'Disable', it will not work anymore. **OLT MAC Address:** Shows the OLT MAC Address. **OLT Work Status:** Shows the current OLT status. **ONU P2P:** If set as 'Disable', the ONU P2P will not disable.
PON1 Interface Config:	**Max LLID Number[0~239]:** Allows to set value of LLID **Registered LLID Number:** Allows to set number of Registered LLID. **Access ONU Number:** Shows the current ONU devices.
PON2 Interface Config:	**Max LLID Number[0~239]:** Allows to set value of LLID **Registered LLID Number:** Allows to set number of Registered LLID. **Access ONU Number:** Shows the current ONU devices.

4.4 ONU Management

Double click the EPL-2000 device node unit in the topology tree or clicks the Right mouse button on EPL-2000 and clicks [Chassis Management] in the interface, you will find the picture as follow:

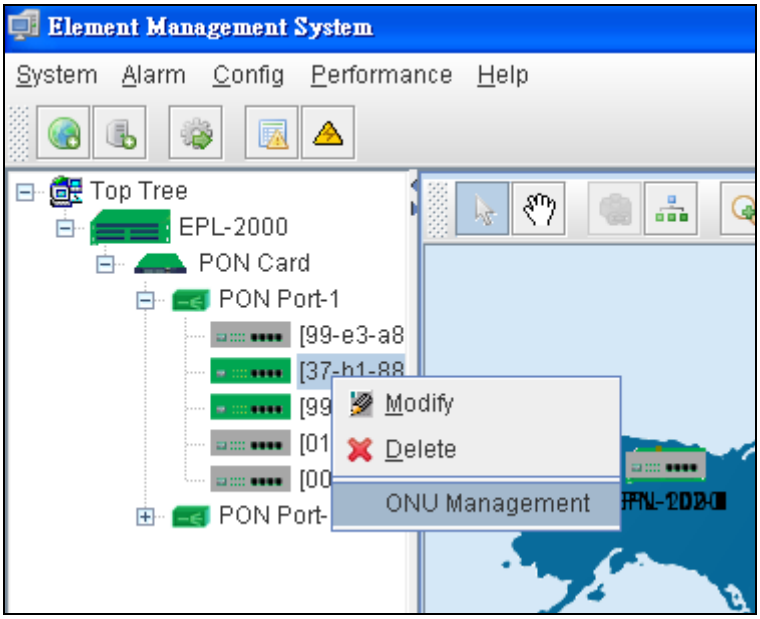


Figure 4-32 ONU Interface screen

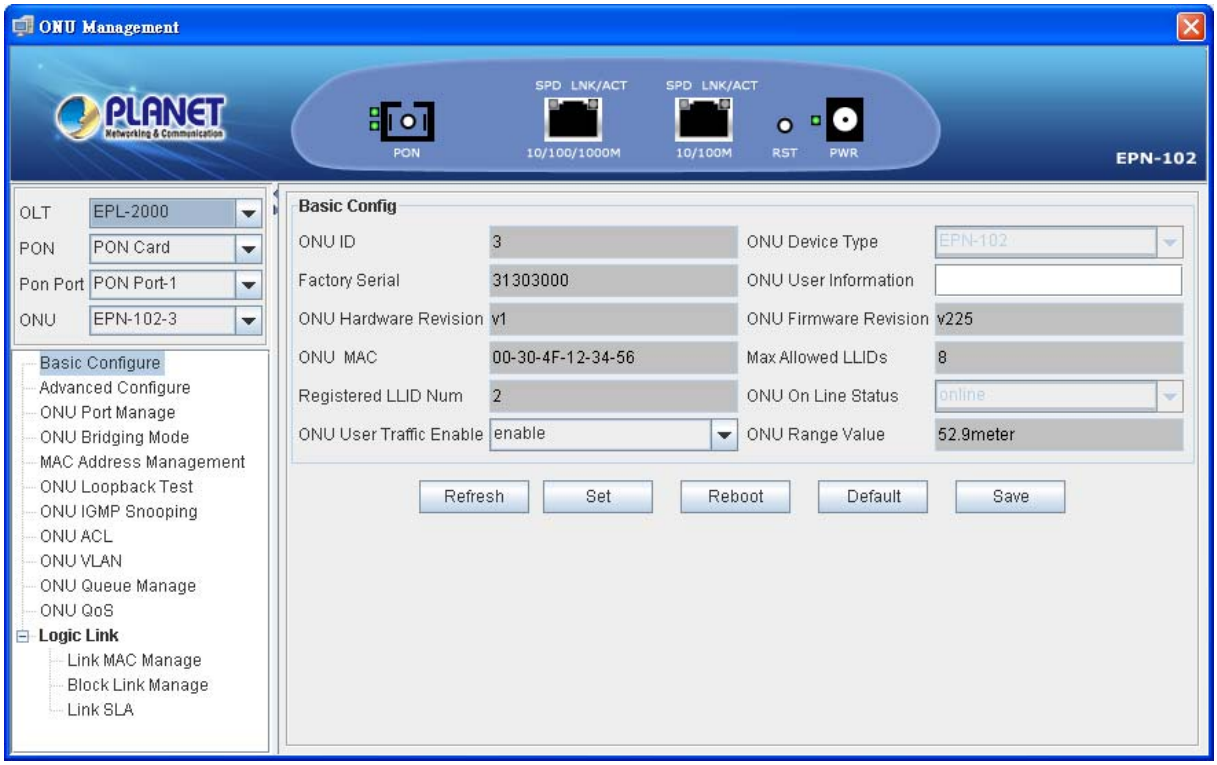


Figure 4-33 ONU Management screen

4.4.1 Basic Configure

The Basic System page provides information for the current device information. Basic System page helps an OLT administrator to identify the ONU device's firmware / hardware version, ONU MAC Address, ONU Line Status and others.

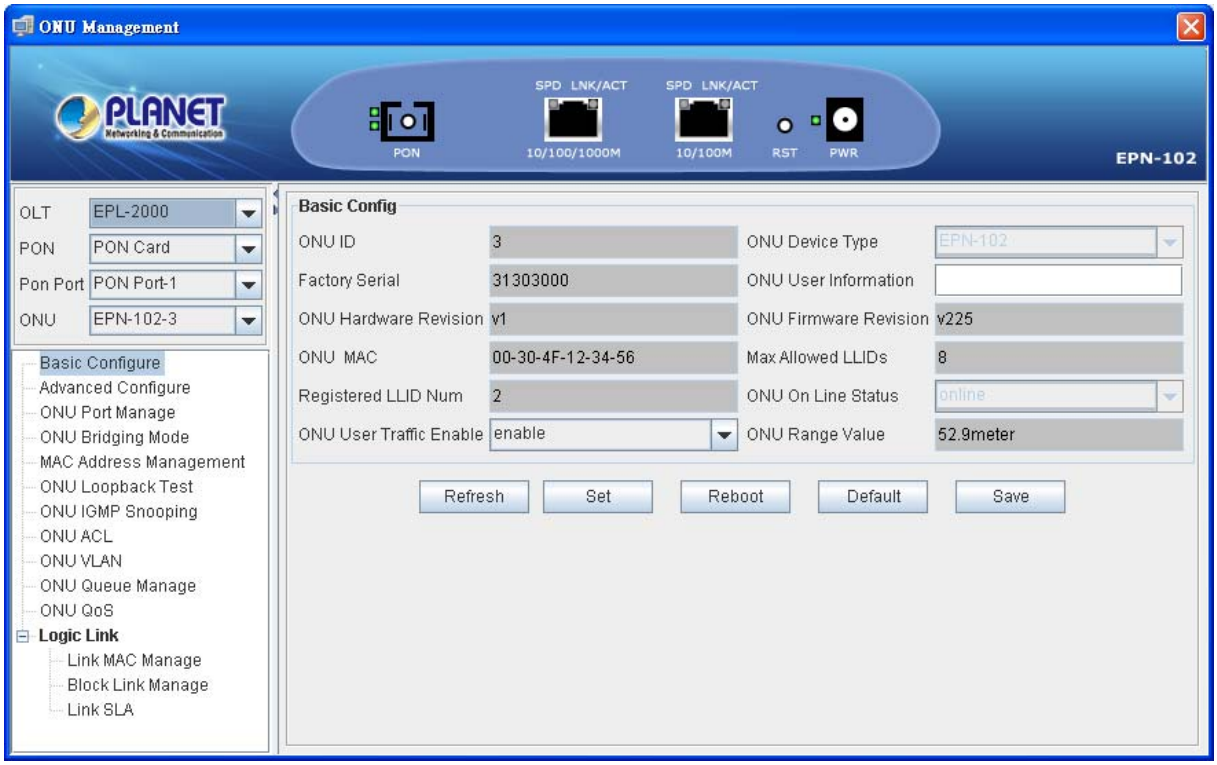


Figure 4-34 Basic Configure screen

The window includes the following fields:

Object	Description
ONU ID:	Number of ONU Device which detects by EMS Utility.
ONU Device Type:	Model name of ONU device.
Factory serial:	Displays Serial Number of ONU device.
ONU User Information:	Indicates the ONU description.
ONU Hardware Revision:	Displays the ONU Hardware Version.
ONU Firmware Revision:	Displays the ONU Firmware Version.
ONU MAC:	Displays the ONU MAC Address.
Max Allowed LLIDs:	Displays the ONU MAX
Registered LLID Num:	Displays the registered LLID Number of ONU.
ONU On Line Status:	Displays the current ONU status.
ONU User Traffic Enable:	Enable: Allows user to transfer data via port. Disable: No allows user to transfer data via port.
ONU Range Value:	Displays the distances from OLT to ONU. (Short cable will make the detection incorrectly.

4.4.2 Advanced Configure

■ Rapid Spanning Tree

The Spanning Tree protocol can be used to detect and disable network loops, and to provide backup links between switches, bridges or routers. This allows the switch to interact with other bridging devices in your network to ensure that only one route exists between any two stations on the network, and provide backup links which automatically take over when a primary link goes down. The **IEEE 802.1W Rapid Spanning Tree** Protocol allows for the blocking of links between switches that form loops within the network. When multiple links between switches are detected, a primary link is established. Duplicated links are blocked from use and become standby links. The protocol allows for the duplicate links to be used in the event of a failure of the primary link. Once the Spanning Tree Protocol is configured and enabled, primary links are established and duplicated links are blocked automatically. The reactivation of the blocked links (at the time of a primary link failure) is also accomplished automatically without operator intervention.

