SpeedLIGHT16 and TurboLIGHT16

User Manual

Version 0.96

Introduction

The Best Choice

SpeedLIGHT16 and TurboLIGHT16 are designed for the realization of high-speed access networks. The equipment enables symmetric and dedicated high-bandwidth optical data links to deliver services such as video, Internet and voice communications. Existing subscriber devices such as xDSL or cable-modems have limitations in distance and data rates. SpeedLIGHT16 and TurboLIGHT16 are optimum solutions for complementing these limitations by enabling efficient and cost-effective optical connectivity for FTTC and FTTB network applications.

SpeedLIGHT16 and TurboLIGHT16 are based on Dense Wavelength Division Multiplexing (DWDM) technology, which utilizes economical and efficient use of the outside fiber plant. The system realizes a stable high-speed service by adopting highly reliable passive optical components in the fiber network to connect the central office with the curb/building/pole/wall, with an independent optical communication channel delivered to each remote location. In addition, SpeedLIGHT16 and/or TurboLIGHT16 system have the additional advantages in that it is compatible with the existing Ethernet LAN-based subscriber networks. Thus, SpeedLIGHT16 and TurboLIGHT16 are economical DWDM-PON systems that ensure high-performance, high-reliability and stable services without the need for data protocol conversion.

Thank you for purchasing SpeedLIGHT16 and/or TurboLIGHT16.

Before you read this manual

This manual provides information for users on how to operate the SpeedLIGHT16 and/or TurboLIGHT16 equipment. This manual is subject to version updates to meet any future modifications of SpeedLIGHT16 and TurboLIGHT16. This manual describes the functions of SpeedLIGHT16 and TurboLIGHT16 and how to install, use and manage the system.

Read this manual carefully before and/or during operation of the SpeedLIGHT16 and TurboLIGHT16 systems.

If you wish to expand functions or to repair defects, make sure to contact the dealer or the Customer Service Center of Novera Optics. If you have any query in operating SpeedLIGHT16 and TurboLIGHT16 or find any defect, please contact the dealer or the Customer Service Center.

WARNINGS

Please read the warnings before you start operating the product. Make sure to have these precautions in mind before/during installation and operation of the product.

Qualification for installation

This product should be installed by personnel who is qualified for handling network devices and fiber communication devices, or who is a skilled engineer.

Inhibition of disassembly

Disassembling this product may cause injury of personnel or loss of property due to electric shock, failure, malfunction or static electricity. Disassembling, repairing or modifying the product at your own discreet will invalidate the warranty. If you need to repair the product, please contact Technical Support Center of Novera Optics Korea (82-42-602-3700).

Possible risks according to the installation location

In order to prevent impact on the product or the consequential damage of personnel or property, do not install or operate the product in the area with excessively hot or cold temperature, high humidity, excessive dust or vibration. Any water permeated into the product may cause damage to personnel or property due to electric shock or failure. Please make sure to use power supply that complies with the specifications of this product, and not to use unearthed or damaged cables. And check if the installation location and conditions meet the regulations on electric safety.

Inhibition of wearing personal ornaments

Do not wear any personal ornament such as ring, necklace or watch while handling this product. Any conductive metal may cause damage to personnel or property due to electric shock, static electricity or fire. Loose clothing, neck tie or slippers may also cause accidents during operation of the product.

Precaution on EMI

EMI will affect this product and cables, causing abnormal operation of the product due to disturbance of signal handling. Therefore, do not install or operate this product in areas that are susceptible to high levels of electromagnetic interference.

Precaution on lightning

Lightening may cause severe defect of the product. Check if there are any conditions that may lead to lightning damage. If there is a flash of lightening or any such event is expected, stop handling the product and do not touch the cable.

Precaution on electric shock

Do not touch the power supply if the power code is connected. Even when the power switch is in OFF position, electric current runs inside the product if the power code is connected to the power source.

Safety handling of laser

The BMU which is one of the components of this product, emits high-power laser radiation in the infrared wave range of 100 mW or below(CLASS 1M) . Therefore, do not stare at emission during operation of the product. Exposing your eye directly to the light is very dangerous. Make sure to wear safety goggles and also be careful not to expose your eyes to any reflected light. Check if the power is OFF on the BMU before connecting the optical connector.

The OCU and ONT also emit laser radiation in the infrared wave range of CLASS 1. Therefore, do not stare at emission during operation of the product. Exposing your eye directly to the light is very dangerous. Make sure to wear safety goggles and also be careful not to expose your eyes to any reflected light. Check if the power is OFF on the OCU and ONT before connecting the optical connector.

CAUTION (FCC STATEMENT)

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

*** NOTE : The OLT and ONT have been tested and found to comply with the limit for a Class A and Class B digital device, respectively, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in particular installation, which can be determined by turning the equipment off and on, the user is encourage to try to correct the interference by one or more of the following measures:**

- **Reorient or relocate the receiving antenna.**
- **Increase the separation between the equipment and receiver.**
- **Connect the equipment into an outlet on a circuit different from that to which the receiver is connected**
- **Consult the dealer or an experienced radio/TV technician for help**

***NOTE: The OLT and ONT comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) the OLT and ONT may not cause harmful interference, and (2) the OLT and ONT must accept any interference received, including interference that may cause undesired operation.**

Precautions in installing SpeedLIGHT16 and TurboLIGHT16

Check if you have received all the parts of SpeedLIGHT16 and/or TurboLIGHT16.

Select the location for installation of SpeedLIGHT16 and/or TurboLIGHT16.

In order to ensure performance and maintainability of SpeedLIGHT16 and/or TurboLIGHT16, install the product at safe distances from external devices for better ventilation and to prevent interference with each other.

Software update

You will be informed of software update, if any, via mail or e-mail.

Refer to “2.4 Live software update” of this manual for further information on software updates.

Provisions of Warranty of Novera Optics, Inc.

Thank you for purchasing our product. If you find any defects in the product or have any problem in operating the product, **Novera Optics, Inc.** will provide free or charged replacement/repair depending on the whether the warranty is expired in accordance with the below-specified warranty provisions. If you want to request replacement or repair of the product, please contact the dealer where the product is purchased or any Novera Optics' authorized agent, and request the service.

Object of warranty

This warranty is applied to any product supplied by **Novera Optics, Inc.**

Principle of warranty

This product can be disassembled, repaired or assembled only by personnel authorized by **Novera Optics, Inc.**, No maintenance work can be performed without the consent of **Novera Optics, Inc.**

Period of warranty

This warranty is valid for 12 months from the date of purchase. Any service provided after the expiration of the warranty period will be charged in accordance with the relevant regulations of **Novera Optics, Inc.** (If the warranty period is otherwise specified in the Agreement, warranty service will be provided for the period as specified in the Agreement.)

Free service:	Within 12 months from the date of purchase
Charged service:	After 12 months from the date of purchase

Exceptions of warranty

Following exceptions are applied to the warranty.

- The customer will pay for the service, even for defects occurring within the warranty period, if the defect is caused by force majeure including fire, explosion, lightning, earthquake or flood.
- The customer will pay for the service, even for defects occurring within the warranty period, if the defect is caused by negligence of the customer (inappropriate power supply, defects in the connected devices, etc.).
- No service will be provided for any defect caused by the maintenance work performed by any personnel not authorized by Novera Optics, Inc.

Liability of transportation

Any transportation cost incurred due to defects of the product found within the warranty period will be at the cost of **Novera Optics, Inc.** In this case, transportation of the repaired product for the customer will be at the cost of **Novera Optics, Inc.** The customer is responsible for any transportation costs after the warranty period is expired.

Novera Optics, Inc. takes no responsibility for delay in transportation and/or missing of the product during the transportation caused due to incorrect information provided by the customer at the request of service.

Novera Optics, Inc. will do its best to provide the customers with satisfactory products and after-sales services.

Novera Optics, Inc.

Contents

Chapter 1 General Description

1.1. System Overview

SpeedLIGHT16 and/or TurboLIGHT16 system consists of Optical Line Terminals (OLT), Remote Nodes (RN) and Optical Network Terminals (ONT). A fiber trunk path is used from CO to the passive RN in the subscriber area. A fiber trunk path is used from the RN to each ONT. The ONT can be connected to an electrical switch for connectivity to multiple users. The ONT converts the optical signal from the OLT into an electric signal at the remote location. It also converts the electric signal into an optical signal for transmission to the OLT. The ONT is automatically allocated with a dense WDM optical wavelength for a dedicated and independent connection to the OLT.

The main optical components of OLT include the Broadband Light Source and Mux Unit (BMU) and the Optical Channel Unit (OCU). The OCU is connected with the subscriber aggregation switch (L3 Ethernet switch), which is the upper layer device, via the UTP cable, and with BMU in the lower layer via the fiber cable. The OCU is the CO media converter that converts the optical signal from the subscriber into the electric signal for the subscriber aggregation switch. It also converts the electric signal from the subscriber aggregation switch into the optical signal for the subscriber. MUX in BMU multiplexes the downlink signal and delivers it to the fiber trunk path.

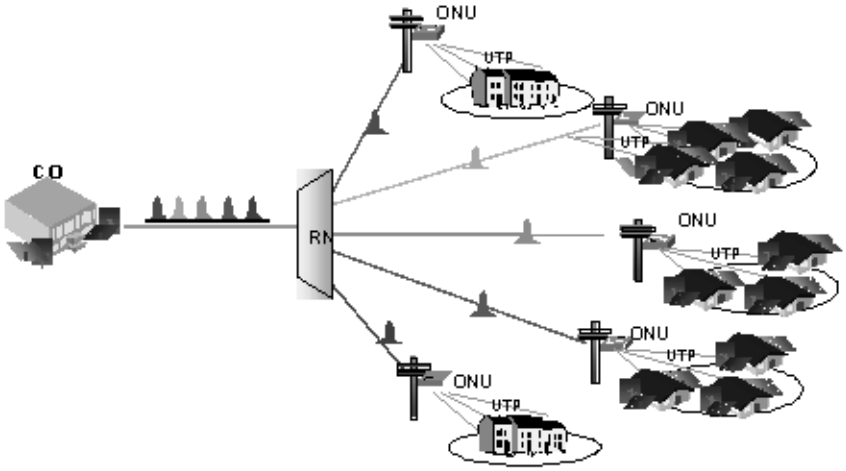


Figure 1-1. Concept of FTTC Service

The MUX also demultiplexes the upper link signal from the fiber trunk path, and delivers it to each OCU. If the OCU in the CO or the ONT at the remote location are connected to the system, the BLS allows automatic locking to the wavelength channel. Therefore, OCUs (or ONTs) are interchangeable with each other, irrespectively of the other assigned wavelength channels.

1.2. SpeedLIGHT16 and TurboLIGHT16 product configuration

TurboLIGHT16 Configuration

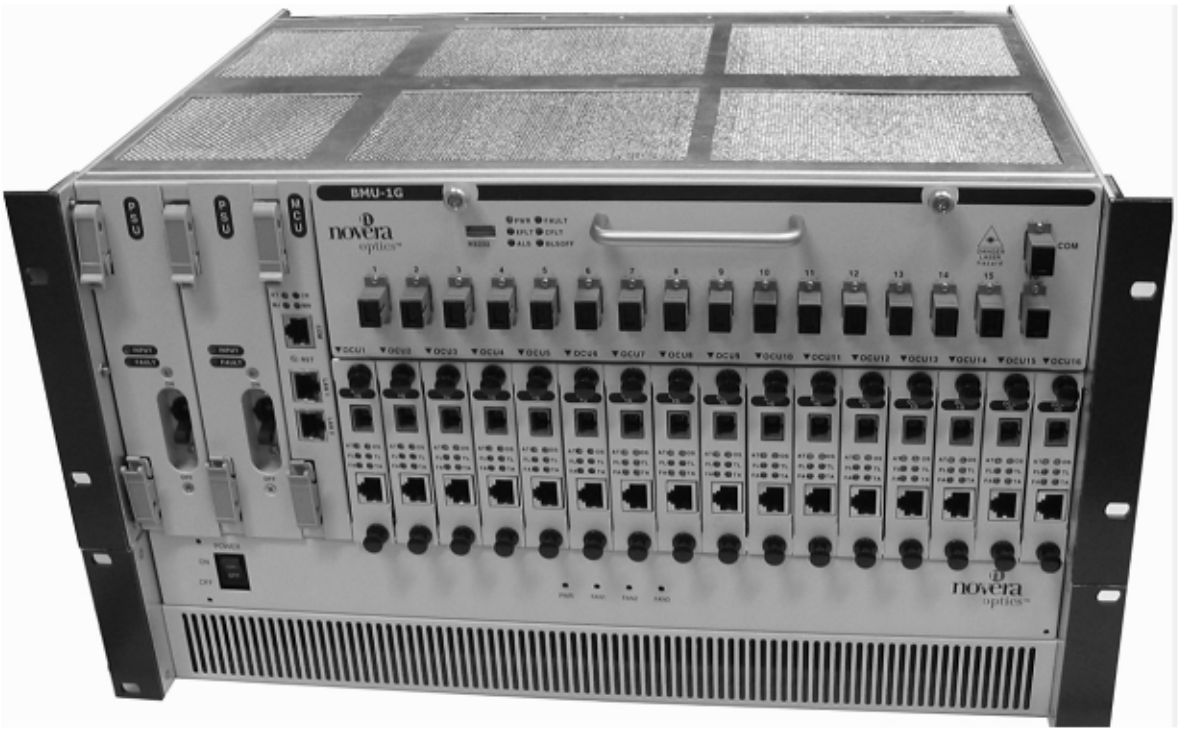
Position	TurboLIGHT16	
OLT	OLT Shelf (including backplane and providing 2 PSU, 1 BMU, 1 MCU, 16 OCU slots	
	PSU (2 modules for redundancy)	
	MCU	
	BMU-1G	
	OCU-100M	OCU-1G
	Fan Shelf	
RN	RN AWG	
	RN Enclosure	
ONT	DWDM ONT-100M	DWDM ONT-1G
	(100 / 240) Vac to 5 Vdc power adaptor	

SpeedLIGHT16 Configuration

Position	SpeedLIGHT16
OLT	OLT Shelf (including backplane and providing 2 PSU, 1 BMU, 1 MCU, 16 OCU slots
	PSU (2 modules for redundancy)
	MCU
	BMU-100M
	OCU-100M
	Fan Shelf
RN	RN AWG
	RN Closure
ONT	DWDM ONT-100M
	(100 / 240) Vac to 5 Vdc power adaptor

1.3. SpeeedLight16 / TurboLIGHT16 Product Pictures

1.3.1. OLT with full module population



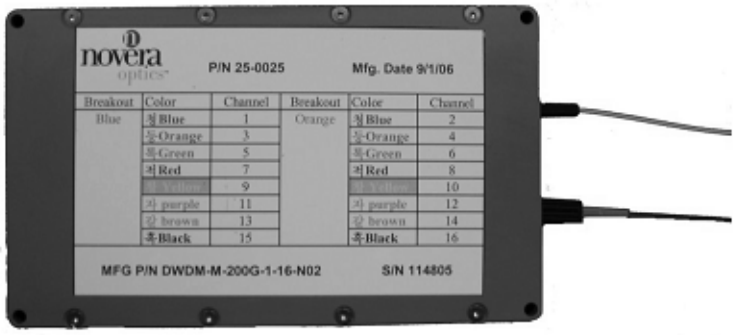
1.3.2. BMU-100M (BMU-1G the same footprint with difference capacity)

1.3.3. PSU, MCU, OCU-100M (OCU-1G the same footprint with Gigabit Ethernet support)

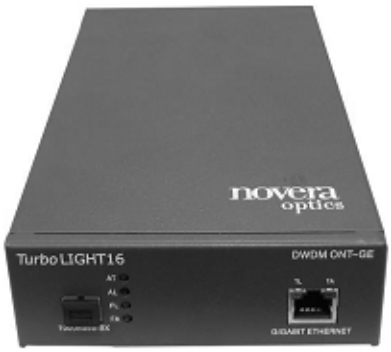
1.3.4. Fan shelf and fan unit

The Fan shelf has three pluggable fan units that can be inserted and ejected through back side.

