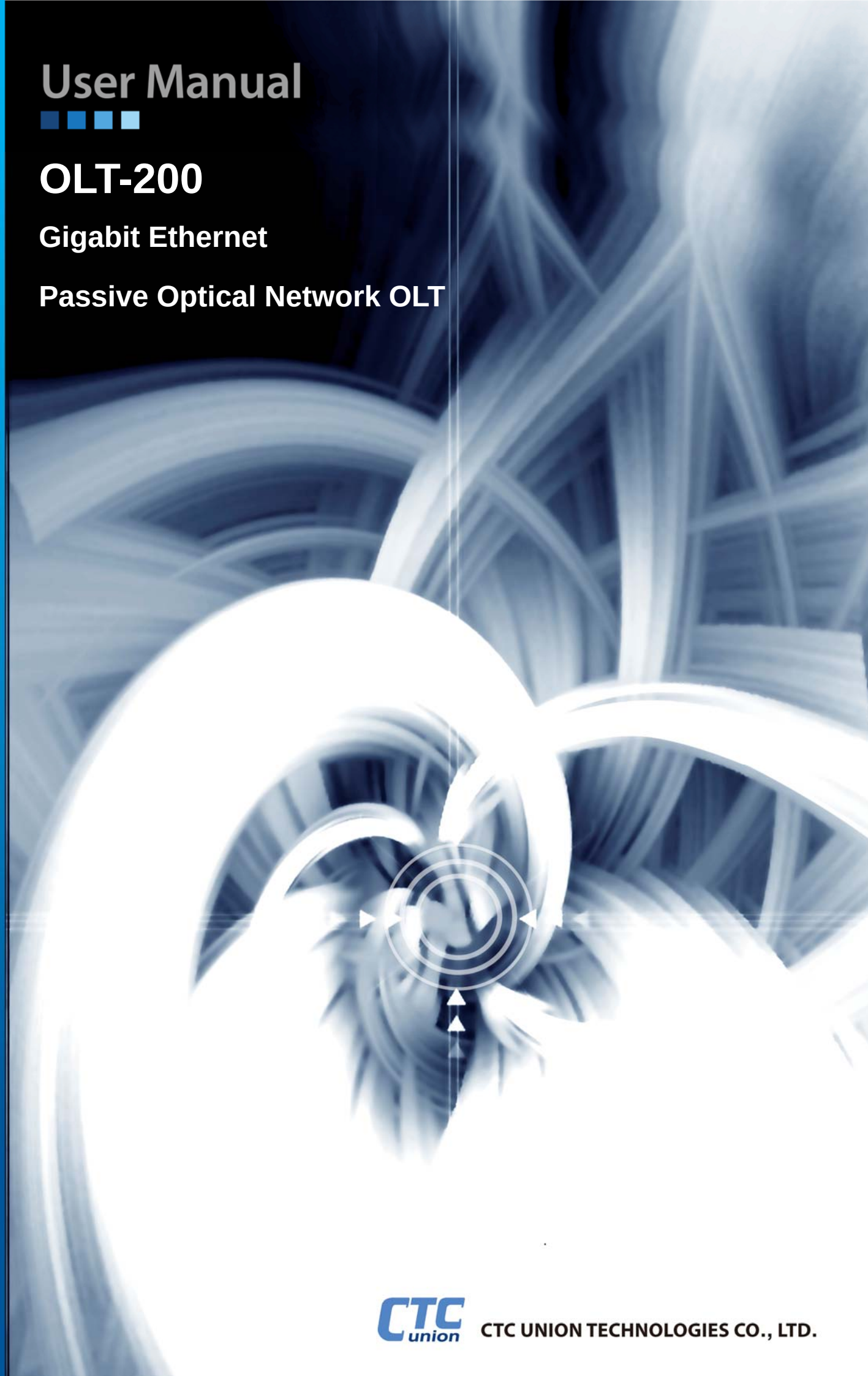
User Manual

OLT-200

Gigabit Ethernet

Passive Optical Network OLT



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OLT-200 User Manual
GEPON OLT

Version 1.0

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Revision History

Version	Date	Reason	Author	Approved by

Overview

Thank you for purchasing the Gigabit EPON OLT-200.

OLT-200 is the OLT device in an Ethernet Passive Optical Network (EPON). This document is the user guide for the EPON OLT System (OLT-2000). It describes the architecture, installation, and usage of OLT-200. Users of EPON OLT should read this document before using it.