This automatic network reconfiguration provides maximum uptime to network users. However, the concepts of the Spanning Tree Algorithm and protocol are a complicated and complex subject and must be fully researched and understood. It is possible to cause serious degradation of the performance of the network if the Spanning Tree is incorrectly configured.

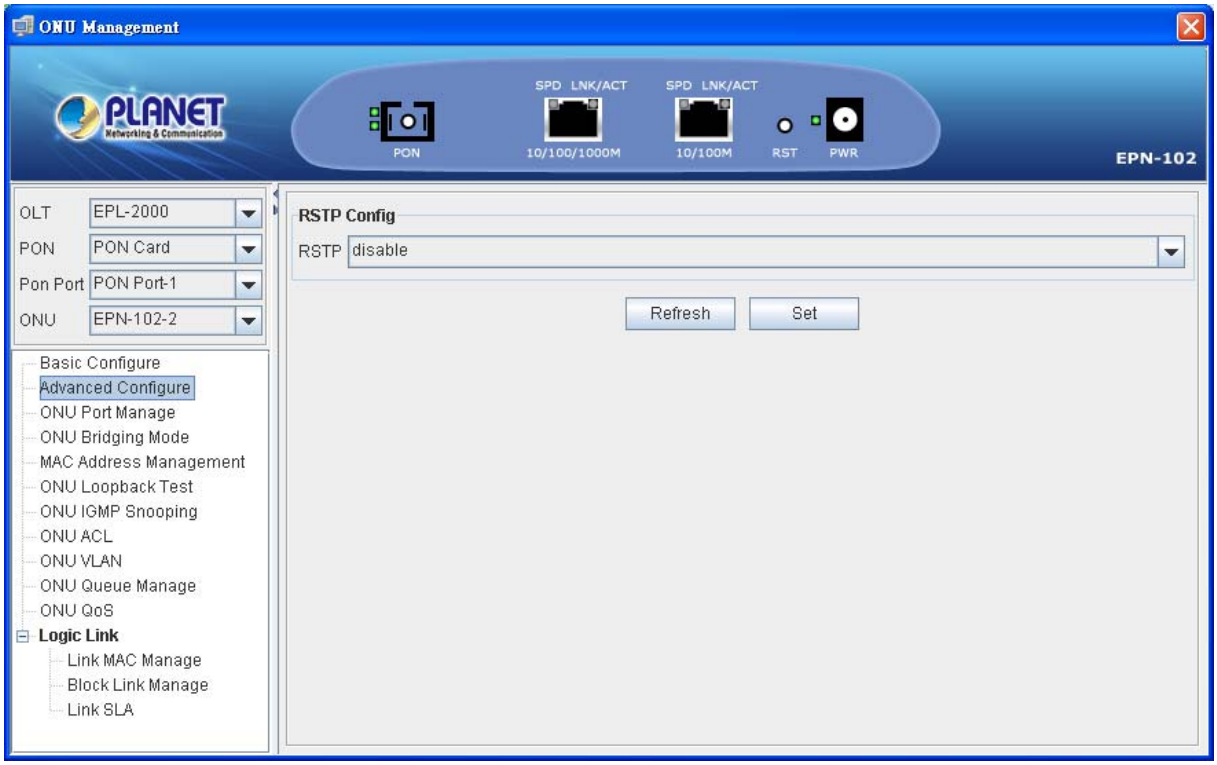


Figure 4-35 Advanced Configure screen

The window includes the following fields:

Object	Description
RSTP Config:	The RSTP function setting. Valid values are **Enable** and **Disable**.

4.4.3 ONU Port Management

In ONU Port Manage, you can configure the settings of ONU ports to control the connection parameters which likes Port Speed, Duplex mode, Flow Control and Port Auto-Negotiation.

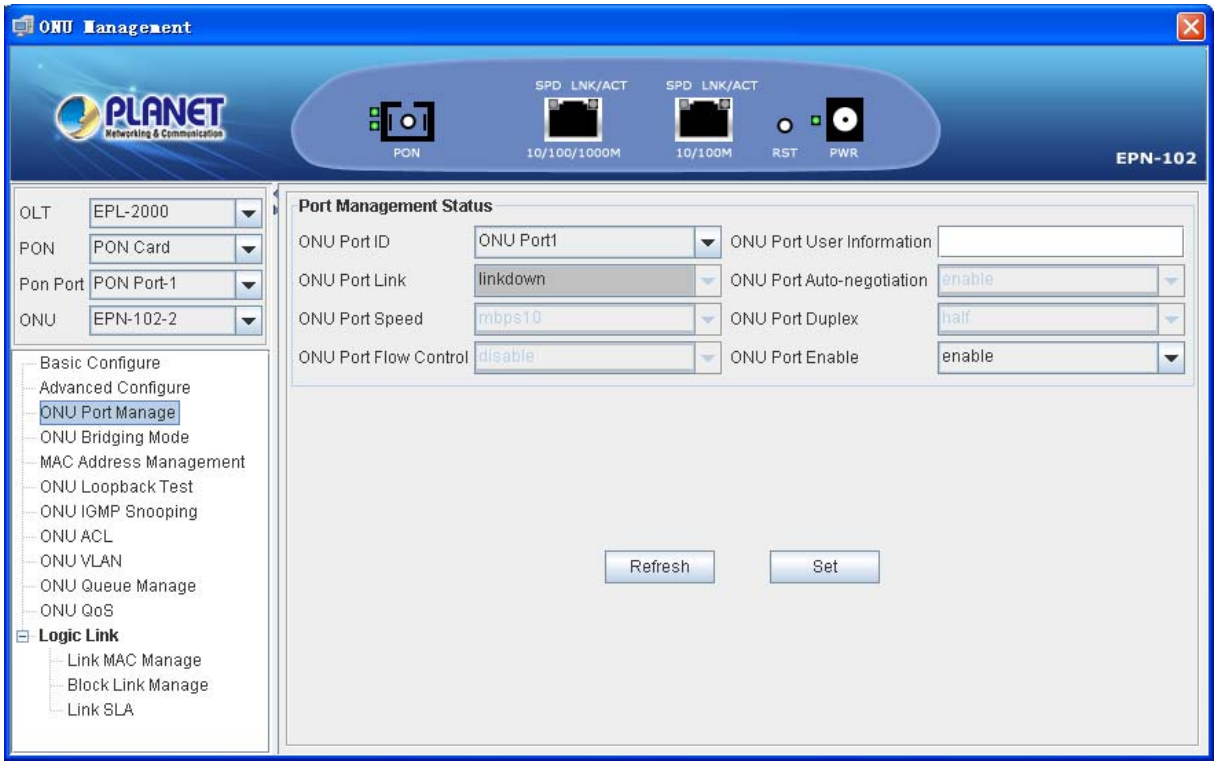


Figure 4-36 ONU Port Manage screen

The window includes the following fields:

Object	Description
ONU Port ID:	ONU Port1: 10/100/1000Mbps Port. ONU Port2: 10/100Mbps Port.
ONU Port User Information:	Indicates the ONU Port's description.
ONU Port Link:	Displays the current ONU Port status.
ONU Port Auto-Negotiation:	**Enable** and **Disable**. Being set as Enable, the speed and duplex mode are negotiated automatically. When you set it as Disable, you have to set the speed and duplex mode manually.
ONU Port Speed:	It is available for selecting when the Negotiation column is set as Disable. When the Negotiation column is set as Enable, this column is read-only.
ONU Port Duplex:	It is available for selecting when the Negotiation column is set as Disable. When the Negotiation column is set as Enable, this column is read-only.
ONU Port Flow Control:	It is available for selecting when the Negotiation column is set as Disable. When the Negotiation column is set as Enable, this column is read-only.
ONU Port Enable:	This allows user to Enable or Disable the ONU port.

4.4.4 ONU Bridging Mode

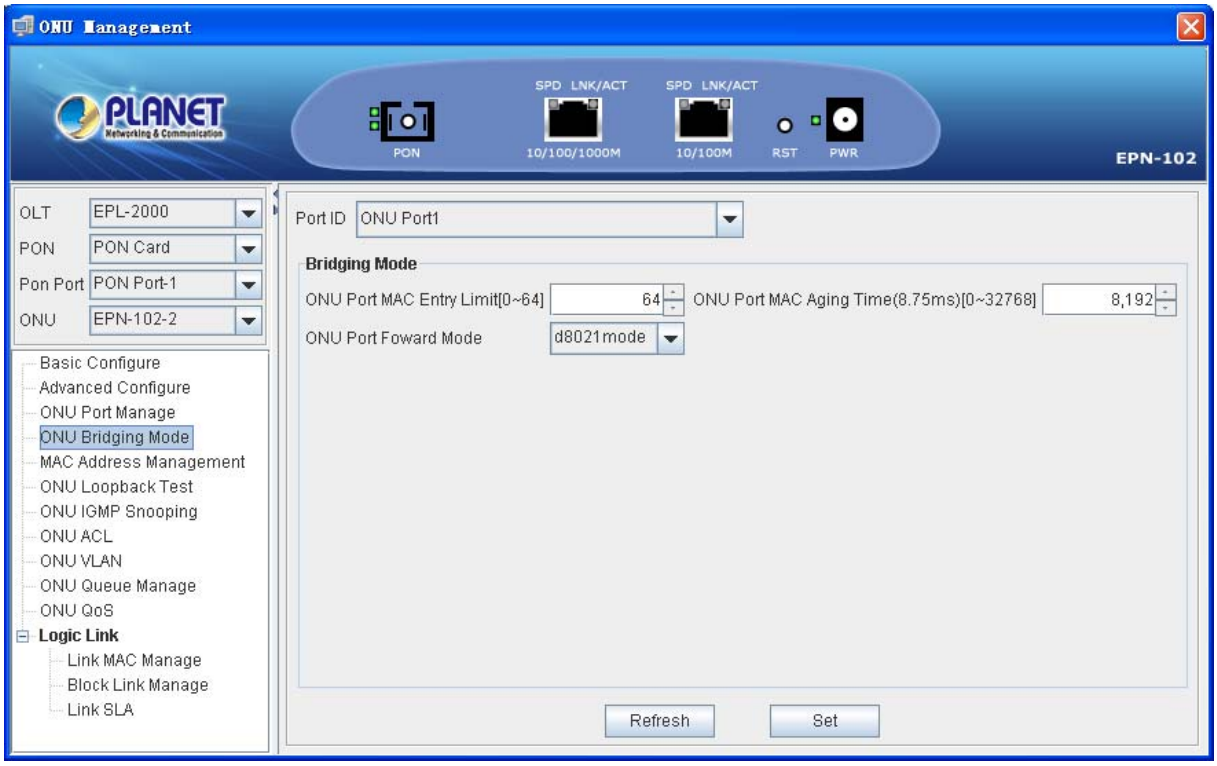


Figure 4-37 ONU Bridging Mode screen

The window includes the following fields:

Object	Description
ONU Port MAC Entry Limit[0~64] :	Allows to set the Limit of MAC address, range from 0~64.
ONU Port MAC Aging Time[0~32768]:	Allows to set the Aging time of MAC address, range from 0~32768.
ONU Port Forward Mode:	**d8021model:** broadcast those unlearned MAC address. **DropUtilLearn:** drops MAC address until it learns.