1.3.5. RN AWG and RN Closure (Manhole type, Pole mount type)



1.3.6. DWDM ONT-100M and DWDM ONT-1G



Chapter 2 SpeedLIGHT16 and TurboLIGHT16 Specification

2.1. TurboLIGHT16 Specifications

2.1.1. System specification

- Number of ONT's per RN: 16
- Data rate per ONT: 1.25 Gbps and 125 Mbps
- Maximum Range from OLT to ONT: 0 to 10 km
- Number of Fibers from OLT to RN: 1 feeder fiber per OLT
- Number of Fibers from RN to each ONT: 1 distribution fiber per ONT
- Maximum loss of the transmission fibers: 4.5 dB
- Upstream wavelength band: 1534 – 1560 nm
- Downstream wavelength band: 1426 – 1451 nm
- BER: 10^{-12} for 1.25 Gbps and 10^{-10} for 125 Mbps

2.1.2. Optical Line Terminal (OLT) shelf : NS 16 1G CO

Main Specifications	
OCU-1G/OCU-100M	Up to 16 channels per shelf
MCU	1 unit per shelf
BMU-1G	1 unit per shelf
PSU	2 units per shelf (for redundancy)
Power Supply and Dimensions	
Operating voltage	-40.8 Vdc ~ 57.6 Vdc
Max. power consumption	300 W
Dimension	19" rack, Height: 5 U
Operating Environment	
Operating Temperature	0 ℃ ~ 50 ℃
Storage Temperature	-40 ℃ ~ 85 ℃
Humidity	5 % ~ 85%

2.1.3. Optical Channel Unit (OCU-1G)

Optical Interface	
Optical cable	Single mode optical fiber
Optical interface to feeder fiber	1 SC/APC connector
Line Rate	1.25 Gbps
Input optical data power	-18.5 dBm to -1 dBm (C-band)
Output optical data power	-1.5 dBm to +5 dBm (E-band)
BLS input power	-7.5 dBm to +1 dBm (E-band)
Ethernet Port	
Operation mode	Gigabit Ethernet / Auto-Negotiation Mode
Electrical interface	RJ-45 connector

2.1.4. Optical Channel Unit (OCU-100M)

Optical Interface	
Optical cable	Single mode optical fiber
Optical interface	SC/APC connector
Line Rate	125 Mbps
Input optical data power	-31.5 dBm to -4 dBm (C-band)
Output optical data power	-10 dBm to +2 dBm (E-band)
BLS input power	-7.5 dBm to +1 dBm (E-band)
Ethernet Port	

Operation mode	Fast Ethernet / Auto-Negotiation Mode
Electrical interface	RJ-45

2.1.5. Broadband Light Source and Mux Unit (BMU-1G)

Optical Features	
Maximum branches	16 channel (Uplink: 16 wavelengths, Downlink: 16 wavelengths)
Optical cable	Single mode optical fiber
Optical connector	SC/APC
Max output data power into feeder fiber	+13.5 dBm (E-band)
BLS power into feeder fiber	+16 dBm to +22.5 dBm (C-band)
BLS output power to OCU	-7.5 dBm to +1 dBm (E-band, including one patch cord)

2.1.6. Main Control Unit (MCU)

Interface	
Console	RS-232
Ethernet	RJ-45

2.1.7. Fan shelf

Main Features	
Fan unit	3 units per shelf
Power	-48 Vdc from the OLT shelf

2.1.8. Remote Node (RN) : NS 16 1G PN

Optical Features		
Maximum branches	16 channel (Uplink: 16 wavelengths, Downlink: 16 wavelengths)	
Maximum Insertion Loss at Peak	5 dB for C-band and 5.5 dB for E-band	
Optical cable	Single mode optical fiber	
Optical connection	Connection to the CO	1 core
	Connection to the subscriber	1 core
Environmental Conditions		
Operating temperature	-30 °C ~ 70 °C	
Operating humidity	5% ~ 85%	

2.1.9. Optical Network Terminal (DWDM 1G ONT) : NS 16 1G NN

Optical Interface	
Optical cable	Single mode optical fiber
Line rate	1.25 Gbps
Optical interface	SC/APC connector
Input optical data power	-20 dBm to –2 dBm (E-band)
Output optical data power	-1.5 dBm to +6 dBm(C-band)
BLS input power	-7.5 dBm to +5 dBm (C-band)
Ethernet Port	

Operation mode	Gigabit Ethernet / Auto-Negotiation Mode
Electrical interface	RJ-45
Environmental Conditions	
Operating temperature	0 °C ~ 50 °C
Operating humidity	5% ~ 85%
Input Power Supply	
Rating	5 Vdc 3A

2.1.10. Optical Network Terminal (DWDM 100M ONT) : NS 16100 NN

Optical Interface	
Optical cable	Single mode optical fiber
Line Rate	125 Mbps
Optical interface	SC/APC connector
Input optical data power	-33 dBm to –5 dBm (E-band)
Output optical data power	-10 dBm to +3 dBm (C-band)
BLS input power	–12 dBm to +5 dBm (C-band)
Ethernet Port	
Operation mode	Fast Ethernet / Auto-Negotiation Mode
Electrical interface	RJ-45 connector
Environmental Conditions	
Operating temperature	0 °C ~ 50 °C
Operating humidity	5% ~ 85%
Input Power Supply	

Rating	5 Vdc 3A

2.2. SpeedLIGHT16 Specifications

2.2.1. System Specification

- Number of ONTs per RN: 16
- Data rate per ONT (symmetric and dedicated) : 125 Mbps
- Maximum Range from OLT to ONT: 0 to 10 km
- Number of Fibers from OLT to RN: 1 feeder fiber per OLT
- Number of Fibers from RN to each ONT: 1 distribution fiber per ONT
- Max loss of transmission fibers: 4.5 dB
- Upstream wavelength band : 1534 – 1560 nm
- Downstream wavelength band: 1426 – 1451 nm
- BER: 10^{-10}

2.2.2. Optical Line Terminal (OLT) shelf : NS 16100 CO

Main Specifications	
OCU-100M	Up to 16 channels per shelf
MCU	1 unit per shelf
BMU-100M	1 unit per shelf
PSU	2 units per shelf (for redundancy)
Power Supply and Dimensions	
Operating voltage	-40.8 Vdc ~ 57.6 Vdc
Max. power consumption	300 W
Dimension	19" rack, Height: 5 U
Operating Environment	
Operating Temperature	0 ℃ ~ 50 ℃
Storage Temperature	-40 ℃ ~ 85 ℃
Humidity	5 % ~ 85%

2.2.3. Optical Channel Unit (OCU-100M)

Optical Interface	
Optical cable	Single mode optical fiber
Optical interface	SC/APC connector
Line Rate	125 Mbps
Input optical data power	-31.5 dBm to -4 dBm (C-band)
Output optical data power	-10 dBm to +0.5 dBm (E-band)
BLS input power	-14 dBm to +1 dBm (E-band)
Ethernet Port	
Operation mode	Fast Ethernet / Auto-Negotiation Mode
Electrical interface	RJ-45

2.2.4. Broadband Light Source and Mux Unit (BMU-100M)

Optical Features	
Maximum branches	16 channel (Uplink: 16 wavelengths, Downlink: 16 wavelengths)
Optical cable	Single mode optical fiber
Optical connector	SC/APC
Max output data power into feeder fiber	+1 dBm (E-band)
BLS power into feeder fiber	+15 dBm to +20 dBm (C-band)
BLS output power to OCU	-14 dBm to +1 dBm (E-band, including one patch cord)

2.2.5. Main Control Unit (MCU)

Interface	
Console	RS-232
Ethernet	RJ-45

2.2.6. Fan shelf

Main Features	
Fan unit	3 units per shelf
Power	-48 Vdc from the OLT shelf

2.2.7. Remote Node (RN) : NS 16100 PN

Optical Features		
Maximum branches	16 channel (Uplink: 16 wavelengths, Downlink: 16 wavelengths)	
Maximum Insertion Loss at Peak	5 dB for C-band and 5.5 dB for E-band	
Optical cable	Single mode optical fiber	
Optical connection	Connection to the CO	1 core
	Connection to the subscriber	1 core
Environmental Conditions		
Operating temperature	-30 °C ~ 70 °C	
Operating humidity	5% ~ 85%	

2.2.8. Optical Network Terminal (DWDM 100M ONT) : NS 16100 NN

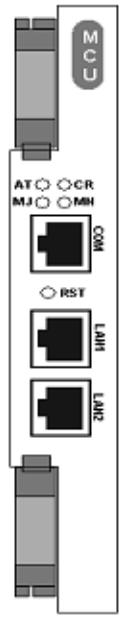
Optical Interface	
Optical cable	Single mode optical fiber
Line Rate	125 Mbps
Optical interface	SC/APC connector
Input optical data power	-33 dBm to –5 dBm (E-band)
Output optical data power	-10 dBm to +3 dBm (C-band)
BLS input power	−14 dBm to +5 dBm (C-band)
Ethernet Port	
Operation mode	Fast Ethernet / Auto-Negotiation Mode
Electrical interface	RJ-45 connector
Environmental Conditions	
Operating temperature	0 °C ~ 50 °C
Operating humidity	5% ~ 85%
Input Power Supply	
Rating	5 Vdc 3A

Chapter 3 How to Install SpeedLIGHT16 / TurboLIGHT16

3.1. SpeedLIGHT16 / TurboLIGHT16 Units port and LED information

3.1.1. MCU

LED information

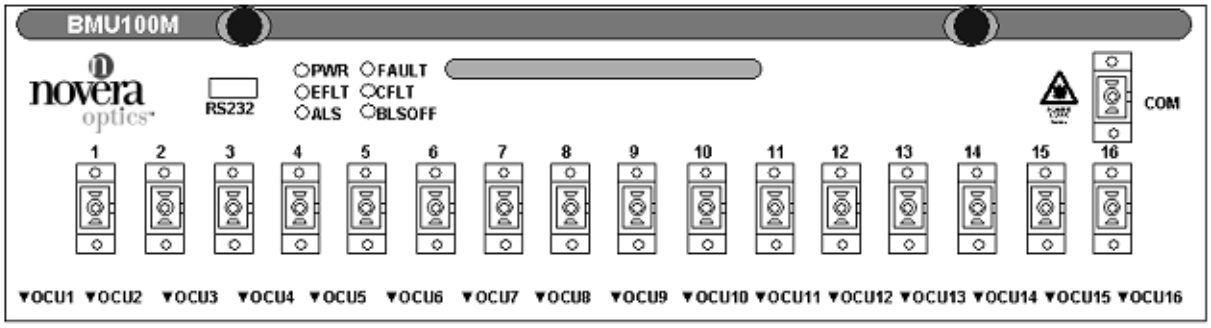


LED	Color	Status	Description
AT (Active)	Orange	On	Displays MCU is in booting status
	Green	On	Displays MCU is in normal operation
CR (Critical Alarm)	Red	On	Displays alarm that system in critical fault/failure
MJ (Major Alarm)	Orange	On	Displays alarm that system in major fault/failure
MN (Minor Alarm)	Yellow	On	Displays alarm that system in minor fault/failure

Port information

Port	Type	Description
COM	RJ-45	Console port for RS232 Serial Terminal
LAN1	RJ-45	Port for Ethernet connection #1 (10/100 Base-T)
LAN2	RJ-45	Port for Ethernet connection #2 (10/100 Base-T)
RST	Push-Button	System reset button

3.1.2. BMU



BMU LED information (the LED information is the same both for BMU-100M and for BMU-1G)

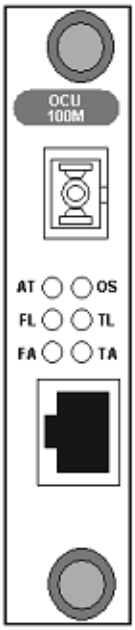
LED	Color	Status	Description
PWR	Green	On	Indicates that power is properly providing
FAULT	Red	On	Alarms that BMU internal temperature is abnormally high
EFLT	Red	On	Displays E-BLS Fault (high temperature, high current, optical power drop more than 3 dB)
CFLT	Red	On	Displays C-BLS Fault (high temperature, high current, optical power drop more than 3 dB)
ALS	Red	On	Automatic Link Shut down occurs (Optical cable between OLT and RN is in abnormal state (fiber cut or fiber plugged out)
BLSOFF	Red	On	E-BLS or C-BLS power down