Notes：

1. The information contained in this document is subject to change without prior notice. Please consult the web site to get further information.
2. Please send all User Guide-related comments, suggestions or questions to us for document improvement. We appreciate your valuable suggestions about the content of this user guide. Thank you very much.
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Safety Warnings

1. This product contains a high output-power Laser; please do not point the SC optical connector to eyes directly.
2. Do not touch the metal part of components, PCB traces or power connectors.
3. Put this product away from the high-voltage electricity power and make a lighting surge protection on the power distribution system.
4. A minimum radius of 60 mm will be better while bending the optical fiber.
5. Always keep the optical fiber connector to be “clean” and put a cover on the optical fiber connector while the optical connector is removed during the system maintenance.

1 Product Overview

The bandwidth demands of many broadband applications such as IP-TV, video conference and online games are growing, Fiber to the Home (FTTH) is the future trend of broadband communication. The EPON Access System (or EPON Network), standardized in IEEE 802.3ah, is the most promising FTTH technology due to the simple, high bandwidth, and low cost features of Ethernet.

The EPON Network consists of an Optical Line Terminal (OLT) system at the central office and a set of Optical Network Units (ONUs) at the user side or remote side. The OLT and ONUs are connected through a passive optical distribution network (ODN) comprised of fibers and passive optical splitter(s). The EPON is used as a broadband point-to-multipoint access network to provide the triple play services, including voice, data and video services.

The EPON network is a single fiber system, its downstream signal wavelength is 1490nm and upstream signal wavelength is 1310nm. To provide the CATV service, the 1550nm wavelength can be supported in the single fiber using WDM technology. The EPON network supports symmetrical bit rate of 1Gbps shared among the population of ONUs in downstream and upstream. The downstream transmission technology is TDM broadcast and the upstream uses Time Division Multiple Access (TDMA).

OLT-200 is an EPON OLT device. Its architecture is modular. The front view of OLT-200 is as shown in Figure 1.

Figure 1. EPON OLT Front View

OLT-200 Product Features

- Compliant to IEEE 802.3ah EFM
- OLT can be installed in 19 inch or 23 inch ETSI shelf
- OLT is a modular design. It provides one SCU (System Control Unit) card, one FPU (FAN Power Unit) card, and four PON cards.
- For each PON card, there are two SNI (Service Node Interface) interfaces and two PON interfaces. For the whole system, it can provide eight PON interfaces for 256 subscriber access.
- OLT provides 10/100 Base-TX RJ-45 remote management interface, and RS-232 DB9 local management interface.
- OLT provides RFC845 Telnet and Command Line Interface (CLI) for administrator to manage the device
- OLT provides LEDs for system status maintenance.
- OLT provides dual -48V DC power input, and also dual AC 110V/220V input

Figure 2 depicts the application scenario of Fiber to the Home. Telecom operator will deploy OLT device at the central office, and installs the ONU at home. It can provide at least 30Mbps for each subscriber for HDTV IP-TV services.

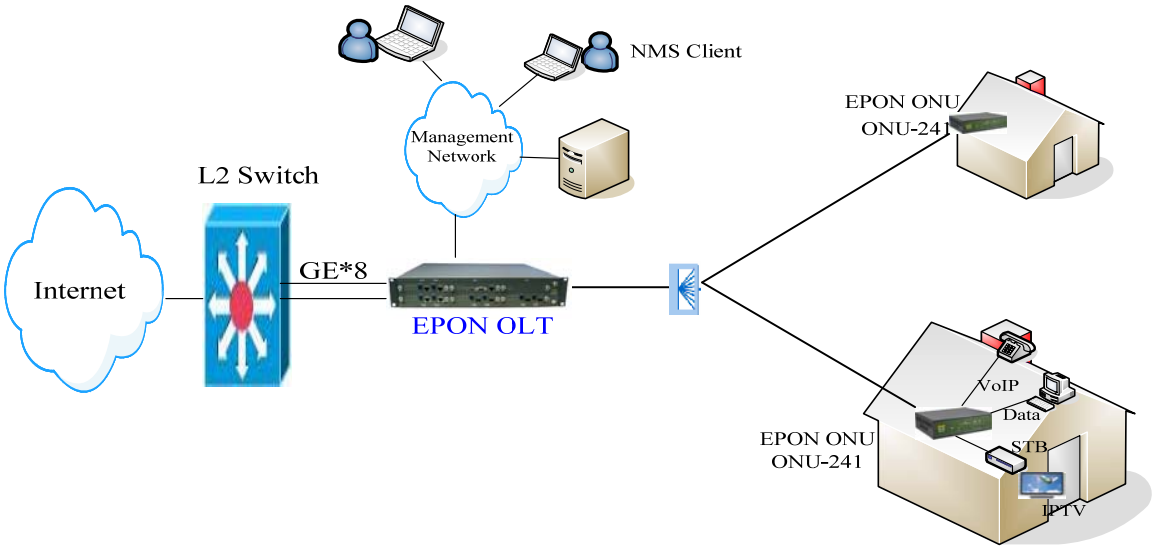

Figure 2. FTTH EPON Architecture

2 OLT-200 System Description

OLT-200 shelf has eight slots. It can plug in one System Control Unit (SCU) card, four EPON Unit (EPU) cards, one FAN Power Unit (FPU) card, one Air Filter, and one FAN module card. Figure 3 shows the front view of OLT.