4.4.5 MAC Address Management

Entries in the MAC Table are shown on this page. The Dynamic MAC Table contains up to 64 entries max. You can view all of the dynamic MAC addresses learned by the listed port.

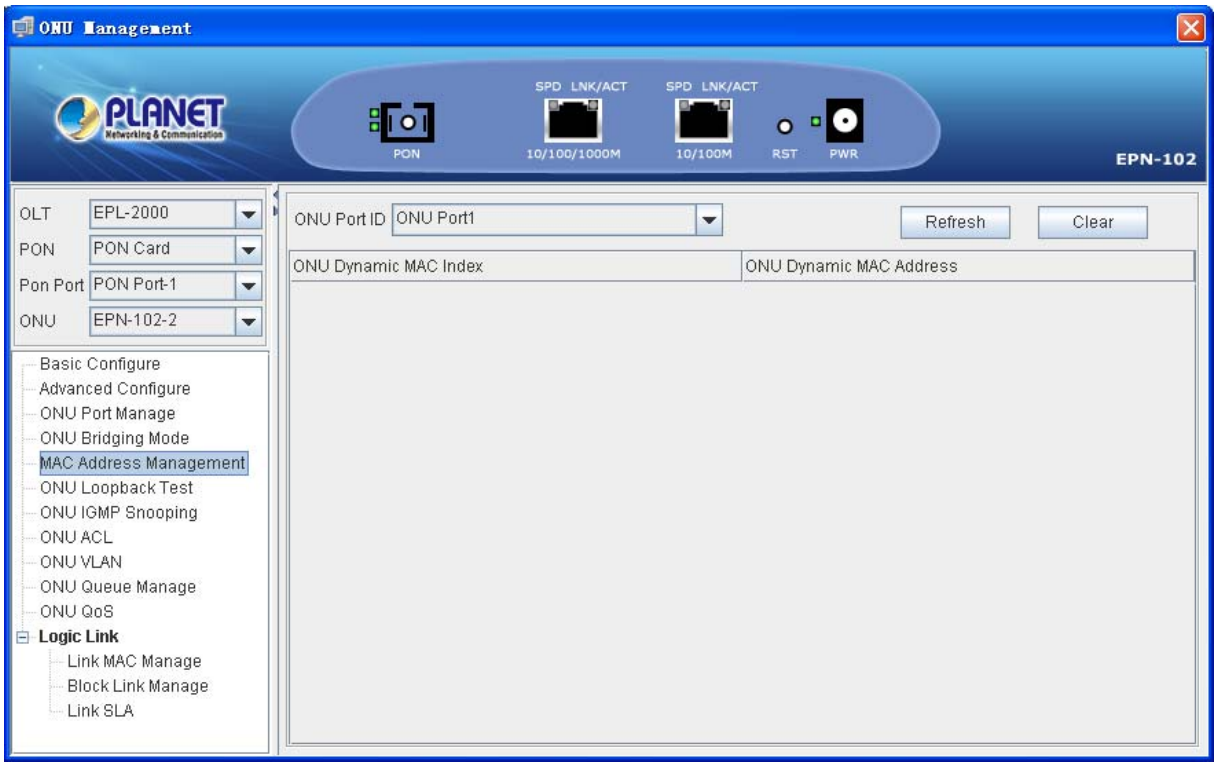


Figure 4-38 MAC Address Management screen

The window includes the following fields:

Object	Description
ONU Port ID :	ONU Port1: 10/100/1000Mbps Port. ONU Port2: 10/100Mbps Port.
ONU Dynamic MAC Index :	Displays the Index number of ONU MAC.
ONU Dynamic MAC Address:	The MAC address for the entry.

4.4.6 ONU Loopback Test

To operate ONU loopback test, please enter correct "frame number", "Payload Size" and "VLAN Tag" then you could click "test". OLT will send back loop back test frame to this ONU. When the test is under process and the status will show "busy", users can't go on any other test. The test status shows "ready" after OLT send back test results. At this time, user could continue the test operation. Users could click "reset" to make the test status "ready".

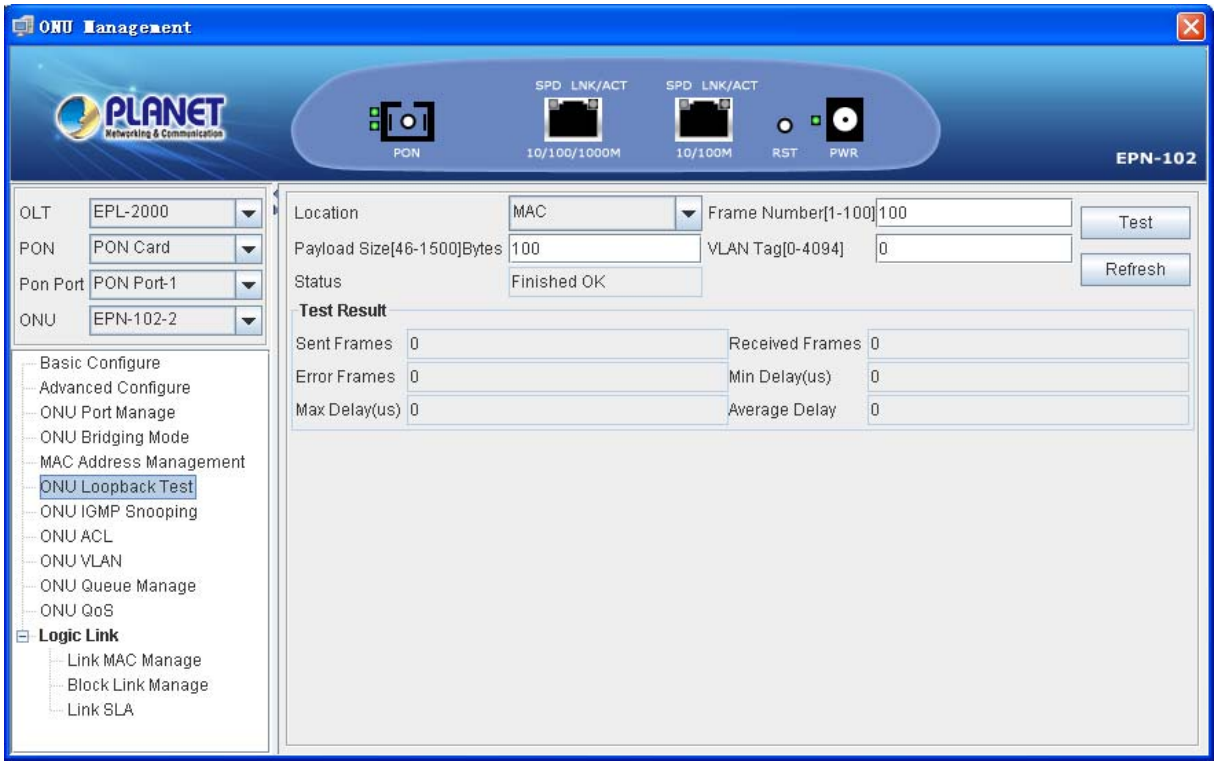


Figure 4-39 ONU Loopback Test screen

The window includes the following fields:

Object	Description
Location:	Selects Test Location: **MAC** and **PHY**.
Frame Number[1-100] :	Selects the vaule of frames for testing. Range from 1-100.
Payload Size [46-1500] Bytes:	Selects the vaule of Payload Size for testing. Range From 46-1500 Bytes.
VLAN Tag[0-4096]:	Selects the specific VLAN Tag ID.
Test Result:	Displays the result of loopback testing.

4.4.7 ONU IGMP Snooping

The **Internet Group Management Protocol (IGMP)** host and routers share information about multicast groups memberships. IGMP snooping is a switch feature that monitors the exchange of IGMP messages and copies them to the CPU for feature processing. The overall purpose of IGMP Snooping is to limit the forwarding of multicast frames to only ports that are a member of the multicast group.

About the Internet Group Management Protocol (IGMP) Snooping

Computers and network devices that want to receive multicast transmissions need to inform nearby routers that they will become members of a multicast group. The **Internet Group Management Protocol (IGMP)** is used to communicate this information. IGMP is also used to periodically check the multicast group for members that are no longer active. In the case where there is more than one multicast router on a sub network, one router is elected as the 'queried'. This router then keeps track of the membership of the multicast groups that have active members. The information received from IGMP is then used to determine if multicast packets should be forwarded to a given sub network or not. The router can check, using IGMP, to see if there is at least one member of a multicast group on a given subnet work. If there are no members on a sub network, packets will not be forwarded to that sub network.