BMU Port information

Port	Type	Description
RS232	4P	Test port for internal use
COM	SC/APC Adaptor	Output : 16 downstream WDM signals and C-BLS Input : 16 upstream WDM signals
OCU 1 to16	SC/APC Adaptor	Output : 16 spectrum sliced E-BLS Input : 16 downstream WDM signals

3.1.3. OCU

OCU LED information (the same both for OCU-100M and for OCU-1G)

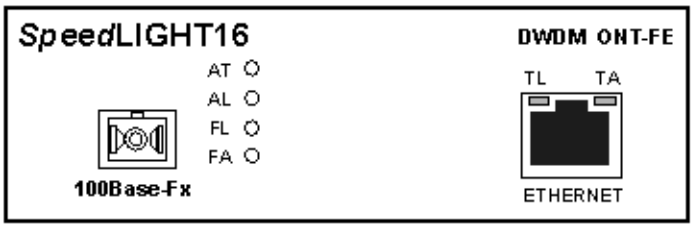


LED	Color	Status	Description
AT (Active)	Green	On	Displays power on and normal status
OS (Out of service)	Red	On	Displays "Out Of Service" status
	Green	On	Displays "In Service" status
FL (Fx Link)	Green	On	Displays Fx Link up status
TL (Tx Link)	Green	On	Displays Tx Link up status
FA (Fx Active)	Green	On	Displays optical signal data transmitting and receiving correctly
TA (Tx Active)	Green	On	Displays electrical signal data transmitting and receiving correctly

OCU port information

Port	Type	Description
FX	SC/APC Adaptor	100Base-FX data port
TX	SC/APC Adaptor	100Base-TX data port

3.1.4. ONT



ONT LED indicator (the LED information is the same both for ONT-100M and for ONT-1G)

LED	**Color**	**Status**	**Description**
AT	Green	On	Active
AL	Red	On	Alarm
FL	Orange	On	Fx Link up
FA	Green	On	Fx Active : receive and transmit data
TL	Orange	On	Tx Link up
TA	Green	On	Tx Active : receive and transmit data

ONT front panel port

Port	**Type**	**Description**
FX	SC/APC Adaptor	100Base-FX data port, Link to RN
TX	RJ-45	100Base-TX data port, Link to FES or VDSL

3.2. System installation and connections

3.2.1. OLT

- Locate and fix the OLT in a stabilized place. It can be placed on the table or installed in a rack. The selection of installation location is important in order operate the system properly. The installation space shall have enough space distant from other equipments so that it is easy to access the OLT for maintenance.
- Locate the OLT where air flow is provided sufficiently in order to prevent overheating of equipments. Without proper air flow, the heat generated in the system can be accumulated to over heat the modules inside the OLT.
- Provide the power supply that meets the requirement described in Chapter 2. Connect –48 Vdc power cables to the screws of OLT shelf backside as shown in Fig. 3-1.

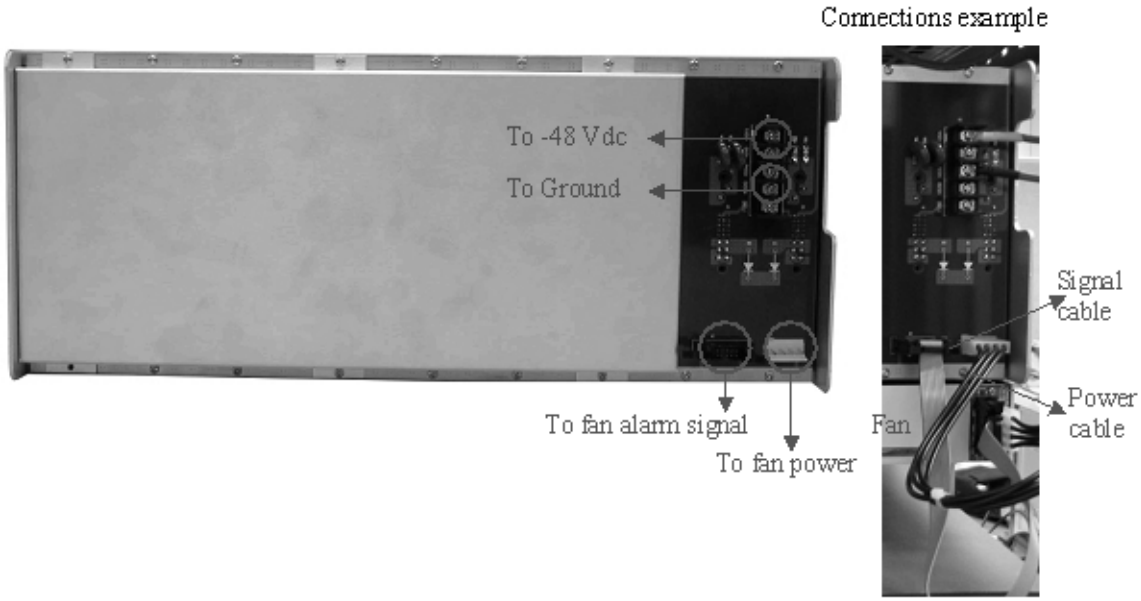


Fig. 3-1 OLT –48 Vdc connection and OLT shelf / Fan shelf power and alarm signal connection example

- In case of connecting external redundant power, the two pairs of power cables shall be separately connected to independent power supply.
- For connection of OLT shelf with Fan shelf, use ribbon cable for fan alarm signal and power cable for power supply to fan that are provided in the shipping box.
- In case of installing the OLT in a 19 inch telecommunication rack, use the rack-mount brackets and four rack-mount screws through holes in the brackets
- For connection between OLT shelf and Fan shelf, use the alarm signal ribbon cable and power cable that are shipped with OLT together (See the connection example in Fig. 3-1).

- For optical connections between OCU and BMU, use the SC/APC type optical patch cord (2.4 mm thick, 20 cm long) that are providing in the OCU shipping boxes. (See Fig. 3-2 for connection example)
- For electrical connection (RJ45) between Aggregation switch in CO with OCU, use the straight type UTP cable (Cat. 5e or Cat. 6). (See Fig. 3-2 for connection example)

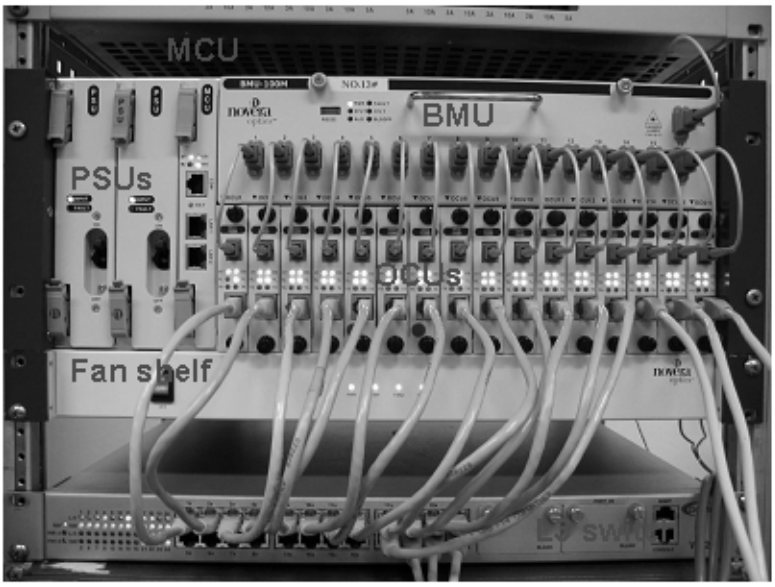


Fig. 3-2 OCU and BMU optical connection, OCU and L3 switch electrical connection

3.2.2. RN

RN consists of an AWG (Arrayed Waveguide Grating) wavelength division multiplexer/demultiplexer and its closure. The AWG is a very high reliable passive optical component that does not need electrical power. The RN is located between the CO and ONU, it de-multiplexes 16 channel-multiplexed downstream signals received through the feeder fiber from the CO and transmits the independent de-multiplexed downstream signal to each ONT. And adversely, it multiplexes 16 independent upstream signals coming from the ONUs and transmits them to the CO. The common port of the RN connects to the OLT in the CO and consists of a 900 mm jacket optical patch cord with an SC/APC connector. The output ports to connect to the ONT consist of two 8-ribbon fibers whose ends are terminated with 900 mm jacketed optical fiber with a fan-out of 16 SC/APC connectors.

Fig. 3-3 RN AWG

The RN connects to each ONU through a single optical fiber.

In case of installing RN on a Pole as shown in Fig. 3-4, The RN-closure has the AWG and patch panel for 17 SC/APC optical patch cord connections. An operator in the field can plug in a 24 core fiber cable with SC/APC connecters for connection to the RN common and output ports in advance. (For more detail, see the RN AWG installation procedure in closure)

Fig. 3-4 RN installed in closure for pole application

3.2.3. ONT

ONT consists of DWDM-ONT and power adaptor pack. The power adaptor is to be connected to 110 - 240 Vac power supply and generates 5 Vdc for ONT. When connecting ONT to power adaptor, optical patch cord from RN to ONT and LAN cable to RJ45 port, the Fx port, ONT AT, FL, FA, TL, and TA LEDs will turn on in proper data transmission case.

Chapter 4 How to Operate the System using software

4.1. Cautions in system operation

The special key functions of CLI in serial communication may be restricted depending on the type of terminal (Windows hyper terminal).

4.2. Initial setting of terminal and accessing console

The system must be managed in the following 4 ways:

- Command Line Interface (CLI) via serial line
- CLI via Telnet or SSH
- Management via EMS
- Management via SNMP

At initial start-up, you must access the management mode via the serial port, and allocate the IP of SpeedLIGHT16 & TurboLIGHT16 system. After that, you can manage the system via Telnet, SSH or EMS or SNMP for NMS.

Since the default rate of the serial port is 9,600 bps, set the serial port rate in the terminal to 9,600 bps, and proceed with access.

When using a terminal emulator such as a hyper terminal, set the terminal mode to VT100 as described in the following table.

How to set the hyper terminal

Bits per second	9,600 bps
Data bit	8 bit
Parity	None
Stop bit	1 bit
Flow control	None

4.3. General requirements for management module

The above-mentioned four management methods have the same type of management process, and hence, require the same capability in system management.

Management via Telnet, SSH or EMS is performed over IP, and access to IP is available from all the ports on the front panel. For example, if you allocate the IP number 192.168.1.10 to the SpeedLIGHT16 & TurboLIGHT16 system, you can manage the system from a remote place through the IP address.

Note Refer to "Chapter 5. Managing System with CLI" and "Chapter 6. Managing System with EMS" for detailed operation method using CLI and EMS.

4.4. OS upgrade

In case of modification or improvement of OS or features of the system, the program should be upgraded. The objects of upgrade are classified into OLT and ONT. You must reboot the system in order to apply the upgrade. It may take several minutes to complete upgrading as the system needs to download the new image files and write on the Flash memory. During the upgrading process "#" is displayed on the screen, and a prompt is displayed when transmission is completed. The system is not affected at all during the upgrade process, and you can operate the system with the existing OS until you reboot the system.

4.4.1. OLT upgrade

The OLT upgrade is performed with tftp or ftp via the network. You should start the ftp/tftp server on the client, and move the updated files to the target folder. Then, access OLT, enter the following command in the Privilege mode, and download the OS upgraded image file. You need to enter the ID and the password for security when downloading files.

Command	Mode	Description
copy { ftp | tftp } *ip_address* *filename* flash	Privilege	Upgrade OS of OLT.

```
DWDM-PON# copy tftp 192.168.1.20 os_v112.ios flash
Are you sure? [Y/N] y
username : ****
password : ****
##########################################################################
##########################################################
 DWDM-PON#
```

The updated files are applied automatically when you reboot the system at any time after downloading files.

4.4.2. ONT upgrade

Because the ONT network is not connected to the external network, you must download the upgraded file for ONT from OLT to CF. Then, you must access ONT, and import the OS upgraded image file for ONT from OLT. To ensure security, you need to enter the ID and the password. The following procedure shows how to upgrade ONT:

A) Log in to OLT, and in the Privilege mode, enter the following command to download the ONT upgrade file to CF.

Command	Mode	Description
download { ftp | tftp } *ip_address filename*	Privilege	To upgrade ONT, download the OS upgraded file from ONT to CF.

```
DWDM-PON# download tftp 192.168.1.20 ont_os_v110.ios

Are you sure? [Y/N] y

username : ****
password : ****
#########################################################
 DWDM-PON#
```

B) As the file is normally transmitted, access ONT and enter the following command. Then ONT automatically accesses OLT and downloads the ONT updated file.

Command	Mode	Description
upgrade flash	Privilege	Download the ONT upgraded file from OLT, and automatically update the system.

```
ONT# update flash
 Connected to 192.0.2.254
Receiving 740701 bytes
#########################################################################
##################
Receiving 740701 bytes
#Verify OK...
```

```
Writing to flash...
################################################################################
#######################
 ONT#
```

The updated files are applied automatically when you reboot the system at any time after downloading files.

Chapter 5 Managing System with CLI

5.1. Basic operation of CLI

This chapter describes how to use Command Line Interface (CLI) for setting of SpeedLIGHT16 & TurboLIGHT16 environment.

5.2. Command system

5.2.1. OLT

CLI provides 5 global modes for management of OLT via the console or the remote terminal. The commands vary depending on the mode, and are restricted by the setting. When you log in the system, the default mode is the User mode.

- User mode

When you first log in, the system operates in the User mode. '>' is displayed following the prompt. In the User mode, the system only supports the show function and other basic features.

You can use the following commands in the User mode.

```
DWDM-PON> ?
  clear     Clear MAC table
  enable    Change to enable mode
  exit      Exit current mode and down to previous mode
  help      Describe interactive help system
  ping      Send ICMP echo messages
  show      Show current system information
  telnet    Connect to a remote host by TELNET
DWDM-PON>
```

- Privilege mode

After logging in, enter "enable" and the password, and the system switches from the User mode to the Privilege mode. In this mode, you can view and change basic settings of the system, and switch the mode to Global or ONT. In this mode, '#' is displayed following the prompt. The following table shows how to enter the Privilege mode and the list of available

commands.