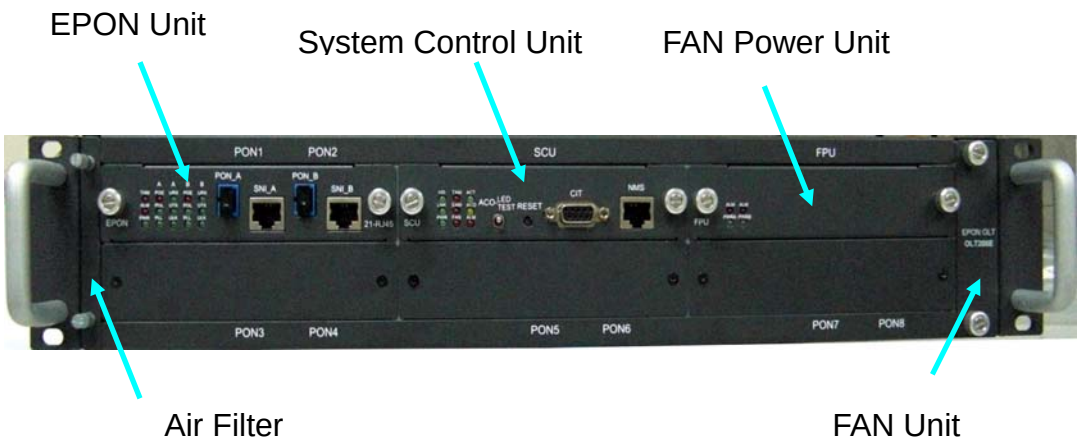

Figure 3. OLT-200 front view

The rear view of OLT-200 is as shown in Figure 4. It is designed with two APSU (AC Power Supply Unit) for AC power input. In addition, it also has two 48v DC power inputs. The power provides 1+1 protection. Both AC and DC power can be connected at the same time. Besides, there is one FAN Module in the rear shelf. OLT-200 is also designed with Audio and Visual Alarm Outputs.

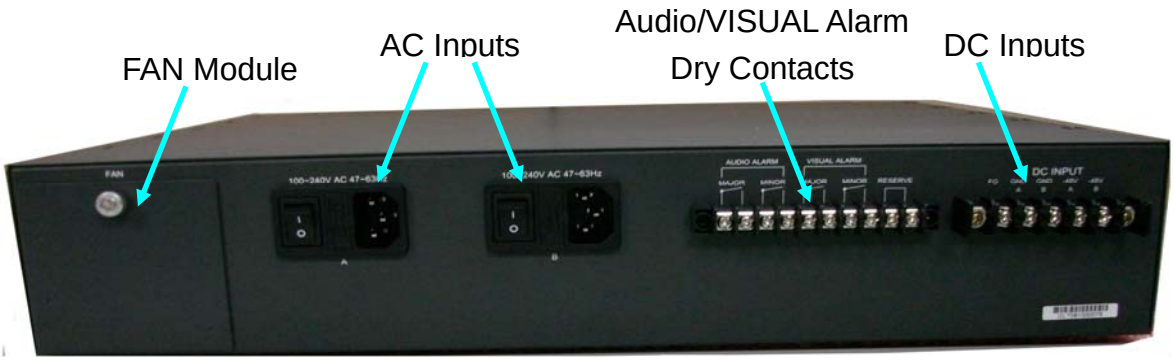

Figure 4. Rear view of OLT-200

2.1. EPON Unit

EPU is the line card unit. There are two PON ports and two associated SNI ports in an EPU card. Each PON port can connect to 32 ONUs through the optical splitter. Therefore, OLT200 can connect to ONUs at the same time. To provide a convenient way integrating OLT200 into the existing network architecture, two types of EPU are provided. One is EPON 21-RJ45, whose SNI ports are in RJ45 type. The other is EPON 21-LC, whose SNI ports are in SFP type.

Panels of EPON 21-RJ45 and EPON 21-LC are shown in Figure 5 and Figure 6. They are different only in the type of the SNI. To ease the identification, PON ports and SNI ports are classified into two groups (A and B). Therefore, two groups of LEDs are also provided for status checking. EPU also provides one LED (TAM) for transmission alarm notification, one LED (ALM) for system general alarm, and one LED (PWR) for the status of the power.