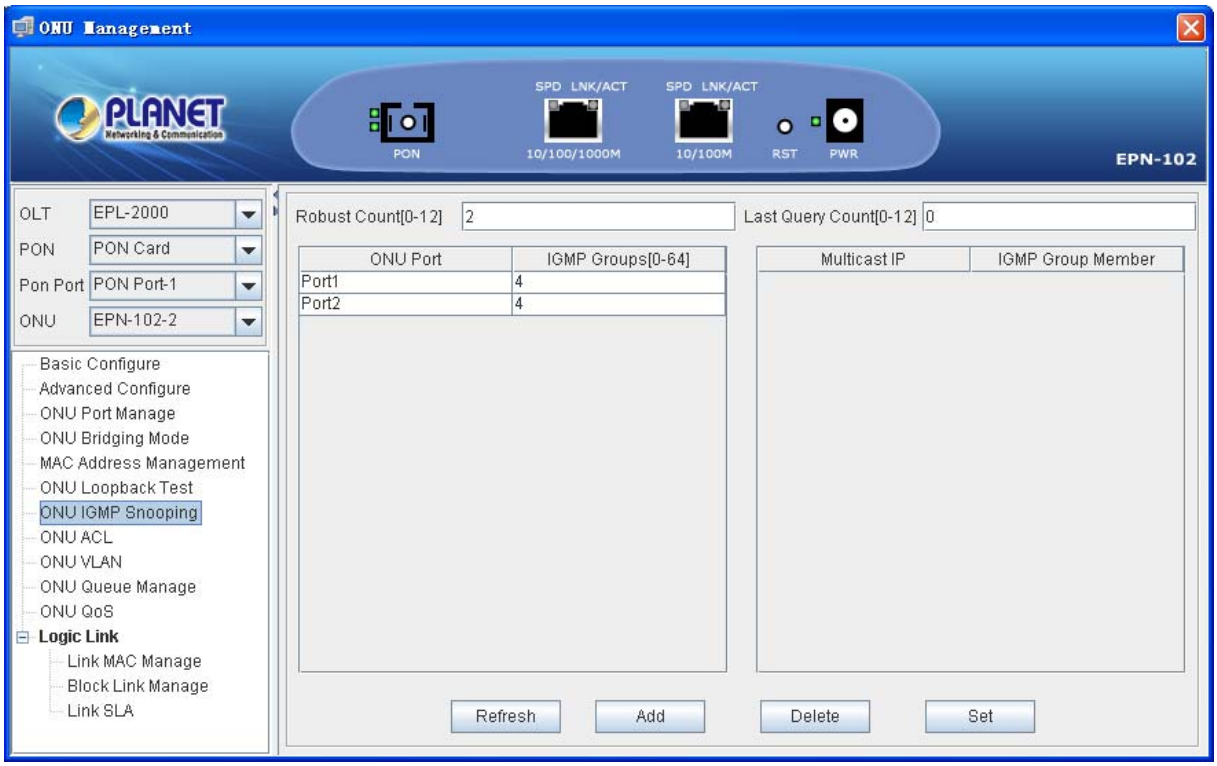


Figure 4-40 ONU IGMP Snooping screen

The window includes the following fields:

Object	Description
Robust Count[0-12]:	The robust count automatically changes certain IGMP message intervals for IGMPv2 and IGMPv3. Increasing the robust count allows for more packet loss

	but increases the leave latency of the subnetwork.
Last Query Count[0-12] :	Number of group-specific queries sent before the router assumes there are no local members of a group. The number of queries is equal to the value of the robustness variable.
ONU Port:	This is the logical port number for this row.
IGMP Groups[0-64]:	Group of IGMP.
Multicast IP:	Displays the setting of IGMP Address.
IGMP Group Member:	Displays the IGMP members.

To force steaming multicast stream to indicate port, please clicks "**Add Button**" to add a static multicast address, it remains in the multicast group table, regardless of whether the multicast stream has been joined or hasn't been joined. The static multicast group will be saved to switch and it will not be released, even no one join it or even the multicast group no more streaming, unless user delete it. Please enter "**IGMP IP Address**",and select ports then clicks "**OK Button**" to add ONU's IGMP IP address and corresponding port member.(Remark: Valid IGMP IP address range should be 224.0.0.1~239.255.255.255.)

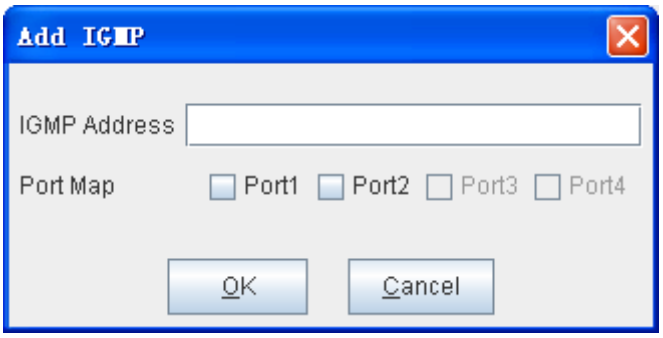


Figure 4-41 Add IGMP screen

The window includes the following fields:

Object	Description
IGMP Address:	Allows user to input multicast address group.
Port Map :	Allows user to select IGMP members of port.

4.4.8 ONU ACL Configure

The **Access Control List (ACL)** is a concept in computer security used to enforce privilege separation. It is a means of determining the appropriate access rights to a given object depending on certain aspects of the process that is making the request, principally the process's user identifier. **Access Control List (ACL)** is a mechanism that implements access control for a system resource by listing the identities of the system entities that are permitted or denied to access the resource. The screen in following screen appears.

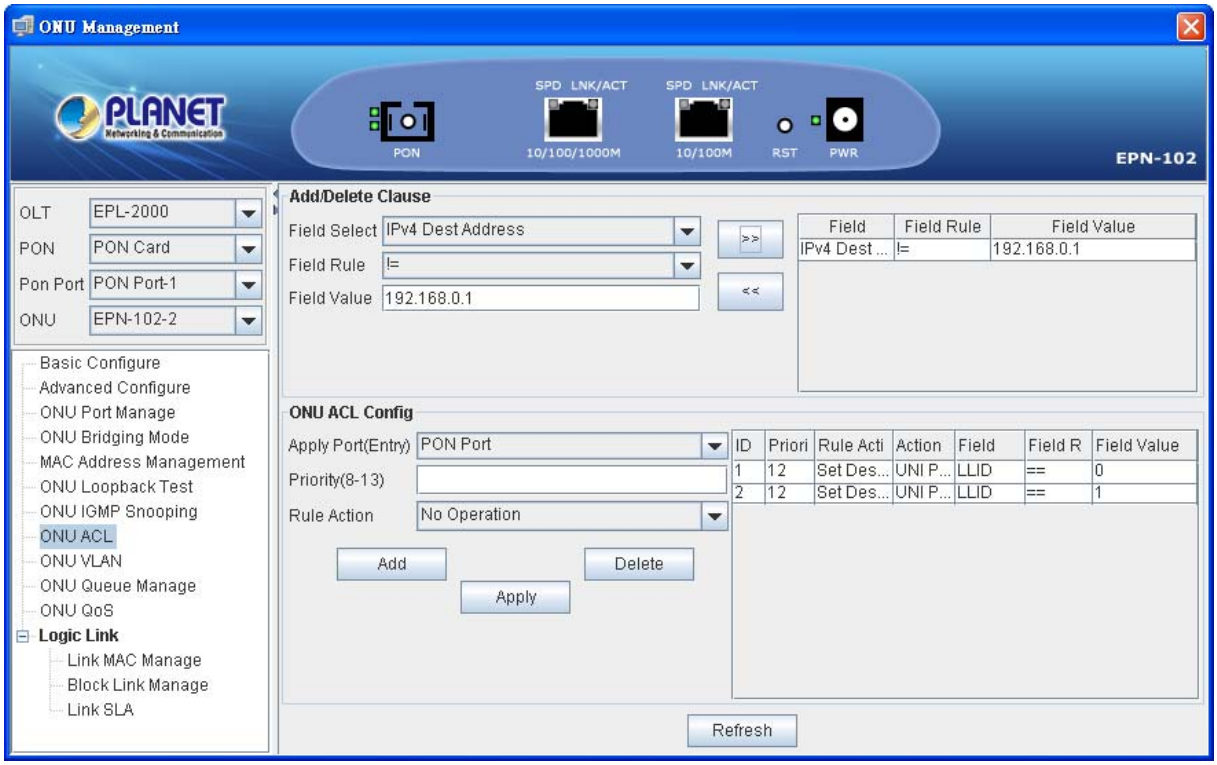


Figure 4-42 ONU ACL screen

The window includes the following fields:

Object	Description
Add/Delete Clause:	This Clause column includes three items: **Field Select:** Select the kind of main object. **Field Rule:** Select the kind of rule. **Field Value:** Fill-in the relate value.
ONU ACL Config:	This ACL Config column includes three items: **Apply Port(Entry):** Select the port which want to set ACL. **Priority(8-13):** Enter the Priority, range from 8-13. **Rule Action:** Select the action of rule.

4.4.9 ONU Queue Management

The GUI may be used to configure various aspects of the ONU data path. Such as the ONU queue configuration, classification of user data traffic and filtering of user data traffic. Because these operations are very complex the user interface is divided between several panels.

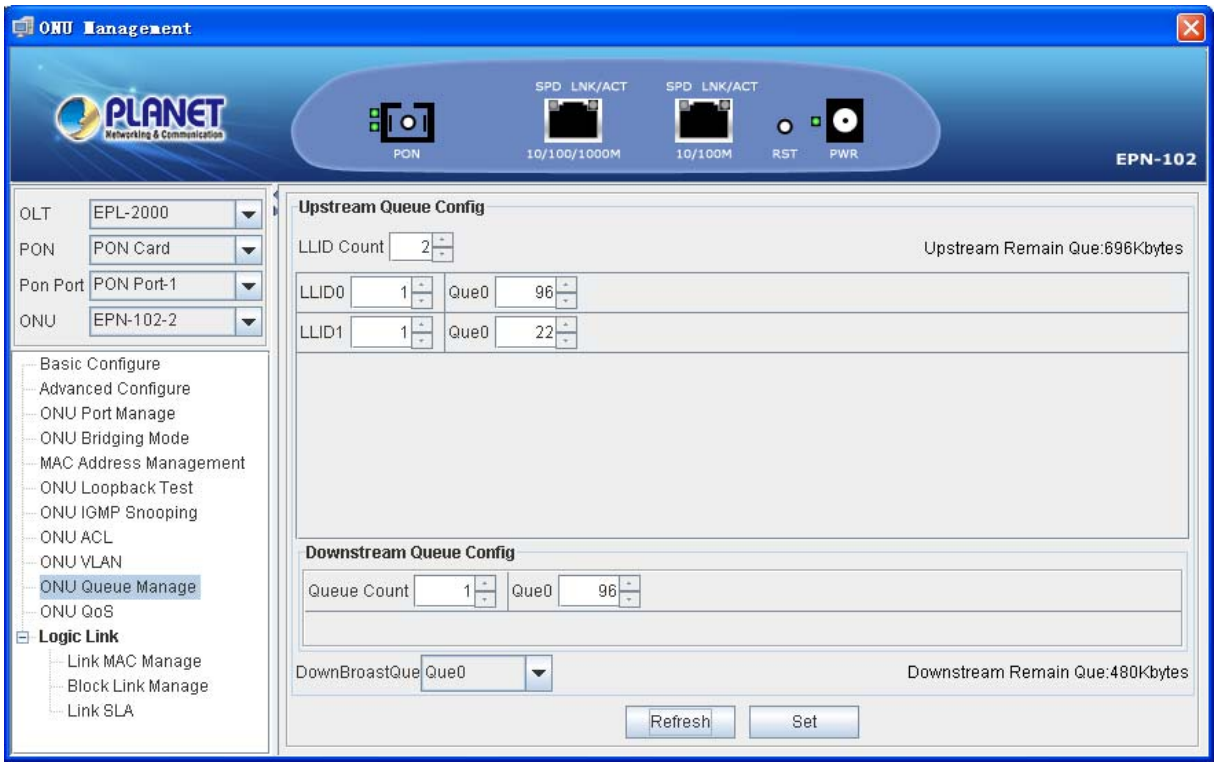


Figure 4-43 ONU Queue Manage screen

The window includes the following fields:

Object	Description
Upstream Queue Config:	LLID Count: Select the number of active ports and links. It can set 8 LLID and 10 Queues at most.
Downstream Queue Config :	Configures the Downstream Queue, it can set 17 Queues at most.
DownBroastQue:	Selects the Downstream Queue.