Command	Mode	Description
enable	user	Switch the mode to Privilege.

```
NOVERA> enable
Password: **********
DWDM-PON#?
clear       Clear current information
config      Enter configuration state
copy        Get IOS or Get/Put Configuration by tftp/ftp
download    Download ONT image
exit        Exit current mode and down to previous mode
help        Describe interactive help system
ocu         Set OCU parameters
ont         Enter ONT interface configuration state
ping        Send ICMP echo messages
reboot      Reboot system
session     Session control
show        Show current system information
telnet      Connect to a remote host by TELNET
write       Configuration backup to flash
DWDM-PON#
```

- Global (setting) mode

In the Privilege mode, enter "config" to switch to the Global mode. In this mode, you can make settings for the system and the units. However, to check the setting, you need to return the mode to Privilege. To switch the mode to Privilege, enter "exit" or "end." In this mode, '**(config)#**' is displayed following the prompt. The following table shows how to enter the Global mode and the list of available commands.

Command	Mode	Description

config	Privilege	Switch the mode to Global.

DWDM-PON# enable

DWDM-PON(config)# ?

alarm	Set alarm grade
arp	Set static ARP
bmu	Set BMU parameters
clock	Set system clock
config	configuration file
contact	Set the system contact
dce	Set DCE parameters
description	Set the system description
enable	Change enable password
end	End configuration mode
exit	Exit current mode and down to previous mode
hostname	Set the system name
interface	Enter interface config mode
ip	Internet Protocol config commands
location	Set the system location
no	Negate a command or set its defaults
ntp	Set NTP parameters
ocu	Set OCU parameters
password	Set password encryption
show	Show current system information
snmp-server	Set SNMP server parameters
syslog	Set syslog
upload	upload file to remote host
username	Set username and password

- Interface mode

In the Global mode, enter "interface ethernet_port" to switch the mode to Interface. In this mode, you can set or delete ip of the Ethernet port. Enter "exit" to return to the previous mode, or enter "end" to return to the Privilege mode. In this mode, '**(config-if)#**' is displayed

following the prompt. The following table shows how to enter the Interface mode and the list of available commands.

Command	Mode	Description
Interface ethernet_port	global	Switch the mode to Interface.
DWDM-PON(config)# interface eth0 DWDM-PON(config-if)# ? end End configuration mode exit Exit current mode and down to previous mode interface Enter interface config mode ip Internet Protocol config commands no Negate a command or set its defaults		

- ONT mode

To manage ONT, you need to switch the mode to ONT. In the Privilege mode, enter "ONT *ont_number*" to enter the ONT mode. However, the system must be physically connected to the ONT, and the management channel must be normal. The connection error message is displayed if the connection is abnormal. In the ONT mode, you can view and change all the settings of ONT, and can monitor states of ONT. To enter the ONT mode, you need to enter the ONT user ID and password. Other ONT functions are described in the next chapter as they are the same as the console-based ONT function.

Command	Mode	Description
ont index	Privilege	Switch the mode to ONT
DWDM-PON# ont 4 Trying 192.0.2.4(23)... Connected to ont4. Escape character is '^]'. Welcome to Novera		

```
User Access Verification

Username: root
Password: ****
ONT>
```

5.2.2. ONT

CLI provides 3 global modes for management of OLT via the console or the remote terminal. The commands vary depending on the mode, and are restricted by the setting. When you log in the system, the default mode is the User mode.

- User mode

When you first log in, the system operates in the User mode. '>' is displayed following the "OMT". In the User mode, the system only supports the show function and other basic features.

You can use the following commands in the User mode.

```
ONT>
  enable    Change to enable mode
exit      Exit current mode and down to previous mode
help      Describe interactive help system
ping      Send ICMP echo messages
show      Show current system information
telnet    Connect to a remote host by TELNET
```

- Privilege mode

After logging in, enter "enable" and the password, the system switches from the User mode to the Privilege mode. In this mode, you can view and change basic settings of the system, and switch the mode to Global or ONT. In this mode, '#' is displayed following the prompt. The following table shows how to enter the Privilege mode and the list of available commands.

Command	Mode	Description
enable	user	Switch the mode to Privilege.

```
ONT> enable
Password: **********
ONT#
 arp       set static ARP
 clear     Clear current information
 config    Enter configuration state
 copy      Get IOS or Get/Put Configuration by tftp/ftp
 exit      Exit current mode and down to previous mode
 help      Describe interactive help system
 no        Negate a command or set its defaults
 ping      Send ICMP echo messages
 reboot    Reboot system
 session   session control
 show      Show current system information
 telnet    Connect to a remote host by TELNET
 upgrade upgrade from MPU
 write     Configuration backup to flash
```

- Global (Setting) mode

In the Privilege mode, enter "config" to switch to the Global mode. In this mode, you can make settings for the system and the units. However, to check the setting, you need to return the mode to Privilege. To switch the mode to Privilege, enter "exit" or "end". In this mode, '(config)#' is displayed following the prompt. The following table shows how to enter the Global mode and the list of available commands.

Command	Mode	Description
config	Privilege	Switch the mode to Global.

```
ONT# enable
```

```
ONT(config)#
  clock          Set system clock
  contact        Set the system contact
  description    Set the system description
  enable         Change enable password
  end            End configuration mode
  exit           Exit current mode and down to previous mode
  hostname       Set the system name
  ipm            Set IPM value
  location       Set the system location
  no             Negate a command or set its defaults
  ont            ONT
  password       Set password encryption
  show           Show current system information
  username       Set username and password
```

5.3. How to use commands

The following functions enable you to easily enter commands in CLI.

- Help

If you press the < **Tab** > key on the prompt, the possible commands are listed. Or you may enter the question mark (**?**) to view the possible commands in the mode and the brief descriptions on the commands.

```
DWDM-PON# <Tab>
  arp      clear    config    copy      exit      help
  no       ocu      ont       ping      reboot    session
  show     telnet   write
DWDM-PON# <?>
 arp      set static ARP
 clear    Clear current information
 config   Enter configuration state
 copy     Get IOS or Get/Put Configuration by tftp/ftp
 exit     Exit current mode and down to previous mode
 help     Describe interactive help system
 no       Negate a command or set its defaults
 ocu      Set OCU parameters
 ont      Enter ONT interface configuration state
 ping     Send ICMP echo messages
 reboot   Reboot system
 session  session control
 show     Show current system information
 telnet   Connect to a remote host by TELNET
 write    Configuration backup to flash
```

- Auto completion

Type a part of a command and press the < Tab > key. Then the entire command is completed automatically. This function also shows the next possible commands.

```
DWDM-PON# show <Tab>
  arp       bmu       clock          config       dce       fan
  flash     interface ip             log          memory    ocu
  processes psu       running-config snmp-server status
  system    users
DWDM-PON#
```

- Command edit

You can edit the command or select a previous command as shown in the following table.

Available Key	Description
Del	Delete a character on the curser
Backspace	Delete a character in the left of the curser
↑	Call the previous command

5.4. CLI command

The basic CLI commands vary by the mode. The system is in the User mode when you first access the system. You must change the mode to Privilege to manage systems, to Global to make setting, to Interface mode to set the network IP, or to ONT to manage ONT. Basically, the command system and functions are the same between ONT and OLT. Because ONT performs its own functions only, it has neither Interface mode nor ONT mode, and has less commands than OLT. Therefore, this document provides description on the commands by classifying them into functions, without separating them into OLT commands and ONT commands.

5.5. System access and IP setting

This section describes how to set the password and IP address for system access and network communication. You can access the system, set the IP address, and make network communication with other systems via the interface.

5.5.1. System login

You can log in the system through the console port or the remote terminal. To use the remote terminal, you must access the system via the console and set the system IP. Check if the network and the console port are properly connected to the PC, and then, test the connection. Refer to "4.2 Initial setting of terminal and accessing console" for how to set the console port and terminal. If you access the system, the following login prompt appears. Enter the user name and password to enter the User mode. The default user name and password are "root." Then, switch the mode to Privilege and manage the system. The default user name and password for the Privilege mode are also "root." Refer to "5.2 Command system" on how to enter and switch modes.

```
Welcome to Novera


User Access Verification


Username: root
Password: ****
DWDM-PON>
```

5.5.2. Auto logout

If you leave your seat, other people may change the setting of the system. This command sets the auto logout function. You are automatically logged out if there is no keyboard action for a designated period of time. You can set the time or clear the function. The following table shows how to set or clear session timeout.

Command	Mode	Description
session timeout 0	Privilege	Clear auto logout.

session timeout <0-3600>		Set auto logout time in seconds. If you don't set the time, the default time of 600 seconds is applied.
DWDM-PON# session timeout 300 DWDM-PON#		

5.5.3. Create user ID and change password

The default user name for system access is "root." You can add up to 5 user IDs. If you create the first user, the "root" user ID is deleted and replaced by the new user ID. You can add from the second ID. When creating ID, you must also create the password in the same manner as you create ID.

Command	Mode	Description
username *id passwd*	global	Create user ID and change password.
DWDM-PON(config)# username novera novera DWDM-PON(config)#		

Note You can check the created or changed user ID in "5.7.1 Show memory information."

5.5.4. Protect user password

The password is shown as "*******" on show running-config, and not as a text.

Command	Mode	Description
password encryption	global	Set protection for the user password.
DWDM-PON(config)# password encryption DWDM-PON(config)#		

5.5.5. Clear user password protection

The user password protection function is cleared.

Command	Mode	Description
no password encryption	global	Clear the user password protection function.
DWDM-PON(config)# no password encryption DWDM-PON(config)#		

5.5.6. Delete user ID

"no" is prefixed to the commands in order to revert the default value or delete the setting. This rule is also applied to deletion of user ID.

Command	Mode	Description
no username *id*	global	Delete a user.
DWDM-PON(config)# no username novera DWDM-PON(config)#		

5.5.7. Change password

The administrator can change the password for the Privilege mode. To ensure security, it is recommended to change the Privilege password from time to time. You can change the password as described below.

Command	Mode	Description
passwd	global	Change the Privilege password.
DWDM-PON(config)# enable password ****** DWDM-PON(config)#		

5.5.8. Remote access

You can access the remote system with the following command.

Command	Mode	Description
telnet destination ip	User/Privilege	Access the remote system.
DWDM-PON# telnet x.x.x.x DWDM-PON#		

5.5.9. Manage remote user

The administrator can check the remote users and disconnect any user. The maximum number of sessions for remote connection is 5 including the console. To disconnect a remote user, check the line number of the user, and make the delete command.

Command	Mode	Description
show users	User/Privilege	Show the remote users.
clear line *line_number*	Privilege	Disconnect a remote user.
DWDM-PON# show users Line Location ---------- ---------- 1 Console * 2 210.105.79.59 DWDM-PON# clear line 2 DWDM-PON#		

5.5.10. Reboot system

When a new OS image is downloaded via tftp/ftp, the system must be rebooted. You should also reboot the system when you need to boot the system for the management purpose.

Command	Mode	Description
reboot	Privilege	Reboot the system.
DWDM-PON# reboot		

Note

Rebooting of a system restarts the management module only, and therefore, does not interrupt service or affect the service rate.

5.5.11. Set system IP address

No IP address is required for the service for the subscribers. However, you need an IP to manage a remote system or to manage information or status by accessing SNMP from EMS or NMS. You can set IP address for eth0 and eth1 in the current system. eth1 is a stacking port used to manage a number of systems in a single IP address, which is not used at the moment. Therefore, you should set an IP address for eth0 for system management. The following command is used to add, change or delete an IP.

Command	Mode	Description
ip address A.B.C.D/M	interface	Add or change IP.
DWDM-PON(config-if)# ip address 10.1.1.1/24 DWDM-PON(config-if)#		

5.5.12. View system IP address

You can check the IP address set for eth0. The following command is used to view the IP address.

Command	Mode	Description

Show interface eth0	User/Privilege	Show the IP address of the system
DWDM-PON# show interface eth0 Interface eth0 is up MAC Address is 00:19:8b:00:10:20 IP Address is 10.1.1.1/255.255.255.192 Input 6145 packets, 706029 bytes, 0 error, 0 drop Output 2231 packets, 183232 bytes, 0 error, 0 drop DWDM-PON#		

5.5.13. Delete system IP address

You can delete an unnecessary IP address.

Command	Mode	Description
no ip address	Interface	Delete a system IP.
DWDM-PON(config-if)# no ip address DWDM-PON(config-if)#		

5.6. System configuration

This section describes how to set and manage the host name, the time and the version of the system.

5.6.1. Set basic information

You can set brief information on the system, including name, description, contact information and location.

Command	Mode	Description
hostname *hostname*	Global	Set the system name.
description *description*		Write brief description on the system.
location *location*		Save the installation location.
contact *contact*		Set the contact information of the system administrator.
DWDM-PON(config)# hostname NOVERA DWDM-PON(config)# DWDM-PON(config)# description DWDM-PON DWDM-PON(config)# DWDM-PON(config)# location tester_room DWDM-PON(config)# DWDM-PON(config)# contact home		

5.6.2. Delete basic information

You can delete information on the system.

Command	Mode	Description
no hostname	Global	Delete the system name.
no description		Delete the description on the system.
no location		Delete the location.

no contact		Delete the contact information of the system administrator.
DWDM-PON(config)# no hostname DWDM-PON(config)# DWDM-PON(config)# no description DWDM-PON(config)# DWDM-PON(config)# no location DWDM-PON(config)# DWDM-PON(config)# no contact DWDM-PON(config)#		

5.6.3. Set date and time

You can set or change the current time and date on the system. The parameter "HH:MM:SS DD MM YYYY" following the command means "Hour:Minute:Second Day Month Year".

Command	Mode	Description
clock HH:MM:SS DD MM YYYY	global	Set the current time and date on the system.
DWDM-PON(config)# clock 10:30:20 14 9 2006 DWDM-PON(config)#		

5.6.4. Show date and time

You can check the current time and date on the system with the following command.

Command	Mode	Description
show clock	user/Privilege	Show the current time and date of the system.
DWDM-PON# show clock Wed Sep 14 10:30:20 KST 2006 DWDM-PON#		

5.6.5. Set time-zone

You can set the time-zone with the following command.

Command	Mode	Description
Clock timezone *type no*	global	Set the time with time-zone.
DWDM-PON(config)# clock timezone UTC 9 DWDM-PON(config)#		

5.6.6. Set NTP(Network Time Protocols) server

NTP is used to ensure exact time on the network by setting the system time to 1/1000 second. When you set an NTP server, the system retrieves the current time from the NTP server by exchanging messages. To operate the system properly, the system must be set to the exact time. You can set the NTP server and enter IP with the following command.