Figure 5. 21-RJ45 EPU Panel

Figure 6. 21-LC EPU Panel

The LED indications of EPU are described as follows:

ED indications	Status	LED

PWR	Power is on	ON (Green)
	Power is off	Off
PLL	ODN-IONU PON logical link is established	ON (Green)
	ODN-IONU PON logical link is establishing	Blink (Green)
	ODN-IONU PON logical link is down	Off
	EPU is initializing	Blink (Green)
POL	ODN-IONU PON optical link is established	ON (Green)
	ODN-IONU PON optical link is down	Off
	EPU is initializing	Blink (Green)
POE	ODN-IONU PON logical link data receiving error	Blink (Red)
	ODN-IONU PON logical link data receiving normal	Off
	EPU is initializing	Blink (Red)
ULK	SNI logical link is established	ON (Green)
	SNI logical link is establishing	Blink (Green)
	SNI logical link is down	Off
	EPU is initializing	Blink (Green)
UTX	SNI is sending data	Blink (Green)
	SNI is not sending data	Off
	EPU is initializing	Blink (Green)
URX	SNI is receiving data	Blink (Green)
	SNI is not receiving data	Off
	EPU is initializing	Blink (Green)
ALM	OLT or ONU firmware upgrade failed	ON (Red)
	No above events	Off
	EPU is initializing	Blink (Red)
TAM	PON port signal loss	ON (Red)
	PON port signal normal	Off
	EPU is initializing	Blink (Red)

2.2. System Control Unit (SCU)

SCU is the management center of the entire OLT-200 system. It provides three ways for administrators to configure system settings. The first way is to login from the RS232 console port, which is a DB9 female interface. The second way is to manage the system by telnet through the RJ45 NMS interface. The third way is by using Simple Network Management Protocol (SNMP). A general command line interface (CLI) is provided for administrators who use the console or telnet for management. However, the administrators can also use a powerful network management system, EPON NMS, provided by our company to control the system by SNMP.

The panel of SCU provides various LEDs for visual alarm notifications. However, to help the administrators to be aware of the alarm status, SCU provides four dry contacts, which are connected to the backend of the shelf, for connecting to another visual or audio alarm notifications. OLT-200 SCU Panel is as shown in Figure 7.

Figure 7. SCU Panel

- CIT: RS-232 Interface (DB9 connector) for Command Line Interface
- NMS: 10/100M Ethernet Interface (RJ-45 connector) for Telnet and NMS connection
- Reset: Reset button to reset the SCU card to the factory default value except IP address of NMS port. However, those data already stored in SDRAM will not be reset.
- ACO-LED TEST Switch: When alarms are happened in OLT-200 system, and the Audio Alarm dry contacts are connected, you can push the switch to the left side, it will perform ACO (Alarm Cut Off) to turn off the Audio Alarm. The ACO yellow LED will turn ON. When all the system alarms are

eliminated, ACO LED will become OFF.

- ACO-LED TEST Switch: You can push the switch to right. The system will perform LED test function. All the LEDs except power LED of SCU and EPU card will be ON during the test. When you push back the switch, all the LEDs will become their original status.

The LED indications of SCU card are described as follows:

SCU LED	Status	LED
PWR	Power is turned on	On (Green)
	Power is turned off	Off
LNK	NMS Link is established, but no data transmission	On (Green)
	Transmitting Data	Blink (Green)
	No NMS connection	Off
	Initializing	Blink (Green)
100M	Connection Speed is 100M	On (Green)
	Connection Speed is 10M	OFF
	SCU Initializing	Blink (Green)
FAN	FAN alarm	ON (RED)
	FAN in normal operation	OFF
	Initializing	Blink (RED)
EAM	Equipment has alarm	ON (RED)
	Equipment (OLT) in normal operation	OFF
	Initializing	Blink (RED)
TAM	Transmission Alarm	ON (RED)
	Transmission no alarm	OFF
	SCU initializing	Blink (RED)

ALM	SCU alarm	ON (RED)
	SCU in normal operation	OFF
	SCU initializing	Blink (RED)
ACT	SCU in Active Status	ON (Green)
	SCU Initializing	Blink (Green)
ACO	System in normal operation (NO AUDIO/VISUAL Alarm)	OFF
	AUDIO/VISUAL Alarm happened, Push ACO button to turn off Audio alarms	ON (Yellow)
	Initializing	Blink (Yellow)

2.3. FAN Power Unit (FPU)

The function of FPU is to convert 48V DC to two sets 12V DC power (Power A and Power B) for FAN modules. If FPU is broken, it will influence only the FAN module. Panel of FPU is as shown in Figure 8.