4.4.10 Link MAC Management

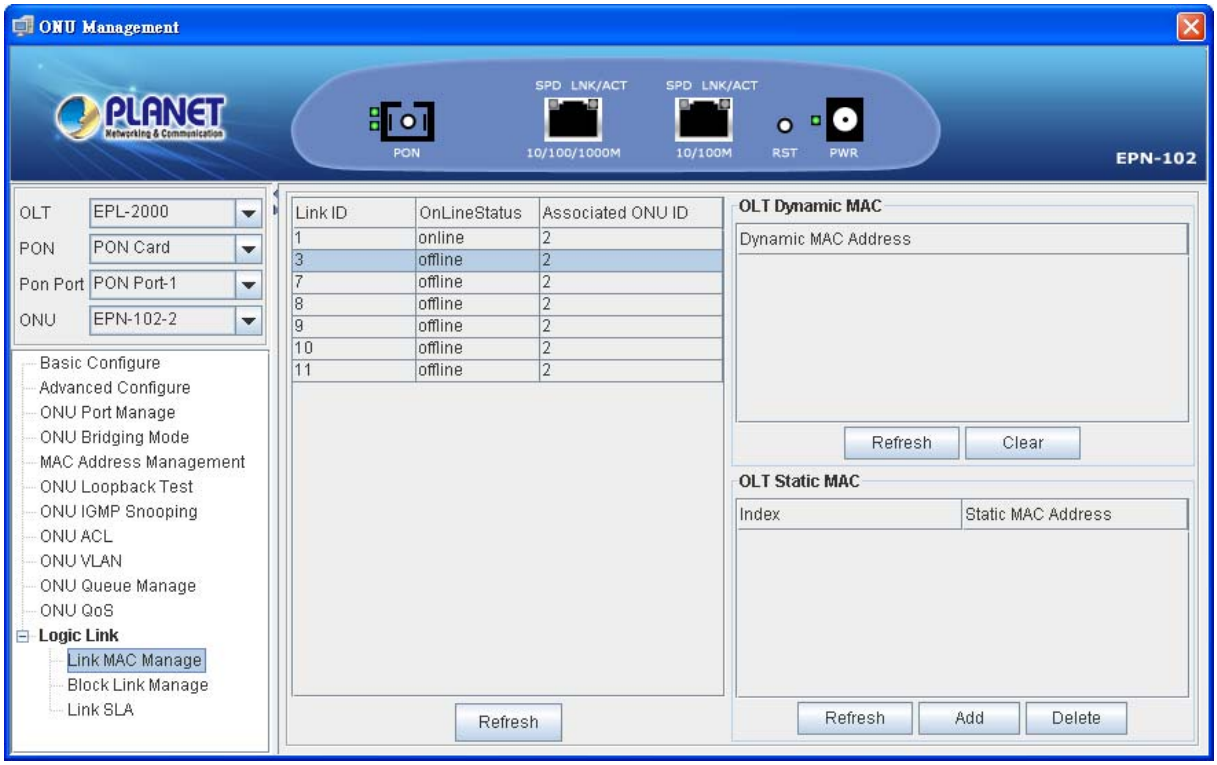


Figure 4-44 Link MAC Manage screen

The window includes the following fields:

Object	Description
Link ID:	Indicates the Link number.
OnLineStatus :	Shows the current link status.
Associated ONU ID:	Indicates the number of ONU ID from EMS utility.
OLT Dynamic MAC:	Displays the current connection of MAC Address.
OLT Static MAC:	Allows to set the Static MAC Address.

To clicks "**Add Button**" to add a static MAC address, please enter "**MAC Address**",and select ports then clicks "**OK Button**" to add MAC address.

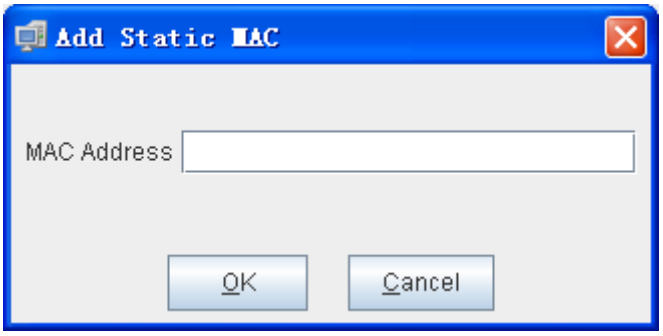


Figure 4-45 Add Static MAC screen

4.4.11 Block Link Management

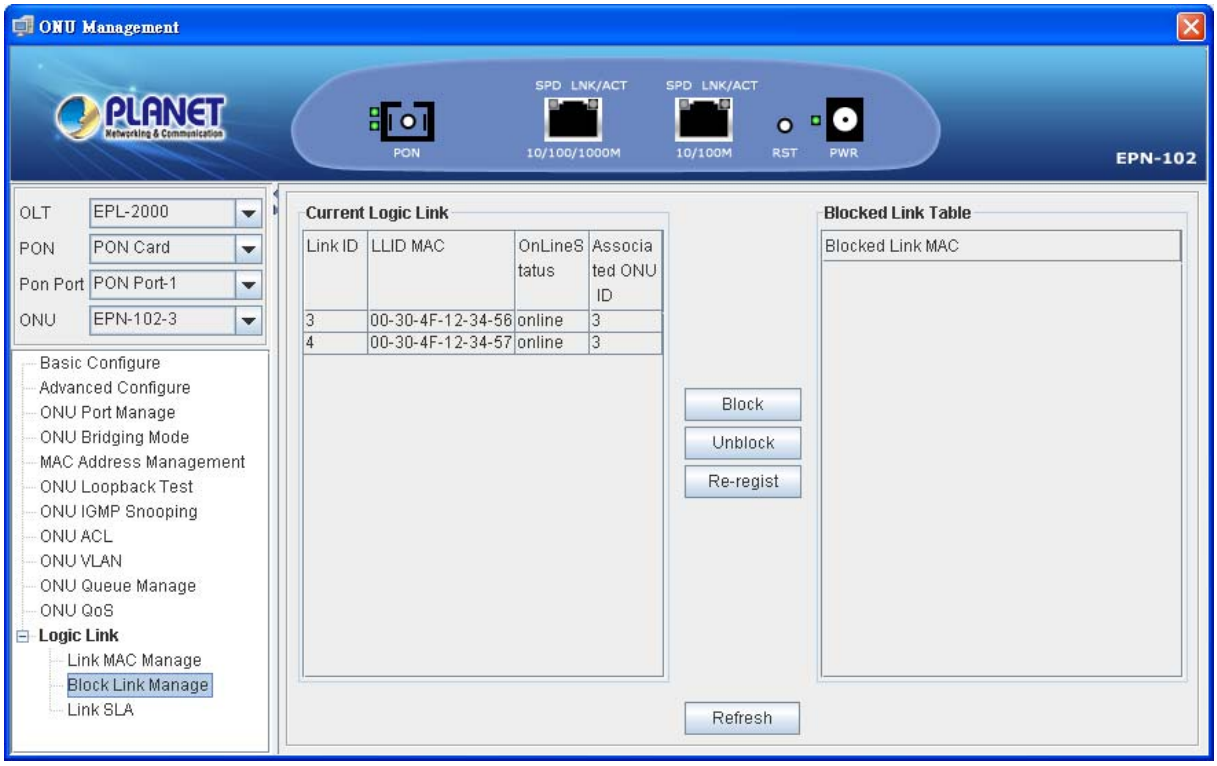


Figure 4-46 Block Link Manage screen

The window includes the following fields:

Object	Description
Current Logic Link:	Displays the current Logic Link.
Block	Block the Selecting current Logic Link.
Unblock	Unblock the link from Block Link Table.
Block Link Table:	Displays the Block Link List.

4.4.12 Link SLA

A **service-level agreement (SLA)** is a part of a service contract where the level of service is formally defined. In practice, the term SLA is sometimes used to refer to the contracted delivery time (of the service) or performance.