Command	Mode	Description
ntp server A.B.C.D	global	Set IP address of the NTP server.
DWDM-PON(config)# ntp server 111.1.1.1 DWDM-PON(config)#		

5.6.7. Delete NTP (Network Time Protocols)

You can delete an NTP server with the following command.

Command	Mode	Description
no ntp server	global	Delete an NTP server.
DWDM-PON(config)# no ntp server 111.1.1.1 DWDM-PON(config)#		

5.7. Manage system configuration

You can check the system setting or save the setting in the system. This section describes the method of managing system configuration.

5.7.1. Show configuration in the memory

You can view the entire settings of a system with a command. Because the command shows the settings stored in the memory, any information not written in CF is not displayed after rebooting of the system.

Command	Mode	Description
show running-config	privilege/global	Show the current setting of the system

```
DWDM-PON# show running-config
Current running configuration:
!
syslog host 210.105.79.16
syslog host 210.105.79.56
!
snmp-server community public ro
snmp-server community private rw
snmp-server trap-host 210.105.79.16 test
snmp-server trap-host 210.105.79.56 public
snmp-server trap ocu-equip
snmp-server trap ocu-admin
snmp-server trap ocu-ipm
snmp-server trap ocu-fxlk
snmp-server trap ocu-txlk
snmp-server trap bmu-equip
snmp-server trap bmu-cfault
snmp-server trap bmu-efault
snmp-server trap bmu-als
snmp-server trap bmu-fan
--more--
```

Note

'-- more --' is used after the 23rd line to indicate that there are more lines. You can stop viewing information by entering "q".

5.7.2. Show compact flash information

This command shows setting up information of the system to be saving in the compact flash. You can use the following command to view setting up information of the system to be saving in the compact flash.

Command	Mode	Description
show config	privilege/global	Show setting up information of the system to be saving in the compact flash.

```
DWDM-PON# show config
Saved configuration:
!
syslog host 210.105.79.16
syslog host 210.105.79.56
!
snmp-server community public ro
snmp-server community private rw
snmp-server trap-host 210.105.79.16 test
snmp-server trap-host 210.105.79.56 public
snmp-server trap ocu-equip
snmp-server trap ocu-admin
snmp-server trap ocu-ipm
snmp-server trap ocu-fxlk
snmp-server trap ocu-txlk
snmp-server trap bmu-equip
snmp-server trap bmu-cfault
snmp-server trap bmu-efault
snmp-server trap bmu-als
snmp-server trap bmu-fan
```

```
--more--
```

Note  '-- more --' is used after the 23rd line to indicate that there are more lines. You can stop viewing information by entering "q".

5.7.3. Save information

Because the information you set is applied to the memory only, any information not written on compact flash is deleted when the system is rebooted. The following command is used to save information on show running-config in the Flash. When changing system or MCU, if you use the compact flash with the current setting, you can easily recover the setting on the new system or MCU.

Command	Mode	Description
write	privilege	Save the setting in compact flash.
DWDM-PON# write DWDM-PON#		

5.7.4. Clear information

You can delete all information from the compact flash.

Command	Mode	Description
clear config	privilege	Delete all information from the comfact flash.
DWDM-PON# clear config DWDM-PON#		

After deleting information, make sure to reboot the system to apply the change.

5.7.5. Back up information

You can make a backup copy of all information in the compact flash. The backup copy can be useful to recover information when the configuration data is damaged or the system is replaced.

Command	Mode	Description
copy config ftp|tftp *ip filename*	privilege	Make a backup copy of compact flash information via ftp/tftp.
DWDM-PON# copy config ftp 100.1.1.1 config.bak DWDM-PON#		

5.7.6. Back up current setting

You can make a backup copy of all settings shown in running-config and not stored in CF. The backup copy can be useful to recover information when the configuration data is damaged or the system is replaced.

Command	Mode	Description
copy running-config ftp|tftp *ip filename*	privilege	Make a backup copy of current setting via ftp/tftp.
DWDM-PON# copy running-config ftp 100.1.1.1 config.bak DWDM-PON#		

5.7.7. Import backup copy of setting information

You can recover the setting information with the backup copy of setting data when the configuration data is damaged or the system is replaced.

Command	Mode	Description
copy ftp|tftp *ip filename* config	privilege	Recover the setting information by importing backup copy via ftp/tftp.
DWDM-PON# copy ftp 100.1.1.1 config.bak config DWDM-PON#		

After recovering information, make sure to reboot the system.

5.8. Check system

If there is a problem in the system, you must find the reason and the solution. You should also check the system before a problem occurs. And after changing setting, you need to check if the system is properly set. This section describes the commands you can use to check the information for basic management of the system.

5.8.1. Show system information

The following command shows a brief profile of the system such as the name, the version by module and the capacity.

Command	Mode	Description
show system	User/Privilege	Show system information.

```
DWDM-PON# show system

System Information

Hostname      : NOVERA
Description     : DWDM-PON
Location      : tester_room
Contact       : home
HWver         : 2.0
SWver         : 1.1.4
FWver         : 1.2
DRAM          : 128 MByte
FLASH         : 16 MByte
```

5.8.2. Show memory state

You can view memory state of the system with the following command.

Command	Mode	Description
show memory	User/Privilege	Show memory state.

DWDM-PON# show memory

	total	used	free	shared	buffers
Mem:	117304	21536	95768	0	812
Swap:	0	0	0		
Total:	117304	21536	95768		

5.8.3. Show process information

This command shows the current CPU load by process. You can find the daemon that seizes the CPU most, any unnecessary daemon, and the process of the faulty daemon.

Command	Mode	Description
show processes	User/Privilege	Show system process information.

DWDM-PON# show processes

< cpu usage average for >

5 sec : 16.60 %

1 min : 20.28 %

5 min : 22.19 %

10 min : 22.35 %

5.8.4. Show Flash memory state

This command shows the Flash memory state of the system. You can get information on the IOS file systems, the applications and the ONT upgrade image files.

Command	Mode	Description
show flash	User/Privilege	Show system process information.

DWDM-PON# show flash

	Total size(B)	Used size(B)	Unused size(B)	version
OS File System	4194304	3932160	262144	2.4.20-novera-1.4

```
Application       | 4194304        | 956724       | 3237580          | 1.1.4

ONT image name : TL16-ont.img , version = 1.1.4

DWDM-PON#
```

5.9. Network management

This section describes the method to set the system network management functions.

5.9.1. Check network connection state

With the ping command, you can check if the system is properly connected to the network.

Command	Mode	Description
ping destination_ip count datagram_size	User/Privilege	Perform the ping test to check the network status. The "count" indicates the repeat counts and "datagram_size" indicates the size of data sent at a time.

```
DWDM-PON# ping 210.105.79.39 10 10
PING 210.105.79.39 (210.105.79.39): 10 data bytes
18 bytes from 210.105.79.39: icmp_seq=0 ttl=128 time=1.5 ms
18 bytes from 210.105.79.39: icmp_seq=1 ttl=128 time=1.1 ms
18 bytes from 210.105.79.39: icmp_seq=2 ttl=128 time=0.9 ms
18 bytes from 210.105.79.39: icmp_seq=3 ttl=128 time=0.9 ms
18 bytes from 210.105.79.39: icmp_seq=4 ttl=128 time=1.0 ms
18 bytes from 210.105.79.39: icmp_seq=5 ttl=128 time=0.9 ms
18 bytes from 210.105.79.39: icmp_seq=6 ttl=128 time=0.9 ms
18 bytes from 210.105.79.39: icmp_seq=7 ttl=128 time=0.9 ms
18 bytes from 210.105.79.39: icmp_seq=8 ttl=128 time=1.0 ms
18 bytes from 210.105.79.39: icmp_seq=9 ttl=128 time=0.9 ms

--- 210.105.79.39 ping statistics ---
10 packets transmitted, 10 packets received, 0% packet loss
round-trip min/avg/max = 0.9/1.0/1.5 ms
DWDM-PON#
```

5.9.2. Set routing table

This command creates the routing table for optimum transmission path out of various

transmission paths used in the system. You can add the default gateway to the routing table.

Command	Mode	Description
ip default-gateway A.B.C.D	global	Add the default gateway to the routing table.
DWDM-PON(config)# ip default-gateway 10.1.1.4 DWDM-PON(config)#		

5.9.3. Show routing table

You can check the routing table with the following command.

Command	Mode	Description
show ip route	User/Privilege	Show the contents of the routing table.
DWDM-PON# show ip route Destination Subnet Mask Gateway ---------- ---------- ---------- S 10.1.1.4 255.255.255.192 connected to interface eth0 S 0.0.0.0 0.0.0.0 via 10.1.1.1 DWDM-PON#		

5.9.4. Delete routing table

You can delete the default gateway from the routing table with the following command.

Command	Mode	Description
no ip default-gateway	global	Delete the default gateway from the routing table.
DWDM-PON(config)# no ip default-gateway DWDM-PON(config)#		

5.9.5. Add ARP table

The devices connected to the IP network have two types of addresses; the LAN address and the network address. The LAN address is called as the data link address because it is typically used in Layer 2, but is widely known as the MAC address. To transmit the data packets, you need to know the 48-bit MAC address. The process of finding the matching MAC address with the IP address is called as "address resolution," and the process of finding the matching IP address with the MAC address is called as "reverse address resolution." The protocol used when finding the matching MAC address with the IP address is ARP (Address Resolution Protocol). The ARP table is automatically added when the system finds the matching MAC address with the IP through ARP. The network administrator may add the matching MAC address with a specific IP address on the ARP table. To match the MAC address with a specific IP address, you must use add the IP address in the ARP table with the following command.

Command	Mode	Description
arp ip_address MAC	global	Add an IP address in the ARP.
DWDM-PON(config)# arp 210.105.79.2 00:0F:EA:50:E2:B9 DWDM-PON(config)#		

5.9.6. Show ARP table

You can view the contents of the ARP table with the following command.

Command	Mode	Description
show arp	User/Privilege	Show the ARP table.

```
DWDM-PON# show arp
IP Address       HWaddress                Iface Flags
---------------  ------------------ -----  -----
210.105.79.2     00:0F:EA:50:E2:B9 eth0    D
210.105.79.19    00:16:36:00:8C:CB eth0    D
192.0.2.1        00:D0:A6:01:08:C4 eth2    D
DWDM-PON#
```

5.9.7. Delete address from ARP table

You can delete an address from the ARP table with the following command.

Command	Mode	Description
no arp ip_address	Global	Delete an address from the ARP table.
DWDM-PON(config)# no arp 210.105.79.2 DWDM-PON(config)#		

5.9.8. Delete all from ARP table

You can delete all the addresses from the ARP table with the following command.

Command	Mode	Description
clear arp all	Privilege	Delete all addresses from the ARP table.
DWDM-PON# clear arp all DWDM-PON#		

5.9.9. Show MAC table

This command creates and shows the MAC table for OCU and ONT. The MAC table has the ports connected to a unit, and the MAC addresses for the following OCU and ONT port.

[OCU-FE]	[OCU-GE]
0 : FX	10 : FX
1 : TX	9 : TX
[ONT-FE]	[ONT-GE]
0 : FX	7 : FX
4 : TX	3 : TX

The following table shows the command for the entire MAC table and the one for specific OCU channel.

Command	Mode	Description
show mac all	User/Privilege	Show the entire MAC table.
show mac *index*	User/Privilege	Show the MAC addresses for the selected OCU.

```
DWDM-PON# show mac all
[OCU 1]
Port    MAC address
------ -----------------
Tx[1]    00:00:f0:90:6a:6a
Tx[1]    00:14:85:d2:83:7d
Tx[1]    00:16:36:00:8c:cb
Tx[1]    00:d0:a6:01:08:30
Fx[0]    00:d0:a6:01:08:a8
Tx[1]    00:d0:c9:94:1a:0b
Tx[1]    00:e0:4d:0c:42:39
 [OCU 2]
Port    MAC address
------ -----------------
Tx[1]    00:00:f0:90:6a:6a
Tx[1]    00:14:85:d2:83:7d
Tx[1]    00:16:36:00:8c:cb
Tx[1]    00:d0:a6:01:08:30
Fx[0]    00:d0:a6:01:08:a0
Tx[1]    00:d0:c9:94:1a:0b
Tx[1]    00:e0:4d:0c:42:39
!
omitted
!
[OCU 16]
Port    MAC address
------ -----------------
Tx[1]    00:00:f0:81:14:47
Tx[1]    00:00:f0:90:6a:6a
Tx[1]    00:01:03:2c:61:ea
Tx[1]    00:03:47:3e:24:c2
```

```
Tx[1]   00:03:47:73:f8:85
Tx[1]   00:0a:e6:f3:3b:a6
Tx[1]   00:0b:6a:e3:cb:a1
Tx[1]   00:0d:0b:11:92:30
Tx[1]   00:0e:a6:8d:de:31
Tx[1]   00:0f:ea:0d:41:d1
Tx[1]   00:0f:ea:53:99:fd
Tx[1]   00:0f:ea:f3:44:74
Tx[1]   00:10:5a:6d:fd:b4
Tx[1]   00:11:2f:1c:bf:c7
Tx[1]   00:11:2f:83:59:f2
Tx[1]   00:11:d8:0a:4c:36
Tx[1]   00:11:d8:90:75:03
Tx[1]   00:14:2a:0e:f3:29
Tx[1]   00:14:2a:94:20:de
Tx[1]   00:14:85:d2:83:7d
Tx[1]   00:16:36:00:8c:cb
Tx[1]   00:16:36:0b:4e:b4
Tx[1]   00:16:e6:1f:62:fd
Tx[1]   00:16:e6:5d:f4:b0
Tx[1]   00:16:ec:a7:43:1f
Tx[1]   00:30:c1:5f:eb:6b
Tx[1]   00:b0:d0:f8:3f:7e
Tx[1]   00:d0:a6:01:08:30
Tx[1]   00:d0:c9:94:1a:0b
Tx[1]   00:e0:4c:d7:92:09
Tx[1]   00:e0:4c:f4:c3:84
Tx[1]   00:e0:4d:0c:42:39
Tx[1]   00:e0:91:05:12:e4
DWDM-PON#
DWDM-PON# show mac 1
[OCU 1]
Port    MAC address
------ -----------------
Tx[1]   00:00:f0:90:6a:6a
Tx[1]   00:14:85:d2:83:7d
```

```
Tx[1]   00:16:36:00:8c:cb
Tx[1]   00:d0:a6:01:08:30
Fx[0]   00:d0:a6:01:08:a8
Tx[1]   00:d0:c9:94:1a:0b
Tx[1]   00:e0:4d:0c:42:39
DWDM-PON#
```

5.10. Set SNMP

SNMP (Simple Network Management Protocol) consists of the SNMP Manager, the systems of the network, and the SNMP agents installed in the systems. SNMP is the protocol that supports communication between the SNMP Manager and the SNMP Agents. The protocol defines the format of information exchanged between the SNMP Manager and the SNMP Agents. When setting SNMP, you must specify the relationship between the SNMP Manager and the Agents. You can provide the read-only or the read/write authority depending on the community. The system supports the V3 function for security, and you can set the ID and password for accessing SNMP. The SNMP Agent has the MIB parameter to respond for the request of the SNMP Manager. The SNMP Manager can get data from the Agent, or save data in the Agent. The Agent gets data from MIB which has information on the system and the network.