Figure 8. FPU Panel

The LED indications of FPU are described as follows:

FPU LED	Status	LED
ALM (A)	DC 12V Power A no output	RED (ON)
PWRA	DC 12V Power A has output	Green (ON)
ALM (B)	DC 12V Power B no output	RED (ON)
PWRB	DC 12V Power B has output	Green (ON)

2.4. FAN Module

OLT-200 is designed with two pluggable FAN modules. One is in the front and the other is on the rear shelf. The front fan module includes two Fans and the Rear FAN module has one FAN. The FAN size is 60x60x15 mm.

Figure 9. Front Fan and Rear Fan

3 Installation and Cable Connections

OLT-200 shelf is 2U high. You can base on the following steps to install OLT-200.

Step 1: Select one of the two places to fix the Rack Bracket in OLT-200

Step 2: Mount OLT-200 and fix with screws in the Rack

- Insert the OLT-200 Shelf into the 19", 23", or ETSI Standard Rack from the front side of Rack.
- Mount OLT-200 and fix with screws.

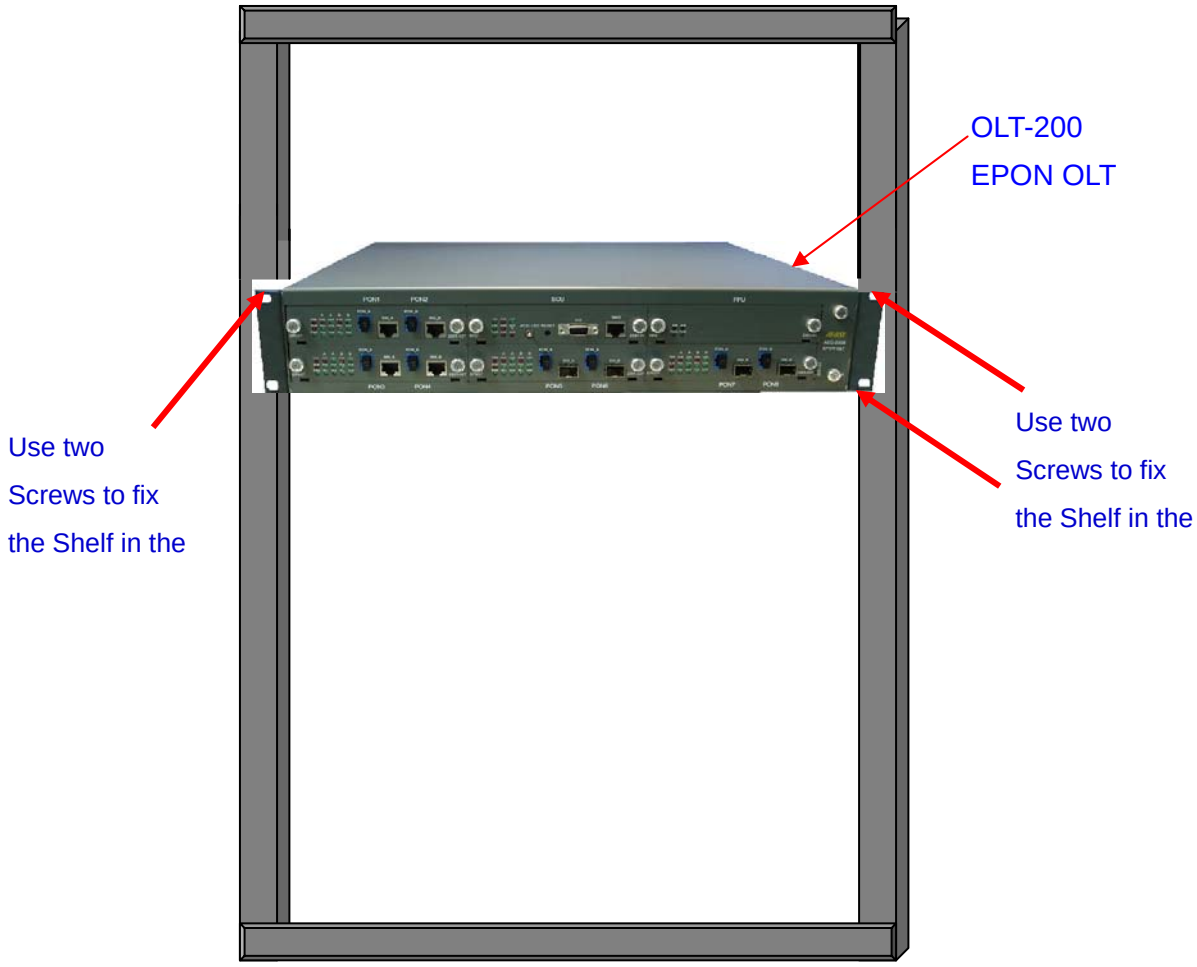

Figure 10. Mount OLT Shelf on Rack

Step 3: Installing SCU Card

- Insert the SCU card in SCU slot
- Insert it securely along the railings on right and left
- Fix the SCU card securely with screws.