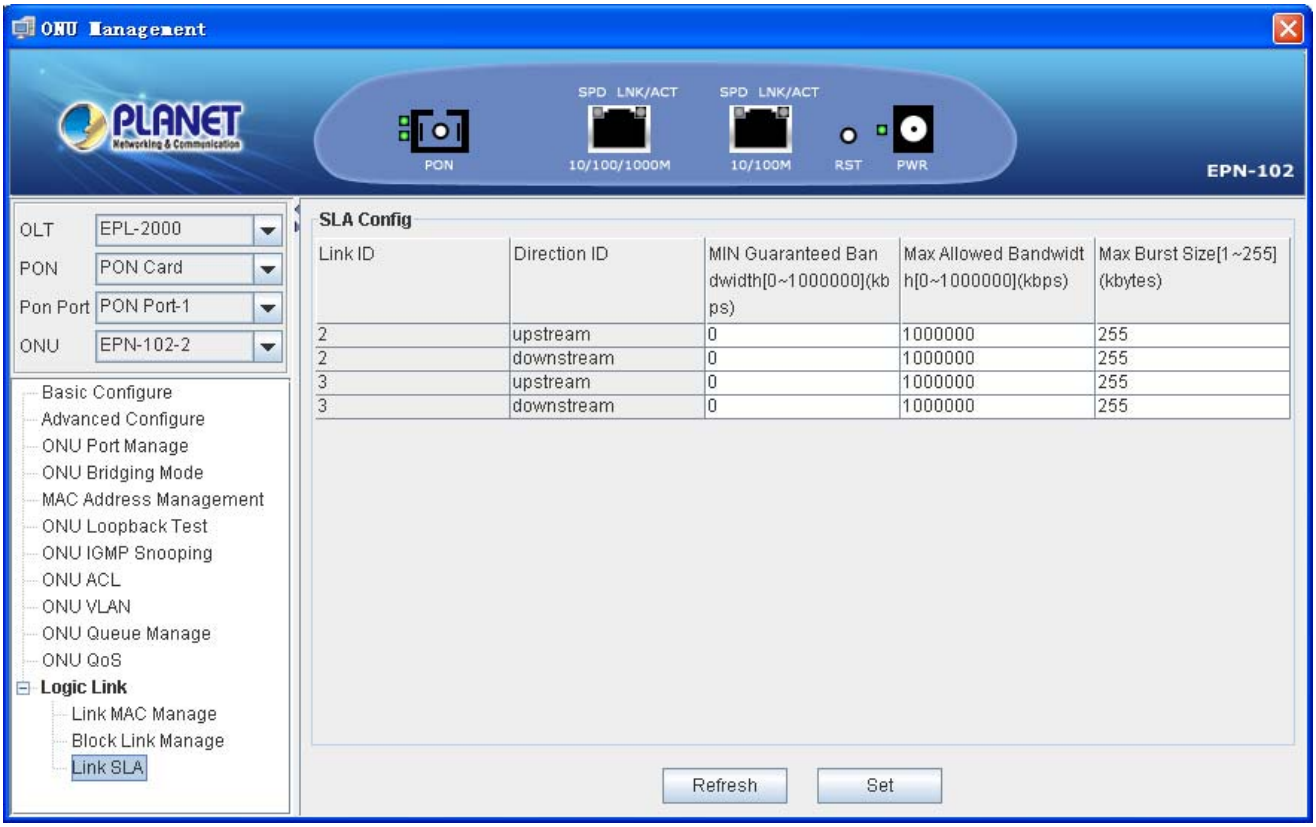


Figure 4-47 Link SLA screen

The window includes the following fields:

Object	Description
Link ID:	Indicates the Link ID from ONU device.
Direction ID:	There are two directions: Upstream and Downstream.
Min Guaranteed Bandwidth:	Guaranteed Minimax of Bandwidth.
Max Allowed Bandwidth:	Allows the Max. of Bandwidth.
Max Burst Size:	Configures the Max. of Burst Size.

4.5 How to Upgrade EPL-2000 firmware

For upgrading the EPL-2000 firmware, you need to have FTP server software. Here we are using Home FTP Server software for making example:

1. Operates the Home FTP server. The following main page will appear,

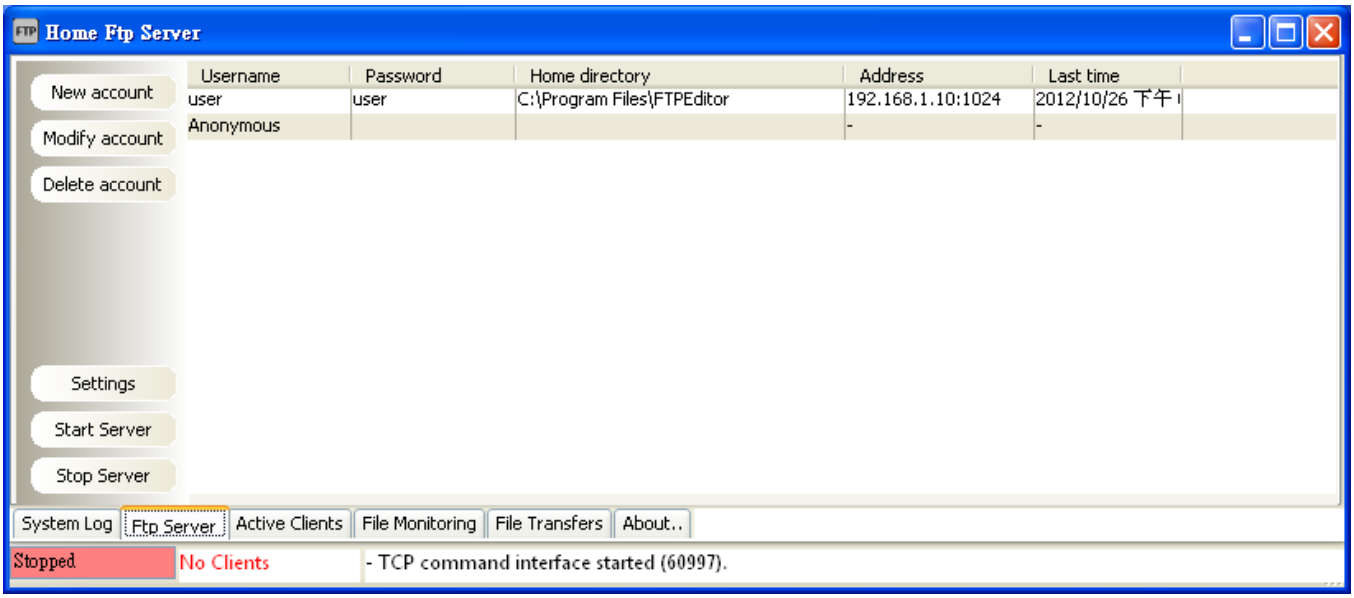


Figure 4-48 Home Ftp Server main screen

2. Press the "**New account**" on the left column, the Ftp Client Editor window will appears like below picture. Please fill in the user name and password as "**user**".

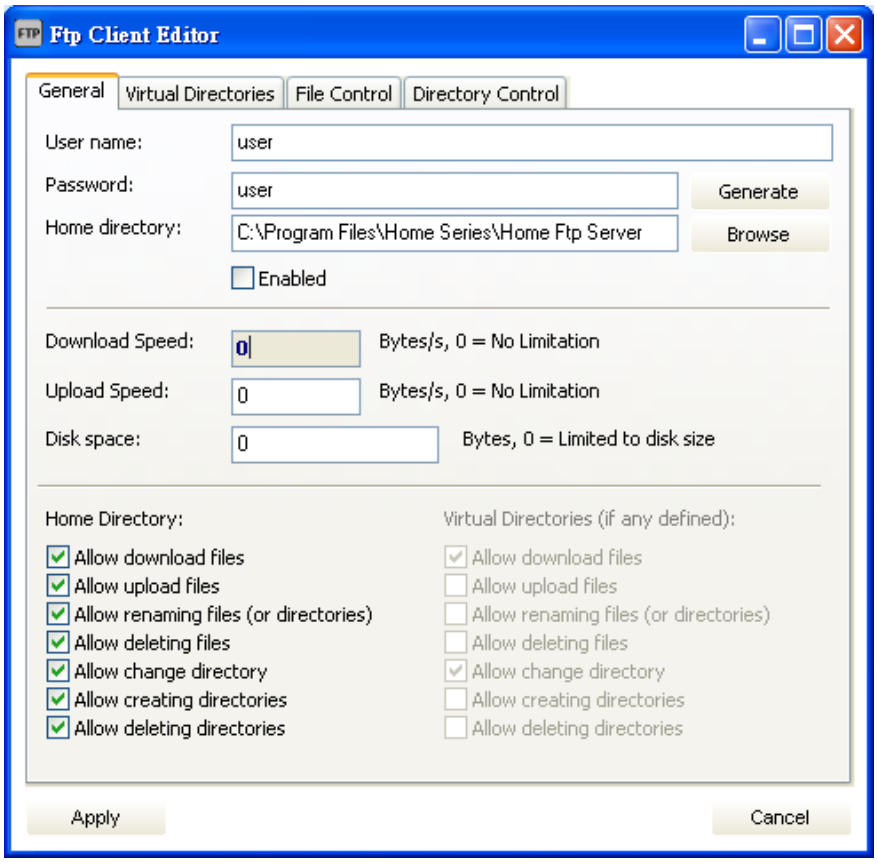


Figure 4-49 Ftp Client Editor screen

3. Excutes "Start Server" for making connection establishes.

4. Copys the EPL-2000 firmware to the Home Ftp server directory.

For example: C:\Program Files\Home Series\Home Ftp Server

5. Operates EMS utility → clicks EPL-2000 once → excutes "Device Upgrade" on the EMS toolbar of Config.

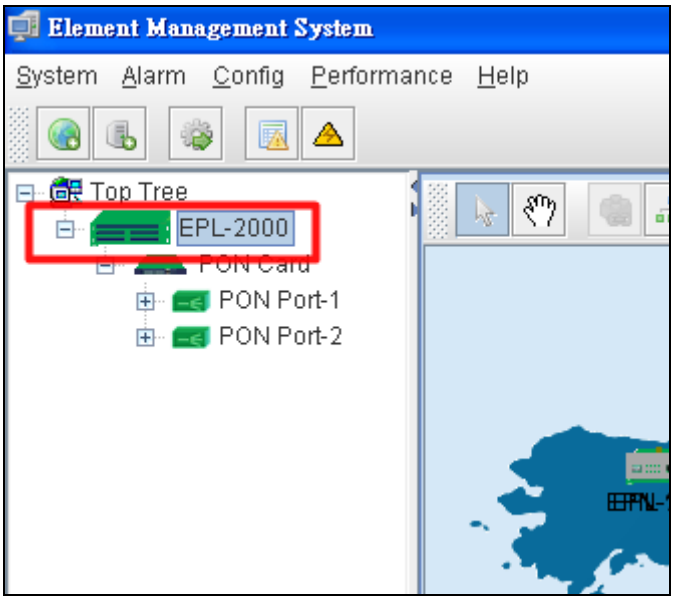


Figure 4-50 EPL-2000 Interface screen

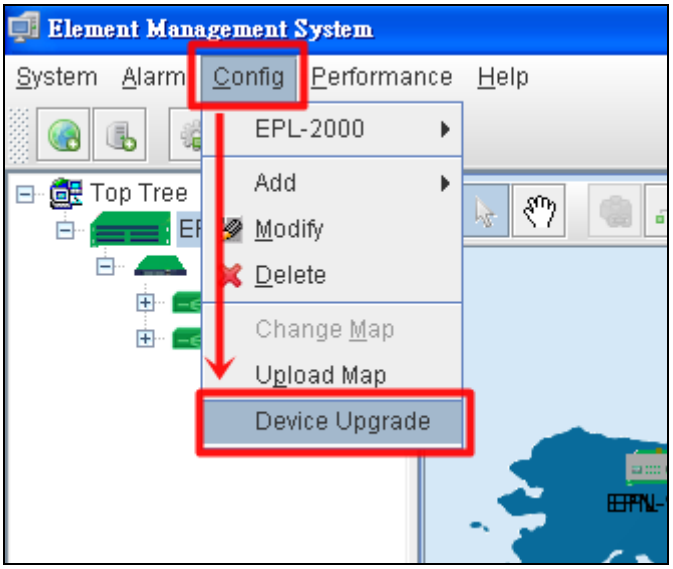


Figure 4-51 Device Upgrade item screen

6. After executes the Device Upgrade, the following window will appear. Please fill in the user name and password as "**user**".

