Product Specifications

Integrated DWDM Equipment

Product Overview

The informatization and automation process of various industries is in full swing, large-bandwidth services are emerging in an endless stream, and the trend of centralized and unified management is intensifying. Therefore, the capacity of the basic transmission pipeline must be upgraded; Simple network planning, fast services deployment, smooth bandwidth upgrade and convenient maintenance operation are the core demands of industry customers to build enterprise information network.

Integrated DWDM equipment independently developed based on wavelength division multiplexing (WDM) technology builds networks in batches with transmission capacities of 400G, 800G, 1.2T and 1.6T, eliminating complex optical layer configuration, reducing redundant connecting optical fibers, switch-like connection, fast network construction and simple maintenance, perfectly matching the transmission needs of industry customers in the metropolitan area, and solving customer demands to the greatest extent.

Device View

Figure 1 Integrated DWDM equipment

Features

- The equipment adopts a simple box-type design with 1U and can be stacked, which can effectively save datacenter space and realize flexible migration.
- 1U supports a maximum transmission capacity of 1.6 T (16 * 100G), and the transmission capacity can be effectively expanded to 1 fiber 3.2 T through device stacking.
- The device supports mixed transmission of multiple services, including 100GE and other service types. The service interface and quantity can be flexibly customized by customers.
- There is no complex photoelectric crossover of the device, the service is transmitted transparently, and the service ports are completely physically isolated, which improves network security.
- The equipment networking is simple, does not change the original network topology structure, and there is no complex optical layer design. You only need to select the equipment model according to attenuation or kilometers.
- The equipment supports 1 +1 line protection on the optical cable side, automatically selects transmission routes, and improves network reliability.
- The device supports in-band monitoring channels, and SNMP management of the entire network can be realized by optical path connection.
- One-box delivery according to the site, no provision when powered on, plug and play; No fiber jumping, no manual intervention.
- Forward wind and rear wind outlet design, AC power supply, reasonable height, width and depth design, adapt to the server rack requirements of the data center computer room, and can be deployed together with servers.

- Dual server power configuration, hot-swappable, using Load Share method 1+1 hot backup.

Technical Parameters

Function	Description	Remark
Equipment dimensions	1 RU: 44 (H) × 442 (W) × 600 (D) mm	
Max. capacity of single machine	1 RU 1.6 Tbps (16 * 100G)	
Max. capacity of single fiber	Device stacking expansion to 32 Tbps	
Max. single port rate	100Gbit/s	
Port type	● 100G QSFP28 Optical port	Customized according to customer needs
Max. number of ports on a single machine	● 16 QSFP28 optical ports	Customized according to customer needs
Service types supported	● 100GE	Determined by the type of service port
Network protection	Supports line side 1 +1 protection	
Device Protection	● Power 1 +1 hot backup ● 4 sets of fans hot backup	
Installation method	19 "Server Cabinet	
Power supply mode	● Power 1 +1 hot backup, support AC/DC mixed plug-in ● AC: 90 ~ 260V ● DC：-36~-72V	
Management	● Visualize Web interface ● Network Management System	
Heat dissipation	Forward air, rear air outlet, 4 sets of hot-swappable fan units	
Power consumption	< 600W (full configuration)	
Operating temperature range	-10 °C ~ 60 °C (typical)	
Operating humidity range	5 ~ 95% no condensation	
Storage Temperature Range	-40℃ ~ 85℃	
MTBF	> 100,000 hours	

Application Scenarios

Integrated DWDM equipment is developed for data center interconnection (DCI) scenarios and can be smoothly expanded to 1 fiber 32 T transmission capacity through device stacking. It adopts high-density optoelectronic integration technology to avoid complex fiber-jumping connections. It is switch-like to connect and easily form an end-to-end complete wavelength division transmission scheme, which brings super-large transmission capacity, perfectly matches the installation conditions of the data center computer room, and a minimalist management mode, bringing the

ultimate user experience to the DCI bearer network in the metropolitan area.

The Integrated wavelength division equipment product is a standard 1U 19-inch rack-mounted architecture with physical dimensions of 44 mm (height) × 442 mm (width) × 600 mm (depth), suitable for installation in a 19-inch cabinet (800~1200mm deep rack); it adopts a dual power hot backup power supply mode to meet AC: 90 ~ 260V, DC: -36~-72V hot-swappable server power modules; 4 fan units provide heat dissipation for the chassis, support temperature monitoring and automatic speed regulation, and ensure that the equipment works normally and efficiently at the designed temperature.

Structure

1. Front View

The chassis of Integrated DWDM equipment adopts the front panel outlet mode, and all optical interfaces and network management interfaces are designed on the front; The design of the air duct adopts the forward and back outlet type, and an air inlet is designed in front and above the chassis. The cold air is absorbed into the chassis through the cooling fan unit, and then exported from the air outlet on the back of the chassis.