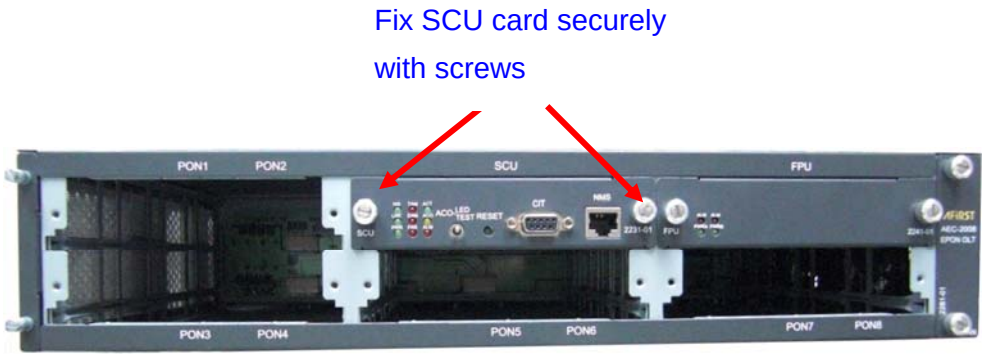

Figure 11. Installing SCU Card

Step 4: Installing EPU Cards

- Insert EPU card in PON slot (depending on how many EPON line cards to be installed)
- Insert it securely along the railings on right and left. You can insert it at any empty PON slot.
- Fix the EPU card securely with screws.

Figure 12. Installing Line Cards

Step 5: Install Power Cables

- If the power supply provides DC 48V power, you can connect DC power cable to Rear Shelf -48VA and/or -48VB screw terminal block. The input power range is -42V ~ -54V DC. There are two DC power inputs. You can install one or two DC power inputs depending on your demands. If two DC power inputs are connected, the two powers are redundant. Figure 13 displays the DC power input in the rear shelf.

Note: The system design already considers the power protection. However, you should be better to connect the positive and the negative hole of power correctly.

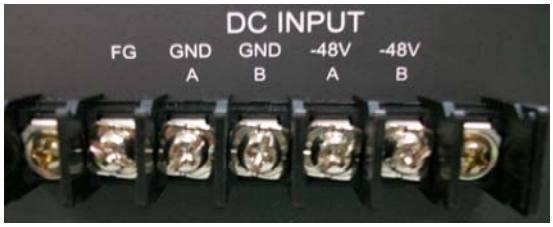

Figure 13. OLT Shelf DC Power Installation

- If the power supply provides AC 110V or 220V power, then connect the power cable into Rear Shelf AC Socket. The input voltage range is 100-240V AC and 47-63Hz. Each AC power has its own ON/OFF switch. Figure 14 displays the AC power inputs in the rear shelf.

Figure 14. OLT Shelf AC Power Installation

- After finishing the power cable connection, you must set the power switches (SW1 and SW2) in FPU. The power DIP switch is used to notify SCU card that what kinds of power input have been connected. Then SCU can monitor the power input status. If AC or DC power has an error, then SCU card will issue an alarm to notify the Administrator. The DIP switch in FPU card is as shown in Figure 15. You should configure the DIP switch according to the following two tables.

AC Input (A)	AC Input (B)	SW1 APSU_A	SW1 APSU_B
ON	ON	ON	ON
ON	OFF	ON	OFF
OFF	ON	OFF	ON
OFF	OFF	OFF	OFF

DC Input (A)	DC Input (B)	SW2 DPSU_A	SW2 DPSU_B
ON	ON	ON	ON
ON	OFF	ON	OFF
OFF	ON	OFF	ON
OFF	OFF	OFF	OFF

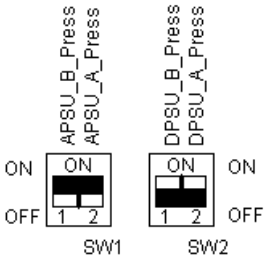

Figure 15. FPU Power DIP switch

Step 6: Installing FPU Card

- Insert FPU card (after setting the power switch) in FPU slot
- Insert it securely along the railings on right and left
- Fix the FPU card securely with screws

Figure 16. Installing FPU Card

Step 7: Connect Alarm Dry Contacts

- OLT-200 EPON OLT provides both Audio ALARM and VISUAL ALARM Dry Contacts. Each kind of alarm has both MAJOR and MINOR Alarm. You can connect the COMMON and NORMAL OPEN dry contacts of each kind of alarm to the Fuse Alarm Panel in the rack.