The SNMP Agent can send traps for troubles to you. Traps are warning messages on the network status sent to the SNMP Trap-host. A trap is sent to the SNMP Trap-host if there is a problem in the systems or the modules.

5.10.1. Set access to SNMP Agent

You should not give access authority to SNMP Agent to everybody. You can set the password to restrict the access. The community contains the general meaning of password. You can enter a password in the "community_name" parameter. You can give the read-only or read/write authority for SNMP Agent depending on the password. The following table shows the commands used to set the password for SNMP Agent. 'ro' and 'rw' at the end of the command indicate 'read-only' and 'read/write', respectively.

Command	Mode	Description
snmp-server community community_name {ro | rw }	global	Set password for accessing agent.
DWDM-PON(config)# snmp-server community novera ro DWDM-PON(config)# snmp-server community administrator rw DWDM-PON(config)#		

You can set up to 5 SNMP communities.

5.10.2. Delete password for SNMP Agent

To cancel authority for SNMP Agent, you should use the following command to delete the password for SNMP Agent.

Command	Mode	Description
no snmp-server community *passwd {ro | rw }*	global	Delete password for Agent.
DWDM-PON(config)# no snmp-server community novera ro DWDM-PON(config)# no snmp-server community administrator rw DWDM-PON(config)#		

5.10.3. Set ID for SNMP Agent

The V3 function is supported for increased security of access to SNMP Agent. You can set ID and password for V3. The following command is used to set ID and password in SNMP Agent.

Command	Mode	Description
snmp-server user *id* auth md5 *password*	global	Create ID for SNMP Agent.
DWDM-PON(config)# snmp-server user admin auth md5 admin01 DWDM-PON(config)#		

Note

You can set up to 5 SNMP users.

5.10.4. Delete ID for SNMP Agent

With the following command, you can delete the ID for SNMP Agent.

Command	Mode	Description
no snmp-server user *id*	global	Delete ID for SNMP Agent.
DWDM-PON(config)# no snmp-server user admin DWDM-PON(config)#		

5.10.5. Set SNMP Trap-host

SNMP traps are the alarm messages sent by the SNMP Agent to the SNMP Manager. If you set the SNMP Trap function, you can receive information on the network management program from the system for a specific event. The receiver of the trap message is Trap-host. If you designate the trap-host with the community, the designated community has the priority. If you don't designate any community, the property set in "5.10.6 Set SNMP Trap-community." The following table shows the command used in designating the SNMP Trap-host.

Command	Mode	Description
snmp-server trap-host ip_address [community_name]	global	Set SNMP Trap-host.
DWDM-PON(config)# snmp-server trap-host 223.11.1.12 DWDM-PON(config)# snmp-server trap-host 211.33.12.56 novera DWDM-PON(config)#		

You can set up to 5 SNMP Trap-hosts.

5.10.6. Set SNMP Trap-community

If you designate the SNMP trap-host and the community, the network management program sends the event message with the community name, so that the system can easily identify messages.

Command	Mode	Description
snmp-server trap-community *community_name*	global	Set SNMP Trap-community.
DWDM-PON(config)# snmp-server trap-community novera DWDM-PON(config)#		

5.10.7. Set SNMP Trap type

You can set trap for each of the 5 modules (BMU, FAN, OCU, PSU and ONT), and set the detailed status for each module. The following table shows the types of alarms for trap by module.

Command	Mode	Description
snmp-server trap all	Global	Set all types available.
snmp-server trap bmu-als	Global	Set the trap for no optical signal in any channels.
snmp-server trap bmu-cfault	Global	Set the trap for BMU c-bls fault.
snmp-server trap bmu-efault	Global	Set the trap for BMU e-bls fault.
snmp-server trap bmu-equip	Global	Set the trap for insertion/deletion of BMU module.
snmp-server trap bmu-temp	Global	Set the trap for BMU temperature alarm.
snmp-server trap fan-equip	Global	Set the trap for insertion/deletion of the FAN module.
snmp-server trap fan-fault	Global	Set the trap for fault in any of 3 FANS in the FAN module.
snmp-server trap fan-power	Global	Set the trap for power fault in the FAN module.
snmp-server trap ocu-admin	Global	Set the trap for ON/OFF of OCU service status.
snmp-server trap ocu-equip	Global	Set the trap for insertion/deletion of OCU.

snmp-server trap ocu-fxlk	Global	Set the trap for OCU FX-LINK UP/DOWN.
snmp-server trap ocu-ipm	Global	Set the trap for OCU optical input power alarm.
snmp-server trap ocu-txlk	Global	Set the trap for OCU TX-LINK UP/DOWN.
snmp-server trap ont-fxlk	Global	Set the trap for ONT FX-LINK UP/DOWN.
snmp-server trap ont-ipm	Global	Set the trap for ONT optical input power alarm.
snmp-server trap ont-txlk	Global	Set the trap for ONT TX-LINK UP/DOWN.
snmp-server trap psu-equip	Global	Set the trap for insertion/deletion of PSU module.
snmp-server trap psu-fault	Global	Set the trap for PSU fault.
snmp-server trap psu-power	Global	Set the trap for PSU power fault.
DWDM-PON(config)# snmp-server trap all DWDM-PON(config)# snmp-server trap bmu-als DWDM-PON(config)# snmp-server trap fan-equip DWDM-PON(config)#		

5.10.8. Show SNMP setting

The command shows the status of the SNMP in the system.

Command	Mode	Description
show snmp-server	User/Privilege	Show status of SNMP.
DWDM-PON# show snmp-server SNMP Information RO Community : public RW Community : private TRAP Community : TRAP Server :		

```
 210.105.79.16 test
  210.105.79.56 public


DWDM-PON#
```

5.11. Set Syslog host

Syslog sends the message on system error to the administrator. It is similar with SNMP Trap in that both notify you of the system event. Syslog, however, sends the message to you through the default syslog daemon called "System logger."

Command	Mode	Description
syslog host *ip_address*	global	Set the syslog host.
DWDM-PON(config)# syslog host 212.11.1.1 DWDM-PON(config)#		

Note

You can set up to 5 syslog hosts.

5.12. Log management

The system reports every event to the administrator and logs the result in CF as the command log, the alarm log or the system log for future usage as the fault statistics data.

5.12.1. Show command log

The command logs stored in the system are displayed.

Command	Mode	Description
show log history	User/Privilege	Show command log.

```
DWDM-PON# show log history
2006-09-14 20:07:14 [console] en
2006-09-14 20:07:16 [console] !linux
2006-09-14 20:08:19 [console] sh run
2006-09-14 20:08:24 [console] conf
2006-09-14 20:08:35 [console] dce 3 type ont
2006-09-14 20:08:36 [console] end
2006-09-14 20:08:37 [console] sh rconf
2006-09-14 20:08:39 [console] sh run
2006-09-14 20:08:42 [console] wr
2006-09-14 20:22:34 [210.105.79.59] en
2006-09-14 20:22:45 [210.105.79.59] show snmp-server
2006-09-14 20:22:52 [210.105.79.59] config
2006-09-14 20:23:23 [210.105.79.59] exit
2006-09-14 20:23:28 [210.105.79.59] show snmp-server
2006-09-14 20:23:37 [210.105.79.16] en
2006-09-14 20:24:14 [210.105.79.59] session timeout 0
2006-09-14 20:28:50 [210.105.79.59] conf
2006-09-14 20:29:02 [210.105.79.59] exit
DWDM-PON#
```

5.12.2. Show system log and alarm log

The system logs and the command logs stored in the system are displayed.

Command	Mode	Description
show log	User/Privilege	Show system log and alarm log.

```
DWDM-PON# show log
2006-09-14 06:05:59 [210.105.79.16] telnet connection
2006-09-14 06:06:32 [210.105.79.16] telnet connection
2006-09-14 15:06:49 [210.105.79.16] telnet disconnect
2006-09-14 15:06:49 [210.105.79.16] telnet disconnect
2006-09-14 15:06:49 [210.105.79.16] telnet disconnect
2006-09-14 06:06:56 [210.105.79.16] telnet connection
2006-09-14 06:07:49 [210.105.79.16] telnet connection
2006-09-14 15:09:45 [210.105.79.16] telnet disconnect
2006-09-14 15:09:45 [210.105.79.16] telnet disconnect
2006-09-14 06:09:50 [210.105.79.16] telnet connection
2006-09-14 15:19:58 OCH-9, NA, OOS
2006-09-14 15:19:59 DCE-9, NA, OOS
2006-09-14 15:20:07 OCH-9, NA, IS
2006-09-14 15:20:07 DCE-9, NA, IS
2006-09-14 15:20:08 OCH-9, CR, TX-LINK-DOWN
2006-09-14 15:20:08 OCH-9, CR, FX-LINK-DOWN
2006-09-14 15:20:08 DCE-9, CR, FX-LINK-DOWN
2006-09-14 15:20:23 OCH-9, NA, OOS
2006-09-14 15:20:23 DCE-9, NA, OOS
2006-09-14 15:20:27 OCH-9, NA, IS
2006-09-14 15:20:27 DCE-9, NA, IS
2006-09-14 15:20:27 OCH-9, CR, TX-LINK-DOWN
2006-09-14 15:20:27 OCH-9, CR, FX-LINK-DOWN
DWDM-PON#
```

5.12.3. Delete log

You can delete the command logs, the system logs and the alarm logs from the system.

Command	Mode	Description
clear log history	Privilege	Delete command log.
clear log		Delete system log and alarm log.
DWDM-PON# clear log history DWDM-PON# clear log		

5.12.4. Set log display (Console)

You can decide whether the command logs, the system logs and the alarm logs should be displayed on the console.

Command	Mode	Description
syslog display log	Global	Display log on the console.
no display log	Global	Display no log on the console.
DWDM-PON(config)# syslog display log DWDM-PON(config)# no display log DWDM-PON(config)#		

5.13. Alarm management

5.13.1. Set alarm grade

The system provides alarms if there is any fault in a module. Each alarm has its alarm grade so that you can take the action in priority order. The alarm grades are divided into Critical (CR), Major (MJ), Minor (MN) and Cleared (NA). You can set the grade for each alarm with the following commands.

Command	Mode	Description
alarm grade all {critical|major|minor}	Global	Set all types of alarms available.
alarm grade bmu-als {critical|major|minor}	Global	Set alarm for no optical signal in any channel.
alarm grade bmu-cfault {critical|major|minor}	Global	Set alarm for BMU c-bls fault.
alarm grade bmu-efault {critical|major|minor}	Global	Set alarm for BMU e-bls fault.
alarm grade bmu-equip {critical|major|minor}	Global	Set alarm for deletion/inserton of BMU module.
alarm grade bmu-fan {critical|major|minor}	Global	Set alarm for BMU FAN fault.
alarm grade fan-equip{critical|major|minor}	Global	Set alarm for deletion/inserton of FAN module.
alarm grade fan-fault {critical|major|minor}	Global	Set alarm for fault in any of 3 FANs in FAN module.
alarm grade fan-power {critical|major|minor}	Global	Set alarm for FAN module power fault.
alarm grade ocu-admin {critical|major|minor}	Global	Set alarm for OCU service ON/OFF.
alarm grade ocu-equip {critical|major|minor}	Global	Set alarm for deletion/inserton of OCU.
alarm grade ocu-fxlk	Global	Set alarm for OCU FX-LINK UP/DOWN.

{critical|major|minor}		
alarm grade ocu-ipm {critical|major|minor}	Global	Set alarm for OCU optical input power alarm.
alarm grade ocu-txlk {critical|major|minor}	Global	Set alarm for OCU TX-LINK UP/DOWN.
alarm grade ont-fxlk {critical|major|minor}	Global	Set alarm for ONT FX-LINK UP/DOWN.
alarm grade ont-ipm {critical|major|minor}	Global	Set alarm for ONT optical input power alarm.
alarm grade ont-txlk {critical|major|minor}	Global	Set alarm for ONT TX-LINK UP/DOWN.
alarm grade psu-equip {critical|major|minor}	Global	Set alarm for deletion/inserton of PSU module.
alarm grade psu-fault {critical|major|minor}	Global	Set alarm for PSU fault.
alarm grade psu-power {critical|major|minor}	Global	Set alarm for PSU power fault.
DWDM-PON(config)# alarm grade all critical DWDM-PON(config)# alarm grade bmu-als major DWDM-PON(config)# alarm grade fan-equip minor DWDM-PON(config)#		

5.13.2. Show alarm grade

With this command, you can view all the alarm grades set in the system.

Command	Mode	Description
show alarm grade	User/Privilege	Show grades of all alarms.
DWDM-PON# show alarm grade alarm grade ocu-equip critical alarm grade ocu-admin critical alarm grade ocu-ipm critical		

```
alarm grade ocu-fxlk critical
alarm grade ocu-txlk critical
alarm grade bmu-equip critical
alarm grade bmu-cfault critical
alarm grade bmu-efault critical
alarm grade bmu-als critical
alarm grade bmu-fan critical
alarm grade fan-equip critical
alarm grade fan-power critical
alarm grade fan-fault critical
alarm grade psu-equip critical
alarm grade psu-power critical
alarm grade psu-fault critical
alarm grade ont-fxlk critical
alarm grade ont-txlk critical
alarm grade ont-ipm critical
DWDM-PON#
```

5.13.3. Delete alarm grade

You can delete the alarm grade. If you delete the grade for an alarm, it is set to "Critical (CR)", the default alarm grade.