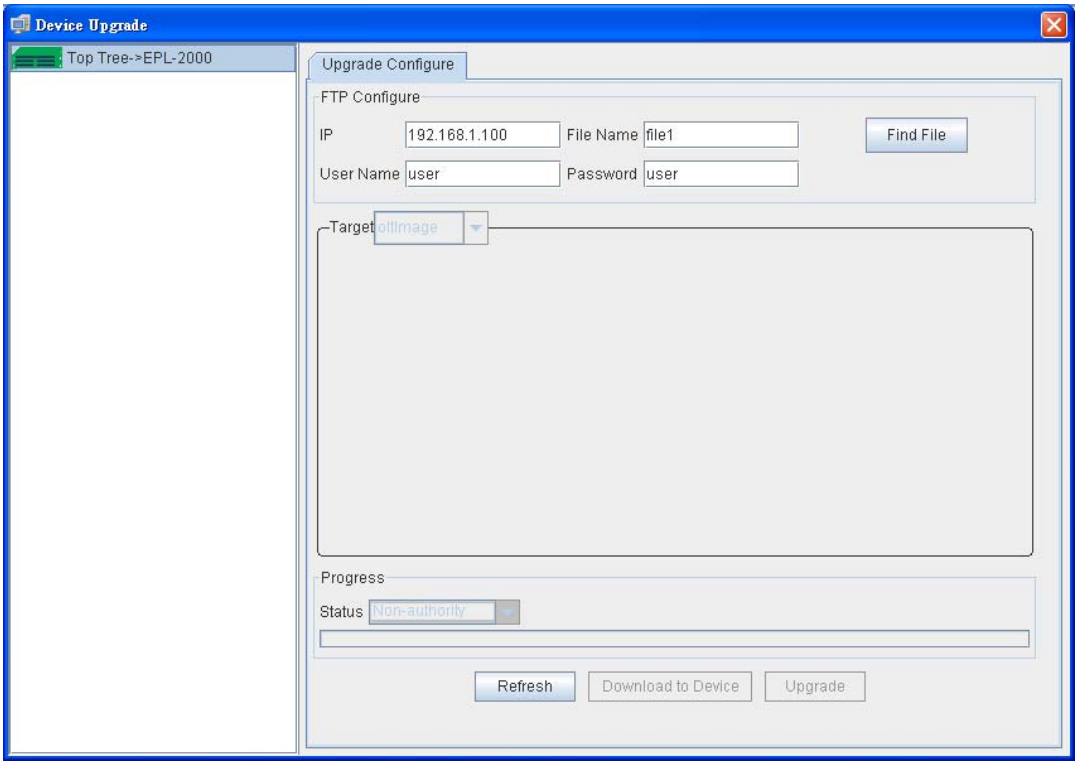


Figure 4-52 Device Upgrade Procedure (1) screen

7. Press "**Find File**" button to get EPL-2000 firmware. Following the Step3, the file should be at "C:\Program Files\Home Series\Home Ftp Server".

8. Press "**Download to Device**" button for downloading the firmware, after couple of seconds, the Protess Status will appear " **TransmitOK**". Like the picture below:

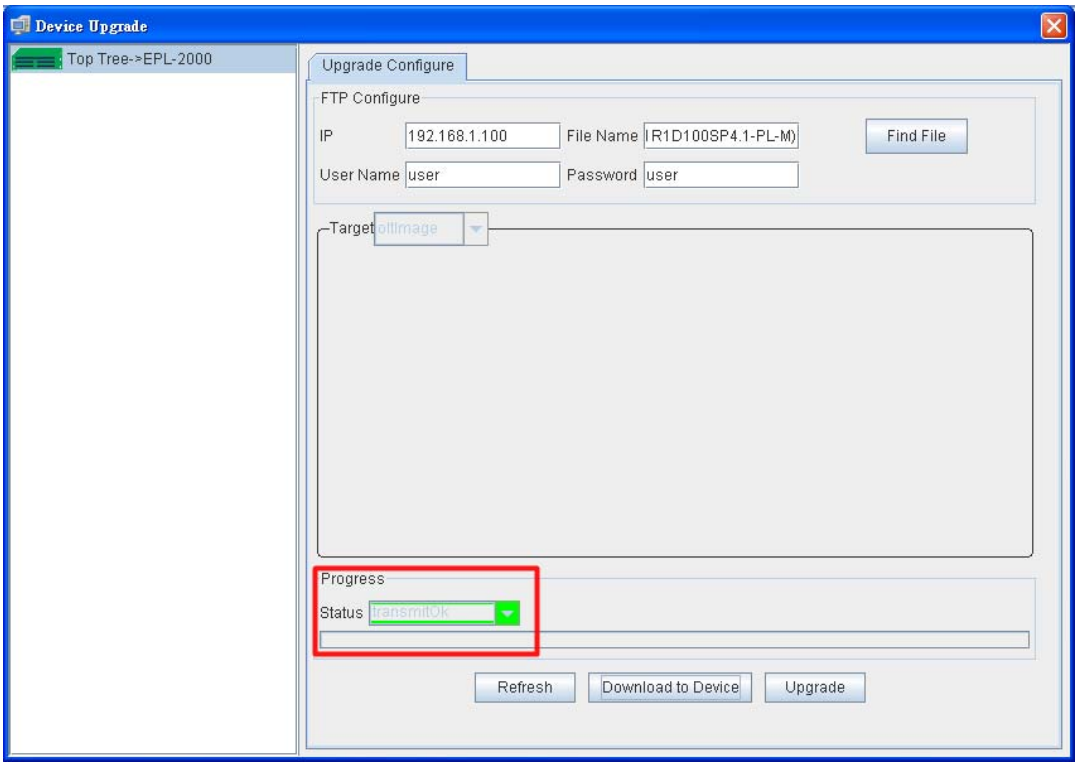


Figure 4-53 Device Upgrade Procedure (2) screen

9. Press "Upgrade" button for upgrading the firmware, during the period, the Progress Status will show "Upgrading", after finish the upgrading, the Progress Status will becomes "Upgrade OK".