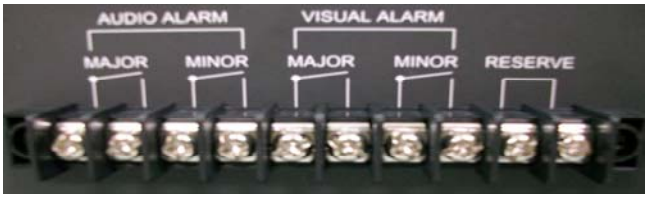

Figure 17. OLT-200 ALARM Dry Contacts

Step 8: Connecting PON Port Cables

The PON interface is SC-type connector. Plug in the SC connector of fiber from ODN to the PON port.

Figure 18. PON Port Cable Connection

Step 9: Connecting SNI Port Cables

You can connect the SNI port to the aggregation switch. There are two types of SNI: RJ-45 and SFP (Mini-GBIC). Depending on what kind of EPU installed, connect the associated cable.

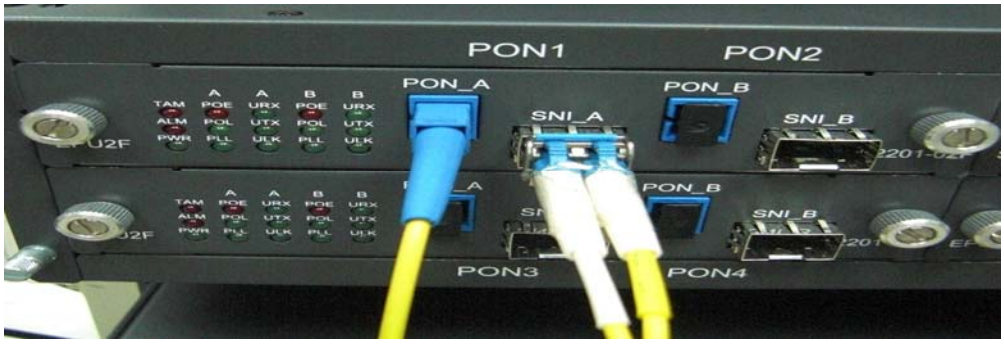

Figure 19. SNI Port Cable Connection

4 System IP addres Configuration

SCU card provides one RS232 CIT Console port (DB9 female) for local management. After system is Power ON, you can use a PC or Notebook to connect to OLT-200 via RS-232 cable. In the console, you can configure the IP address of NMS port, the subnet mask, and NTP address, etc. You can reference the “CLI User Guide” document to understand the detailed CLI commands. The RS-232 connection between PC and SCU card is shown in **Error! Reference source not found.** and **Error! Reference source not found.**.