Command	Mode	Description
no alarm grade all	Global	Delete all alarm grades.
no alarm grade *alarm_type*		Delete the selected alarm grades.

```
DWDM-PON(config)# no alarm grade all
DWDM-PON(config)# no alarm grade bmu-als
DWDM-PON(config)# no alarm grade fan-equip
```

5.13.4. Set alarm grade

You can determine whether the system logs any event as an alarm. For example, alarm grades

are divided into “Critical”, “Major” and “Minor”. If you select “Major”, the system does not log "Minor” alarms.

Command	Mode	Description
syslog alarm log level { critical | major | minor }	Global	Set alarm grade.
DWDM-PON(config)# syslog alarm log level major DWDM-PON(config)#		

5.14. Show BMU & PSU & FAN status

Show deletion/insertion and alarm of BMU, PSU and FAN module.

Command	Mode	Description
show status	User/Privilege	Show alarm status of BMU, PSU and FAN module.

```
DWDM-PON# show status
 < BMU Status >
 Admin            : Injected
 BMU ALARM        :

 < PSU Status >
 PSU Eject        :
 PSU Fail         :

 < FAN Status >
 FAN Power        : OFF
 FAN Eject        : FAN1 FAN2 FAN3
 FAN Fail         : FAN1 FAN2 FAN3
DWDM-PON#
```

5.15. BMU management

5.15.1. Show BMU status

You can receive alarm and information on BMU (Broadband Light Source and Mux Unit).

Command	Mode	Description
show bmu	User/Privilege	Show BMU status.

```
DWDM-PON# show bmu

< BMU Status >
Equip          : Equip
ALS            : OK
CFLT           : OK
EFLT           : OK
C-BLS ON/OFF   : ON
E-BLS ON/OFF   : ON
Board Temp     : OK(37 `C)
Type           : 100M
Board ver      : 2.0
F/W ver        : 2.1
CPLD ver       : 2.0
DWDM-PON#
```

5.15.2. Set ALS

If no optical power is detected in any channel, ALS (Auto Laser Shutdown) stops transmitting BLS optical power to protect vision of the user. You can enable/disable this function with the following command. In other words, this command does not directly activate ALS, but decide whether to enable ALS to act under the given conditions.

Command	Mode	Description
bmu als enable	global	Enable BMU ALS.
bmu als disable	global	Disable BMU ALS.

```
DWDM-PON(config)# bmu als enable
DWDM-PON(config)# bmu als disable
DWDM-PON(config)#
```

5.16. PSU management

5.16.1. Show PSU status

You can receive alarm and information on 2 PSU (Power Supply Unit) modules.

Command	Mode	Description
show psu	User/Privilege	Show status of PSU.

```
DWDM-PON# show psu

< PSU Status >

PSU-A Equip          : equip
PSU-A PWR ON/OFF : ON
PSU-A PWR INPUT    : DC -48V
PSU-A PWR FAULT    : OK

PSU-B Equip          : equip
PSU-B PWR ON/OFF : ON
PSU-B PWR INPUT    : DC -48V
PSU-B PWR FAULT    : OK

DWDM-PON#
```

5.17. FAN management

5.17.1. Show FAN status

You can receive alarm and information on the FAN module with 3 FANS installed in the slots.

Command	Mode	Description
show fan	User/Privilege	Show status of FAN module.

```
DWDM-PON# show fan

 < FAN Status >

 FAN UNIT PWR ON/OFF : ON

 FAN-1 Equip          : equip
 FAN-1 PWR FAIL       : OK

 FAN-2 Equip          : equip
 FAN-2 PWR FAIL       : OK

 FAN-3 Equip          : equip
 FAN-3 PWR FAIL       : OK

 DWDM-PON#
```

5.18. OCU management

5.18.1. Show OCU status

A system can manage up to 16 OCUs (Optical Channel Units). With the following commands you can check alarm status and other information of the optical channels. When using the commands, you can view all OCUs, give range for OCU, or refresh information at every three minutes (OCU monitoring).

A) Show status of all OCUs

Command	Mode	Description
show ocu all	User/Privilege	Show status of all OCUs.

```
DWDM-PON# show ocu all

< OCU Status >
================================================================================
| CH | Equip| Admin |     IPM      | Type | F/W | FxLk  | TxLk     | Speed | Auto | DCE |
================================================================================
| 1 | equip  | IS    | FAIL(-36dBm) | 100M | 2.10 | DOWN | DOWN  | -    | ON   | ONT |
| 2 | unequip | IS   | -            | -    | -    | -    | -     | -    | -    | ONT |
| 3 | equip  | IS    | FAIL(-18dBm) | 1G   | 1.0  | DOWN | DOWN  | -    | ON   | ONT |
| 4 | unequip | IS   | -            | -    | -    | -    | -     | -    | -    | ONT |
| 5 | unequip | IS   | -            | -    | -    | -    | -     | -    | -    | ONT |
| 7 | unequip | IS   | -            | -    | -    | -    | -     | -    | -    | ONT |
| 8 | equip  | IS    | FAIL(-36dBm) | 100M | 2.10 | DOWN | DOWN  | -    | ON   | ONT |
| 9 | unequip | IS   | -            | -    | -    | -    | -     | -    | -    | ONT |
| 10 | unequip | IS  | -            | -    | -    | -    | -     | -    | -    | ONT |
| 11 | unequip | IS  | -            | -    | -    | -    | -     | -    | -    | ONT |
| 12 | unequip | IS  | -            | -    | -    | -    | -     | -    | -    | ONT |
| 13 | unequip | IS  | -            | -    | -    | -    | -     | -    | -    | ONT |
| 14 | unequip | IS  | -            | -    | -    | -    | -     | -    | -    | ONT |
| 15 | unequip | IS  | -            | -    | -    | -    | -     | -    | -    | ONT |
| 16 | unequip | IS  | -            | -    | -    | -    | -     | -    | -    | ONT |

DWDM-PON#
```

B) Show OCU range

Command	Mode	Description
show ocu range *start end*	User/Privilege	Show status of OCUs of the given range. To see a single OCU, you should enter the start number only.

```
DWDM-PON# show ocu rage 1 3

< OCU Status >
================================================================================
| CH | Equip | Admin |    IPM      | Type  | F/W | FxLk  | TxLk  | Speed | Auto   | DCE |
================================================================================
| 1 | equip  | IS    | FAIL(-36dBm) | 100M | 2.10 | DOWN | DOWN | -    | ON     | ONT  |
| 2 | unequip | IS   | -            | -    | -    | -    | -    | -    | -      | ONT  |
| 3 | equip  | IS    | FAIL(-18dBm) | 1G   | 1.0  | DOWN | DOWN | -    | ON     | ONT  |

DWDM-PON#
```

C) Show OCU monitor

Command	Mode	Description
show ocu monitor	User/Privilege	Show status of OCU at every three seconds.

```
DWDM-PON# show ocu monitor

< OCU Status >
================================================================================
| CH | Equip | Admin |    IPM      | Type | F/W | FxLk  | TxLk     | Speed | Auto | DCE |
================================================================================
| 1 | equip  | IS    | FAIL(-36dBm) | 100M | 2.10 | DOWN | DOWN  | -    | ON   | ONT |
| 2 | unequip | IS   | -            | -    | -    | -    | -    | -    | -    | ONT |
| 3 | equip  | IS    | FAIL(-18dBm) | 1G   | 1.0  | DOWN | DOWN | -    | ON   | ONT |
| 4 | unequip | IS   | -            | -    | -    | -    | -    | -    | -    | ONT |
| 5 | unequip | IS   | -            | -    | -    | -    | -    | -    | -    | ONT |
| 7 | unequip | IS   | -            | -    | -    | -    | -    | -    | -    | ONT |
| 8 | equip  | IS    | FAIL(-36dBm) | 100M | 2.10 | DOWN | DOWN | -    | ON   | ONT |
```

```
| 9 | unequip | IS   | -          | -    | -    | -      | -    | -    | ONT |
| 10 | unequip | IS   | -          | -    | -    | -      | -    | -    | ONT |
| 11 | unequip | IS   | -          | -    | -    | -      | -    | -    | ONT |
| 12 | unequip | IS   | -          | -    | -    | -      | -    | -    | ONT |
| 13 | unequip | IS   | -          | -    | -    | -      | -    | -    | ONT |
| 14 | unequip | IS   | -          | -    | -    | -      | -    | -    | ONT |
| 15 | unequip | IS   | -          | -    | -    | -      | -    | -    | ONT |
| 16 | unequip | IS   | -          | -    | -    | -      | -    | -    | ONT |
Press any key to turn off monitoring


DWDM-PON#
```

5.18.2. Show OCU RMON

OCU RMON (remote monitoring) shows the current traffic in FX and TX port of OCU. You can select all OCU RMON or give a range of OCU.

A) Show RMON of all OCUs

Command	Mode	Description
show ocu rmon all	User/Privilege	Show RMON of all OCUs.

```
DWDM-PON# show ocu rmon all
[OCU 1]
=============================================
    Items     |  Fx Port |   Tx Port   |
=============================================
InUnicasts    |         0|            0|
InBroadcasts  |         0|            0|
InMulticasts  |         0|            0|
InFCSErr      |         0|            0|
AlignErr      |         0|            0|
Undersize     |         0|            0|
Fragments     |         0|            0|
In64Octets    |         0|            0|
In127Octets   |         0|            0|
In255Octets   |         0|            0|
```

```
In511Octets     |          0|          0|
In1023Octets    |          0|          0|
Oversize        |          0|          0|
InDiscards      |          0|          0|
----------------------------------------
OutUnicasts     |          0|          0|
OutBroadcasts   |          0|          0|
OutMulticasts   |          0|          0|
OutFCSErr       |          0|          0|
Out64Octets     |          0|          0|
Out127Octets    |          0|          0|
Out255Octets    |          0|          0|
Out511Octets    |          0|          0|
Out1023Octets   |          0|          0|
Collisions      |          0|          0|
OutDiscards     |          0|          0|
-----------------------------------------------
[OCU 2]
=================================
    Items       |  Fx Port  |  Tx Port  |
=================================
InUnicasts      |          0|          0|
InBroadcasts    |          0|          0|
InMulticasts    |          0|          0|
InFCSErr        |          0|          0|
AlignErr        |          0|          0|
Undersize       |          0|          0|
Fragments       |          0|          0|
In64Octets      |          0|          0|
In127Octets     |          0|          0|
In255Octets     |          0|          0|
In511Octets     |          0|          0|
!
(omitted)
!
[OCU 16]
```

```
=========================================
    Items   |   Fx Port |   Tx Port   |
=========================================
InUnicasts     |          0|          0|
InBroadcasts   |          0|          0|
InMulticasts   |          0|          0|
InFCSErr       |          0|          0|
AlignErr       |          0|          0|
Undersize      |          0|          0|
Fragments      |          0|          0|
In64Octets     |          0|          0|
In127Octets    |          0|          0|
In255Octets    |          0|          0|
In511Octets    |          0|          0|
In1023Octets   |          0|          0|
Oversize       |          0|          0|
InDiscards     |          0|          0|
-----------------------------------------------------
OutUnicasts    |          0|          0|
OutBroadcasts  |          0|          0|
OutMulticasts  |          0|          0|
OutFCSErr      |          0|          0|
Out64Octets    |          0|          0|
Out127Octets   |          0|          0|
Out255Octets   |          0|          0|
Out511Octets   |          0|          0|
Out1023Octets  |          0|          0|
Collisions     |          0|          0|
OutDiscards    |          0|          0|
-----------------------------------------------------
DWDM-PON#
```

B) Show OCU RMOM range

Command	Mode	Description

show ocu rmon *start end*	User/Privilege	Show RMON of OCUs of the designated range. To see RMON of an OCU only, you should enter the start number only.

```
DWDM-PON# show ocu rmon 1 5
[OCU 1]
=========================================
    Items   |   Fx Port |   Tx Port   |
=========================================
InUnicasts     |          0|          0|
InBroadcasts   |          0|          0|
InMulticasts   |          0|          0|
InFCSErr       |          0|          0|
AlignErr       |          0|          0|
Undersize      |          0|          0|
Fragments      |          0|          0|
In64Octets     |          0|          0|
In127Octets    |          0|          0|
In255Octets    |          0|          0|
In511Octets    |          0|          0|
In1023Octets   |          0|          0|
Oversize       |          0|          0|
InDiscards     |          0|          0|
-----------------------------------------
OutUnicasts    |          0|          0|
OutBroadcasts  |          0|          0|
OutMulticasts  |          0|          0|
OutFCSErr      |          0|          0|
Out64Octets    |          0|          0|
Out127Octets   |          0|          0|
Out255Octets   |          0|          0|
Out511Octets   |          0|          0|
Out1023Octets  |          0|          0|
Collisions     |          0|          0|
OutDiscards    |          0|          0|
-----------------------------------------
```

```
!
(omitted)
!
[OCU 5]
=========================================
    Items   |   Fx Port |   Tx Port   |
=========================================
InUnicasts     |          0|          0|
InBroadcasts   |          0|          0|
InMulticasts   |          0|          0|
InFCSErr       |          0|          0|
AlignErr       |          0|          0|
Undersize      |          0|          0|
Fragments      |          0|          0|
In64Octets     |          0|          0|
In127Octets    |          0|          0|
In255Octets    |          0|          0|
In511Octets    |          0|          0|
In1023Octets   |          0|          0|
Oversize       |          0|          0|
InDiscards     |          0|          0|
-----------------------------------------------------
OutUnicasts    |          0|          0|
OutBroadcasts  |          0|          0|
OutMulticasts  |          0|          0|
OutFCSErr      |          0|          0|
Out64Octets    |          0|          0|
Out127Octets   |          0|          0|
Out255Octets   |          0|          0|
Out511Octets   |          0|          0|
Out1023Octets  |          0|          0|
Collisions     |          0|          0|
OutDiscards    |          0|          0|
-----------------------------------------------------
DWDM-PON#
```

5.18.3. Show average packet counter of OCU

This function displays average packet counter of OCU for 5sec, 10sec, 1min and 10min. For FE channels, packet counter is calculated severally for Fx and Tx, for IN and OUT, and for per packet and per bytes. For GE channel, because the chipsets are not divided into IN and OUT, packet counter is calculated severally for Fx and Tx only. Because the byte size is bigger than packet, 'pkt/s' is '0', but 'bytes/s' may not be '0'. The commands are divided into the ones for all OCUs and for the selected OCUs only. The following commands are used for average packet counter.