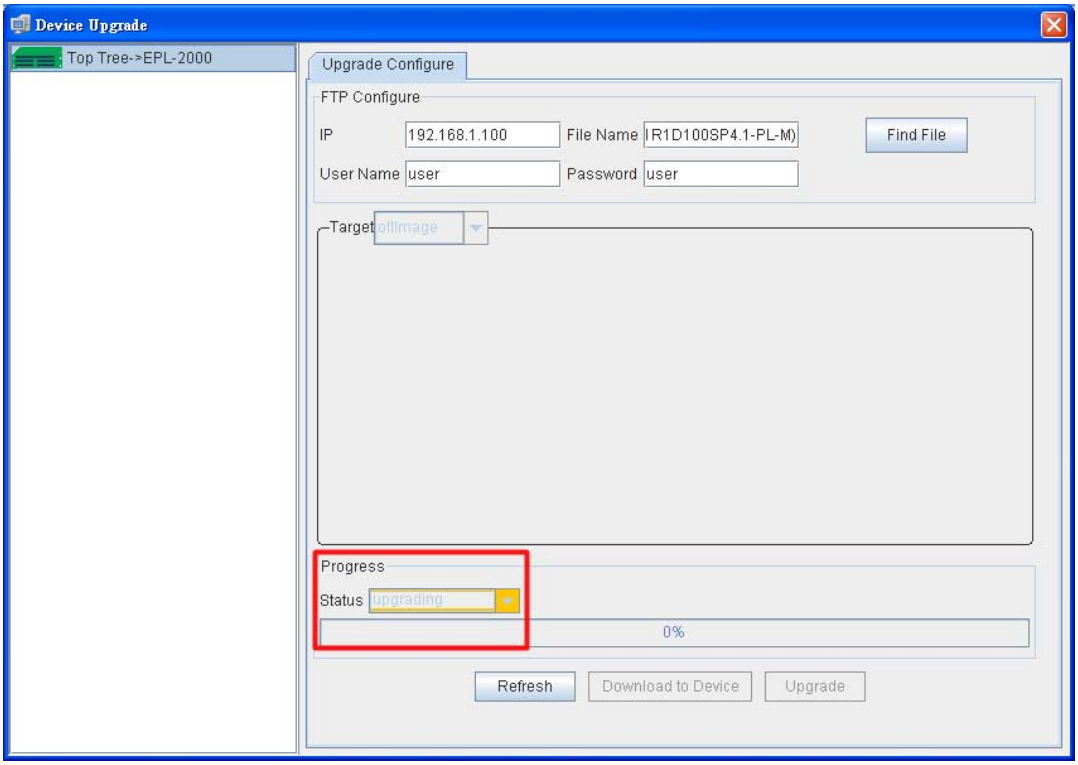


Figure 4-54 Device Upgrade Procedure (3) screen

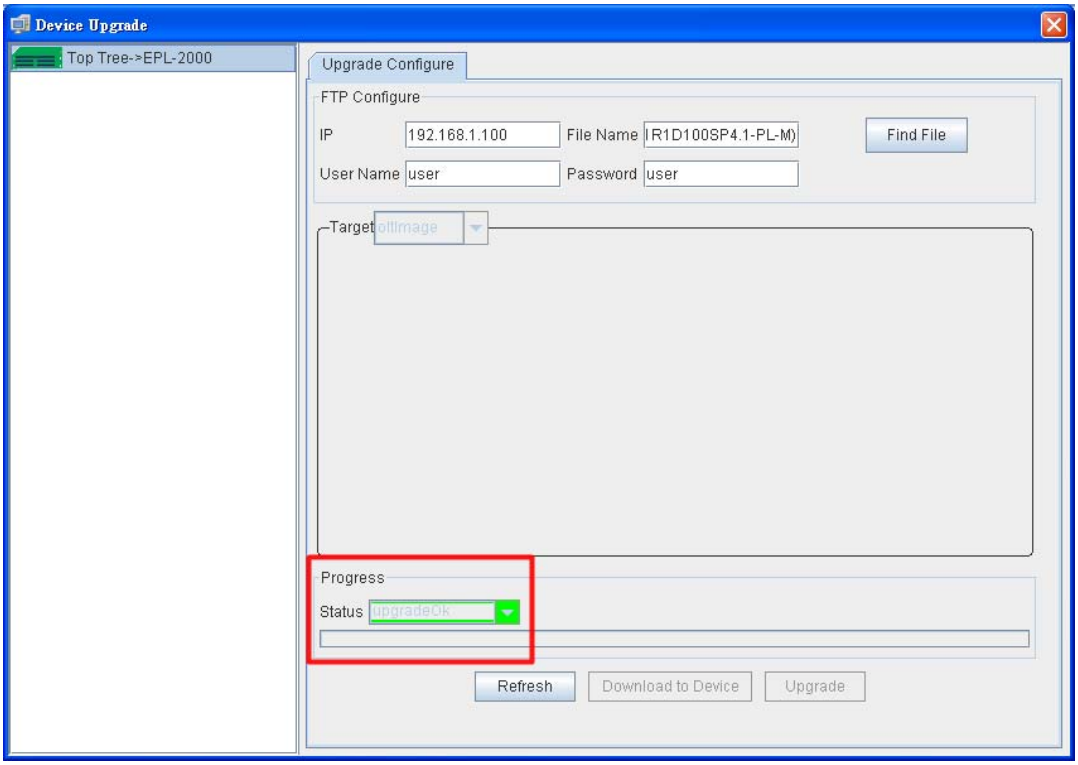


Figure 4-55 Device Upgrade Procedure (4) screen

10. After finish the firmware upgarde, please reboot the EPL-2000.

5. EPL-2000 OPERATION

5.1 Address Table

The OLT switch is implemented with an address table. This address table composed of many entries. Each entry is used to store the address information of some node in network, including MAC address, port no, etc.

5.2 Learning

When one packet comes in from any port, the OLT Switch will record the source address, port no. And the other related information in address table. This information will be used to decide either forwarding or filtering for future packets.

5.3 Forwarding & Filtering

When one packet comes from some port of the Ethernet Switching, it will also check the destination address besides the source address learning. The OLT Switch will lookup the address-table for the destination address. If not found, this packet will be forwarded to all the other ports except the port, which this packet comes in. And these ports will transmit this packet to the network it connected. If found, and the destination address is located at different port from this packet comes in, the OLT Switch will forward this packet to the port where this destination address is located according to the information from address table. But, if the destination address is located at the same port with this packet comes in, then this packet will be filtered. Thereby increasing the network throughput and availability

5.4 Auto-Negotiation

The STP ports on the Switch have built-in "Auto-negotiation". This technology automatically sets the best possible bandwidth when a connection is established with another network device (usually at Power On or Reset). This is done by detect the modes and speeds at the second of both device is connected and capable of, both 10Base-T and 100Base-TX devices can connect with the port in either Half- or Full-Duplex mode.

If attached device is:	100Base-TX port will set to:
10Mbps, no auto-negotiation	10Mbps.
10Mbps, with auto-negotiation	10/20Mbps (10Base-T/Full-Duplex)
100Mbps, no auto-negotiation	100Mbps
100Mbps, with auto-negotiation	100/200Mbps (100Base-TX/Full-Duplex)

APPENDEX A

A.1 Switch's RJ-45 Pin Assignments

1000Mbps, 1000Base T

Contact	MDI	MDI-X
1	BI_DA+	BI_DB+
2	BI_DA-	BI_DB-
3	BI_DB+	BI_DA+
4	BI_DC+	BI_DD+
5	BI_DC-	BI_DD-
6	BI_DB-	BI_DA-
7	BI_DD+	BI_DC+
8	BI_DD-	BI_DC-

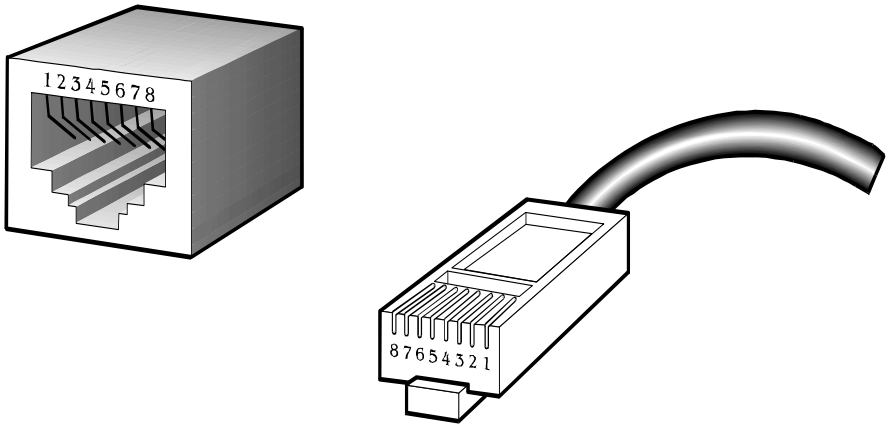
Implicit implementation of the crossover function within a twisted-pair cable, or at a wiring panel, while not expressly forbidden, is beyond the scope of this standard.

A.2 10/100Mbps, 10/100Base-TX

When connecting your 10/100Mbps Ethernet Switch to another switch, a bridge or a hub, a straight or crossover cable is necessary. Each port of the Switch supports auto-MDI/MDI-X detection. That means you can directly connect the Switch to any Ethernet devices without making a crossover cable. The following table and diagram show the standard RJ-45 receptacle/ connector and their pin assignments:

RJ-45 Connector pin assignment		
Contact	MDI Media Dependant Interface	MDI-X Media Dependant Interface-Cross
1	Tx + (transmit)	Rx + (receive)
2	Tx - (transmit)	Rx - (receive)
3	Rx + (receive)	Tx + (transmit)
4, 5	Not used	
6	Rx - (receive)	Tx - (transmit)
7, 8	Not used	

The standard cable, RJ-45 pin assignment



The standard RJ-45 receptacle/connector

There are 8 wires on a standard UTP/STP cable and each wire is color-coded. The following shows the pin allocation and color of straight cable and crossover cable connection:

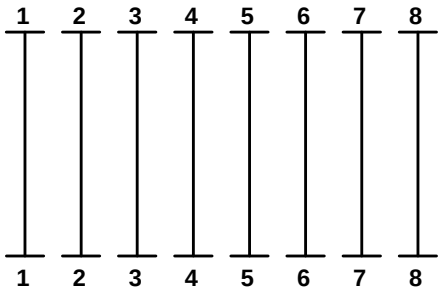
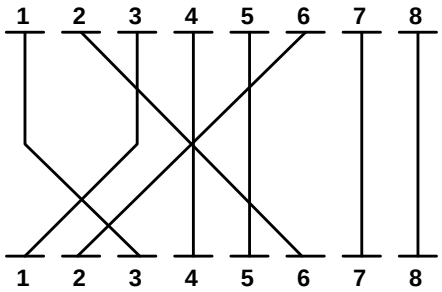
Straight Cable		SIDE 1	SIDE2
	SIDE 1	1 = White / Orange	1 = White / Orange
		2 = Orange	2 = Orange
		3 = White / Green	3 = White / Green
		4 = Blue	4 = Blue
		5 = White / Blue	5 = White / Blue
		6 = Green	6 = Green
		7 = White / Brown	7 = White / Brown
	SIDE 2	8 = Brown	8 = Brown
Crossover Cable		**SIDE 1**	**SIDE2**
	SIDE 1	1 = White / Orange	1 = White / Green
		2 = Orange	2 = Green
		3 = White / Green	3 = White / Orange
		4 = Blue	4 = Blue
		5 = White / Blue	5 = White / Blue
		6 = Green	6 = Orange
		7 = White / Brown	7 = White / Brown
	SIDE 2	8 = Brown	8 = Brown

Figure A-1: Straight-Through and Crossover Cable

Please make sure your connected cables are with same pin assignment and color as above picture before deploying the cables into your network.

EC Declaration of Conformity

For the following equipment:

*Type of Product : GEPON OLT
*Model Number : EPL-2000

* Produced by:
Manufacturer‘s Name: **Planet Technology Corp.**
Manufacturer‘s Address: 10F., No.96, Minquan Rd., Xindian Dist.,
New Taipei City 231, Taiwan (R.O.C.)

is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility (2004/108/EC).
For the evaluation regarding the Electromagnetic Compatibility, the following standards were applied:

EN 55022	(2010)
EN 61000-3-2	(2006 + A2: 2009)
EN 61000-3-3	(2008)
EN 55024	(2010)
EN 61000-4-2	(2009)
EN 61000-4-3	(2006 + A1: 2008)
EN 61000-4-4	(2004)
EN 61000-4-5	(2006)
EN 61000-4-6	(2009)
EN 61000-4-8	(2010)
EN 61000-4-11	(2004)

Responsible for marking this declaration if the:

☒ **Manufacturer** ☐ **Authorized representative established within the EU**

Authorized representative established within the EU (if applicable):

Company Name: **Planet Technology Corp.**

Company Address: **10F., No.96, Minquan Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)**

Person responsible for making this declaration

Name, Surname **Kent Kang**

Position / Title : **Product Manager**

Taiwan	**16nd Nov., 2012**	Kent Kang
Place	*Date*	*Legal Signature*

PLANET TECHNOLOGY CORPORATION

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