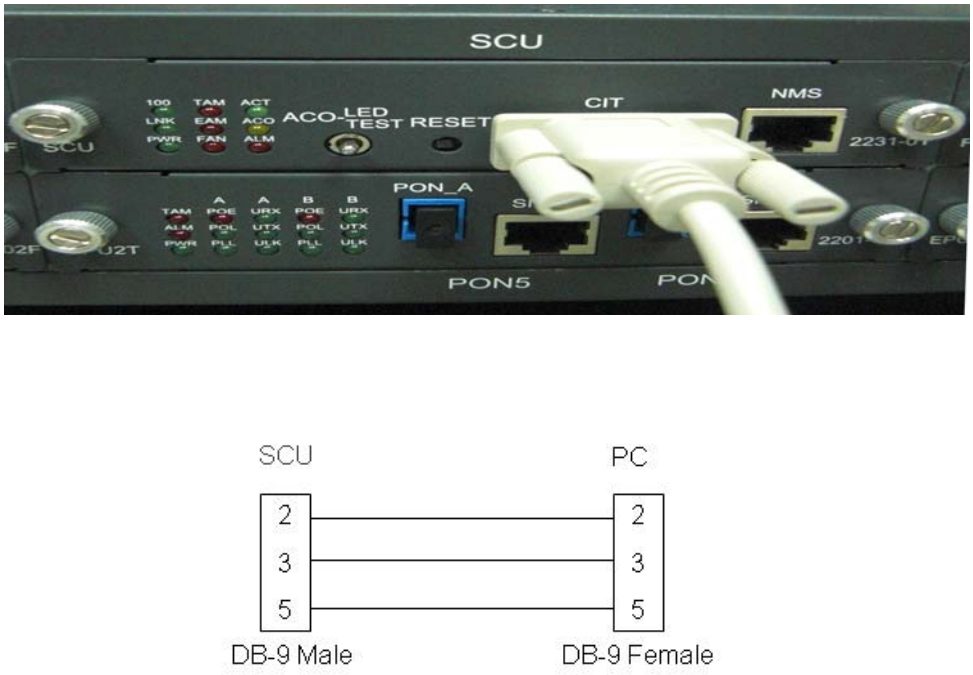

Figure 20. SCU RS-232 Pin Definition

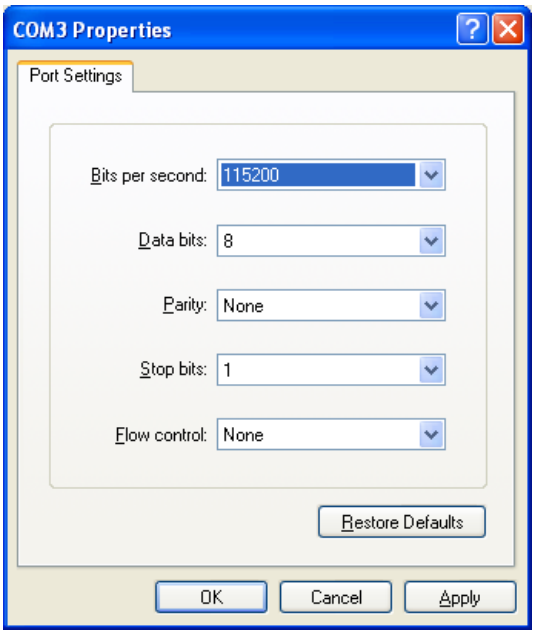

Figure 21. Console Terminal

When you log into Command Line Interface, you will see the diagram below：

```
MontaVista Linux 4.0.1(2.6.10) on
OLT-200 EPON System
OLT-200 login: root(Default Value)
Password:12345678(Default Value)
Welcome to OLT-200 CLI Program Ver:3.406 (Nov 26, 2008)
OLT-200#/>
```

You can follow the following steps to configure system IP address and gateway.

Step 1: Execute “?”, the screen will display all the CLI commands of EPON OLT.

OLT-200#/>?	
'<command> ?' gives a brief description of <command>.	
admin	Enter the admin configure level, to configure manager and operator access.
alarm	Enter the alarm configure level, to configure system alarm function.
if	Enter the interface configure level, to configure module function.
maintenance	Enter the maintenance configure level, to configure system database function.
olt	Enter the OLT configure level, to configure OLT and ONU function.
performance	Enter the performance configure level, to get the system performance counters.
system	Enter the system configure level, to configure system function.(SNMP, TFTP, NTP, etc.)
show	Show system global information
Shell is case insensitive	

Step 2: type in *System* to configure system level parameters, then Execute "?"to display the commands in the system level

OLT-200#system> ?	
firmware	Configure the system firmware information.
ipconfig	Configure a network interface
logconfig	Configure the system log message functionality.
ntpconfig	Configure the system network time functionality.
radiusconfig	Configure the 802.1x authentication functionality.
restart	Restart the OLT system.
show	Show running system information
snmpconfig	Configure system SNMP agent functionality.
timeconfig	Configure the system time configuration.

Step 3: Using ipconfig address to configure the system IP address

```
OLT-200#system> ipconfig address
Usage: ipconfig address [IP address (xxx.xxx.xxx.xxx)] [netmask address
(xxx.xxx.xxx.xxx)]
```

```
Example:
OLT-200#system> ipconfig address 172.168.2.181 255.255.255.0
Set the system IP address successful
```

Step 4: Using ipconfig gateway to configure default gateway address

```
OLT-200#system> ipconfig gateway
Usage: ipconfig gateway [default gateway IP (xxx.xxx.xxx.xxx)]
```

```
Example:
OLT-200#system> ipconfig gateway 172.168.2.1
Set the system gateway IP address successful
```

5 Connecting to Web/NMS server

SCU card also provides one 10/100Base-T Fast Ethernet (RJ-45) interface.You can connect the interface to the managment network. Then, Administrator can manage OLT-200 via Telnet or NMS server remotely if you already buy the NMS server. The detailed NMS operation manual is described in another document. Please contact you sales for the details.

Note: OLT-200 can be managed by EPON NMS server only after the IP address has been configured

Figure 22. NMS Port Connection

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