A) Show average packet counter of all OCU RMON

Command	Mode	Description
show ocu average all	User/Privilege	Show average RMON packet counter of all channels.

```
DWDM-PON# show ocu average all
< OCU Status >
=========================================
|  Port  |         IN            |        OUT            |
-----------------------------------------------------------------------
|  Time | pkt/s | bytes/s |   bits/s | pkt/s | bytes/s |   bits/s   |
=========================================
OCU[ 1]
--- FX ---
   5sec |     0|     212|    1,696|     1|     164|     1,312|
  10sec |     1|     247|    1,976|     1|     164|     1,312|
  1min |     1|     234|    1,872|     1|     148|     1,184|
  10min |     0|     105|      840|     0|      58|       464|
--- TX ---
   5sec |     0|       0|        0|     0|       0|         0|
  10sec |     0|       0|        0|     0|       0|         0|
  1min |     0|       0|        0|     0|       0|         0|
  10min |     0|       0|        0|     0|       0|         0|
-----------------------------------------------------------------------

< GOCU Status >
=========================================
```

```
|  Port  |        Fx              |          Tx          |
-------------------------------------------------------------------------
|  Time | pkt/s | bytes/s |   bits/s   | pkt/s | bytes/s |   bits/s   |
=========================================================
GOCU[ 2]
    5sec |     0|       0|         0|     0|       0|         0|
   10sec |     0|       0|         0|     0|       0|         0|
    1min |     0|       0|         0|     0|       0|         0|
   10min |     0|       0|         0|     0|       0|         0|
-------------------------------------------------------------------------
!
(omitted)
!
OCU[15]
--- FX ---
    5sec |     0|       0|         0|     0|       0|         0|
   10sec |     0|       0|         0|     0|       0|         0|
    1min |     0|       0|         0|     0|       0|         0|
   10min |     0|       0|         0|     0|       0|         0|
--- TX ---
    5sec |     0|       0|         0|     0|       0|         0|
   10sec |     0|       0|         0|     0|       0|         0|
    1min |     0|       0|         0|     0|       0|         0|
   10min |     0|       0|         0|     0|       0|         0|
-------------------------------------------------------------------------
< GOCU Status >
=============================================
|  Port  |        Fx              |          Tx          |
-------------------------------------------------------------------------
|  Time | pkt/s | bytes/s |   bits/s   | pkt/s | bytes/s |   bits/s   |
=========================================================
GOCU[16]
    5sec |     0|       0|         0|     0|       0|         0|
   10sec |     0|       0|         0|     0|       0|         0|
    1min |     0|       0|         0|     0|       0|         0|
   10min |     0|       0|         0|     0|       0|         0|
```

```
-------------------------------------------------------------------------------
DWDM-PON#
```

B) Show average packet counter of the selected OCU RMON

Command	Mode	Description
show ocu average {all | idx1 ide2 … (max 5 select)}	User/Privilege	Show average RMON packet counter for the elected OCU channel of any range.

```
DWDM-PON# show ocu average 1 2
< OCU Status >
=============================================
|  Port  |            IN            |        OUT            |
-------------------------------------------------------------------------------
|  Time  | pkt/s | bytes/s |  bits/s  | pkt/s | bytes/s |  bits/s  |
=============================================
OCU[ 1]
--- FX ---
   5sec |     0|       212|   1,696|       1|    164|     1,312|
  10sec |     1|       247|   1,976|       1|    164|     1,312|
   1min |     1|       234|   1,872|       1|    148|     1,184|
  10min |     0|       105|     840|       0|     58|       464|
--- TX ---
   5sec |     0|         0|       0|       0|      0|         0|
  10sec |     0|         0|       0|       0|      0|         0|
   1min |     0|         0|       0|       0|      0|         0|
  10min |     0|         0|       0|       0|      0|         0|
-------------------------------------------------------------------------------

< GOCU Status >
=================================================
|  Port  |          Fx            |            Tx            |
-------------------------------------------------------------------------------
|  Time | pkt/s | bytes/s |  bits/s  | pkt/s  | bytes/s  |  bits/s  |
=================================================
```

```
GOCU[2]
    5sec|     0|     0|     0|     0|     0|     0|
   10sec|     0|     0|     0|     0|     0|     0|
    1min|     0|     0|     0|     0|     0|     0|
   10min|     0|     0|     0|     0|     0|     0|
-------------------------------------------------------------------------------
DWDM-PON#
```

5.18.4. Control OCU

You can switch OCU status to OOS (Out Of Service) or IS (In Service). If you select OOS, the OCU FX and TX port are disabled, and all the OCU services are stopped. And no alarm is generated. If you select IS, all the services are recovered to normal. In IS, the system checks and generates all alarms of OCU. This function is typically used to stop the functions of OCU as OCU is not inserted in the channels or OCU operates abnormally.

Command	Mode	Description
ocu disable { all | *start end* }	global	Stop all services of the selected OCU.
ocu enable { all | *start end* }	global	Resume all services of the selected OCU.
DWDM-PON(config)# ocu disable 1 4 DWDM-PON(config)# ocu enable 1 4 DWDM-PON(config)#		

5.18.5. IPM function

OCU requires the appropriate optical input power for data transmission. The system needs to generate the IPM (Input Power Monitoring) alarm if the optical input power is out of the range. However, because the appropriate value varies depending on the external environment and channel conditions, you should measure the optical input power at each OCU channel after installing the system, and sets the standard value within the appropriate range. The following command is used to set the IPM range of OCU.

Command	Mode	Description
ocu ipm min_value max_value { all | start end }	global	Set IPM range of OCU.
DWDM-PON(config)# ocu ipm -35 -4 1 DWDM-PON(config)#		

Note

IPM *min-value* and *max-value* are db. The input range is FE : -36db ~ -5db and GE : -22db ~ -1db. The default min and max value of IPM are FE : -30db, -5db, and GE : -22db, -1db

5.18.6. Clear IPM

With this command, you can clear IPM range of OCU. If the setting is cleared, the default value is applied.

Command	Mode	Description
no ocu ipm { all | *start end* }	global	Clear IMP range of OCU.
DWDM-PON(config)# no ocu ipm 1 DWDM-PON(config)#		

5.18.7. Remote reset

Remote reset is a very useful function. If a DCE is abnormal, you can reset DCE through the in-band channel from OLT. This minimizes the maintenance work and costs, improving quality of the customer service.

Command	Mode	Description
ocu rreset *index*	Privilege	Reset DCE of an OCU.

ocu rreset all	Privilege	Reset DCEs of all OCUs.
DWDM-PON# ocu rreset 1 DWDM-PON# ocu rreset all DWDM-PON#		

5.18.8. Set port speed

You can set the data rate of the OCU port from 10Mbps, 100Mbps, 1000Mbps or auto. The auto mode adjusts the data rate to the transmission speed of the connected system and the duplex mode.

Command	Mode	Description
ocu speed { 10 | 100 | 1000 | auto } { full | half } { all | *start end* }	global	Set speed of OCU.
DWDM-PON(config)# ocu speed 100 full 1 3 DWDM-PON(config)#		

The default value of port speed is auto.

5.18.9. Clear port speed

With the following commands, you can clear the OCU port speed. If the setting is cleared, the default value is applied.

Command	Mode	Description
no ocu speed { all | *start end* }	global	Clear speed setting of OCU.
DWDM-PON(config)# no ocu speed 1 3		

```
DWDM-PON(config)#
```

5.19. ONT management

The ONT management commands can be used in the ONT mode. Many of the ONT related commands work the same with the OLT management commands. Therefore, this section only provides the ONT commands that work differently from the OLT commands.

5.19.1. Show status of ONT

The following command shows information on ONT status, such as the deletion/insertion of an Fx port and a Tx port, the IPM value, the link status and the speed.

Command	Mode	Description
show status	Privilege	Show status of ONT.

```
ONT# show status
=============================================================
| Equip   |        IPM          |   FxLk   | TxLk   | Tx Speed | Tx Auto |
=============================================================
| ONT-FE | FAIL(-36.0dBm) | DOWN | DOWN | -          | ON       |
ONT#
```

5.19.2. Show ONT RMON

ONT RMON (remote monitoring) enables you to view current traffic in the Fx / Tx port for OCU.

Command	Mode	Description
show ont rmon	Privilege	Show RMON information of ONT.

```
ONT# show ont rmon
=================================
    Items      |  Fx Port  |  Tx Port  |
=================================
InUnicasts     |         0|          0|
InBroadcasts   |         0|          0|
InMulticasts   |         0|          0|
```

```
InFCSErr        |              0|              0|
AlignErr        |              0|              0|
Undersize       |              0|              0|
Fragments       |              0|              0|
In.64.Octets    |              0|              0|
In.127.Octets   |              0|              0|
In.255.Octets   |              0|              0|
In.511.Octets   |              0|              0|
In.1023.Octets  |              0|              0|
In.Max.Octets   |              0|              0|
Oversize        |              0|              0|
InDiscards      |              0|              0|
-------------------------------------------------
OutUnicasts     |              0|              0|
OutBroadcasts   |              0|              0|
OutMulticasts   |              0|              0|
OutFCSErr       |              0|              0|
Out.64.Octets   |              0|              0|
Out.127.Octets  |              0|              0|
Out.255.Octets  |              0|              0|
Out.511.Octets  |              0|              0|
Out.1023.Octets |              0|              0|
Out.Max.Octets  |              0|              0|
Collisions      |              0|              0|
OutDiscards     |              0|              0|
-------------------------------------------------
ONT#
```

5.19.3. IPM function

ONT requires the appropriate optical input power for data transmission. The system needs to generate the IPM (Input Power Monitoring) alarm if the optical input power is out of the range. However, because the appropriate value varies depending on the external environment and channel conditions, you should measure the optical input power after installing the system, and sets the standard value within the appropriate range. The following command is

used to set the IPM range of ONT.

Command	Mode	Description
ipm min-value max-value	global	Set the range of IPM of ONT.
ONT(config)# ipm -35 -4 ONT(config)#		

IPM *min-value* and *max-value* are db. The input range is FE : -36db ~ -5db and GE : -22db ~ -1db. The default min and max value of IPM are FE : -30db, -5db, and GE : -22db, -1db.

5.19.4. Clear IPM

You can clear IPM range of ONT. If the value is cleared, the default value is applied.

Command	Mode	Description
no ipm	global	Clear IPM range of ONT.
ONT(config)# no ipm ONT(config)#		

5.19.5. Set port speed

You can set the data rate of the ONT port from 10Mbps, 100Mbps, 1000Mbps or auto. The auto mode adjusts the data rate to the transmission speed of the connected system and the duplex mode.

Command	Mode	Description
ont speed { 10 | 100 | 1000 | auto } { full | half }	global	Set the speed of ONT.

```
ONT(config)# ont speed auto
ONT(config)#
```

Note 

The default port speed is auto nego.

5.20. DCE management

5.20.1. Show DCE information

The system has the DCE (Data Circuit-Terminal Equipment) for each channel. There are 3 types of DCE; ONT, ONU and TRC. ONT is classified into the independent pizza box type and the ONT-3 type where 3 ONTs make a single unit. ONU is an Fx-module that operates as an Up-link in the cabinet switch. TRC operates as a transceiver in a transmission system.

Command	Mode	Description
show dce	User/Privilege	Show DCE information.

```
DWDM-PON# show dce
=============================================
 CH | Type | IP Address     | Version
=============================================
  1 | onu  | 211.1.1.23     | -
  2 | ont  | -              | 1.0.2
  3 | onu  | 211.1.1.24     | -
  4 | onu  | 211.1.1.25     | -
  5 | ont  | -              | 1.0.2
  6 | onu  | 211.1.1.26     | -
  7 | ont  | -              | 1.0.2-
  8 | ont  | -              | 1.0.2
  9 | ont  | -              | 1.0.2
 10 | ont  | -              | 1.0.2
 11 | ont  | -              | 1.0.2
 12 | ont  | -              | 1.0.2
 13 | ont  | -              | 1.0.2
 14 | ont  | -              | 1.0.2
 15 | ont  | -              | 1.0.2
 16 | ont  | -              | 1.0.2
DWDM-PON#
```

5.20.2. Set DCE

You can set DCE by designating type and IP address of DCE. You don't need to set the IP address for ONT and TRC, but can set the IP address for ONU. In order to manage DCE, you have to designate the type of DCE for each OCU channel. Especially when the DCE is ONT, if you don't designate the type, the system cannot perform communication as the in-band channel is closed. Setting ONU and the IP address shows the status of the cabinet in EMS. TRC is excluded from the object of management.

Command	Mode	Description
dce type { ont | onu | trc } { all | *start end* }	global	Set the type of DCE.
dce ip ip_address { all | start end }	global	Set the IP address if DCE is ONU.
DWDM-PON(config)# dce type onu 1 DWDM-PON(config)# dce ip 221.11.14.52 1 DWDM-PON(config)#		

Default DCE type is ONU.

5.20.3. Clear DCE

Releasing DCE is divided into releasing all DCEs, releasing a DCE and releasing DCEs of a given range. When you clear a DCE, the type and IP address are also cleared, and the DCE is marked as "-."

Command	Mode	Description
no dce all	global	Clear all DCEs.
no dce *index*	global	Clear a DCE.

no dce start end	global	Clear DCEs of a given range.
DWDM-PON(config)# no dce all DWDM-PON(config)# no dce 1 DWDM-PON(config)# no dce 1 5 DWDM-PON(config)#		

5.21. Help

This function provides brief help for use of CLI commands.

Command	Mode	Description
help	User/Privilege	Provides brief help for use CLI commands.
DWDM-PON# help If you need any help about a command and/or options, just type a question mark '?'. This will show you a list of help which is available now. See the following examples. 1. NOVERA> ? -> list all commands. 2. NOVERA> show ? -> list all arguments following a "show" command. 2. NOVERA> show r? -> list all arguments starting with "r" following a "show" command. DWDM-PON#		