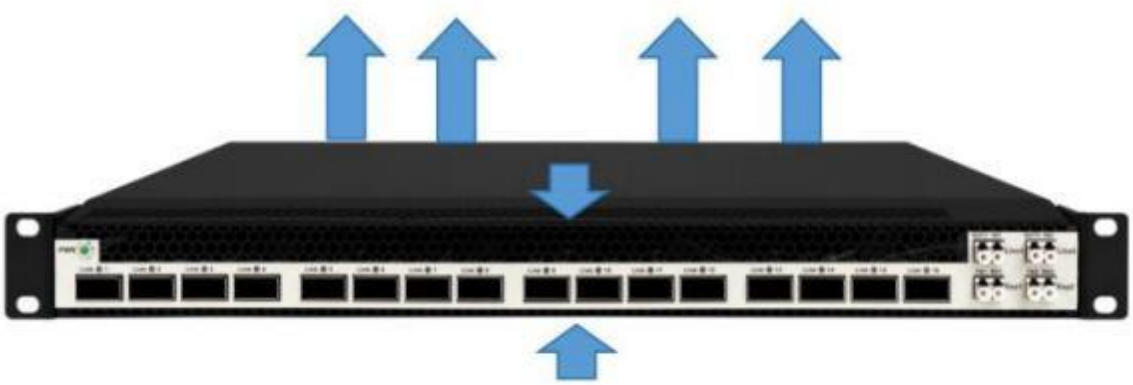


Fig. 2 Front view of Integrated DWDM equipment

Panel Identification	Description
L ink1 ~ 16	100GE customer side module input and output optical interface
IN1/OUT1	Main routing receive/output interface
IN2/OUT2	Standby routing receive/output interface
Rx1/Tx1	Monitor channel input/output port, link network management card SFP TX, and transmit network management information

Rx2/Tx2	Upgrade/download port for channel signal upload/download

Indicators Description

Indicator Identification	Description
Link1 ~ 16	Light off indicator light, on, light off normal, off, light off abnormal
PWR	Power indicator light, on, power supply to network management panel is normal, off, power supply failure

2. Back View

The back of the Integrated DWDM equipment product chassis is designed with 2 power slots and 4 fan slots. The 2 power slots support hot-swappable standard server power configuration and adopt Load Share method 1 +1 hot backup; The 4 fan slots support the configuration of 4 groups of hot-swappable fan cooling units. The fan units can monitor the chassis temperature in real time and automatically adjust the speed of the cooling fans; Four sets of fans are backup for each other.

Figure 3 Back view of Integrated DWDM device

Back Plate

Panel Identification	Description
SFP1, SFP2	The module is input into the optical interface and connects to the transmission optical cable through the OSC interface, so that the network management information of the branch node is converged to the network management center, and the dual optical ports realize transmission in two directions to realize 1 +1 protection
ETH1, ETH2	2 Ethernet management RJ45 electrical interfaces, support rate 10/100/1000M self-adaptation, 2 interfaces are exchanged with each other, can be used at the same time
RST	Restart button; Press the restart button, and the network management system of the equipment will restart (restart will not affect the existing business operation)
Console	Micro-USB local management serial port

Rear Panel Indicator Description

Indicator Identification	Description
RUN	The system running light flashes once every 0.5 seconds. The network management system is running normally, always on or off, and the operation failure is caused. The system running light flashes once every 0.5 seconds. The network management system is running normally, always on or off

A LM	Alarm indicator lamp, if the lamp is off, it means that the equipment is working normally, and if the lamp is on, it means that the equipment has an abnormal alarm 1. Unknown rack type alarm on 2. Any power supply or fan fault alarm is on 3. Temperature alarm on 4. Unknown card message type alarm on

NMS: Network Management Board

NMS is a network management function module specially designed for integrated DWDM equipment products. Its main function is to provide the interface between equipment and network management system. Together with the OTN network management system of integrated wavelength division equipment, it completes all kinds of management, maintenance and management signal transmission of network elements, realizes real-time monitoring, maintenance and management of equipment network elements and the whole synchronous equipment network, and provides a good solution for equipment monitoring.

1. Product Features

- The high-speed ARM processor provides powerful data processing ability, collects the status information, alarm events and performance parameters of each functional module, transforms, processes and stores it, and transmits the control and management information to other functional blocks of the equipment.
- Provides 1 Console interface to support simulation terminal operation.
- Provides 2 RJ45 Ethernet interfaces and supports graphical SNMP network management based on IP.
- Provides 2 SFP optical module interfaces, supports in-band management of equipment, realizes the processing of 2 optical monitoring channels, and completes the receiving and transmitting processing of optical signals in the optical monitoring channels of each site.

2. Technical Parameters

Function	Description
Network management	Supports CLI, Telnet, SNMP, Web and other network management methods
Switching function	Support IP communication function between devices to realize comprehensive management of multiple devices
Protection function	The failure will not affect the existing business
Maintenance function	Supports local or remote software online upgrades
Reset function	Supports operating buttons to reset local NMS board hardware
Initialization function	Supports operating keys to initialize local NMS board hardware
Operating Temperature	-10℃~+60℃
Operating humidity	5%~95%
Maximum power	5W

consumption	
MTBF	> 100,000 hours
Factory default IP address	192.168.1.188

EDFA: Dual-stage Independent Optical Amplification Module

EDFA series optical amplifiers are erbium-doped fiber amplifier series products launched by Takfly. They can provide multi-functional, low-noise, high-gain erbium-doped fiber amplifier solutions, especially suitable for DWDM dense wavelength division multiplexing systems to solve the problem of insufficient power in long-distance transmission. EDFA module adopts a single module two-way independent amplification design, and a single module supports BA+PA design to save space; low noise figure: typical value 5dB, high gain flatness: DWDM 96-wave gain flatness <1dB, multiple working modes: support AGC gain adjustable, APC output adjustable, transient response control: high-performance transient response control, to ensure power and gain stability, without affecting existing signals, ASE automatic correction function: automatically optimize ASE noise to ensure that the noise index is at the minimum value.

1. Technical Parameters

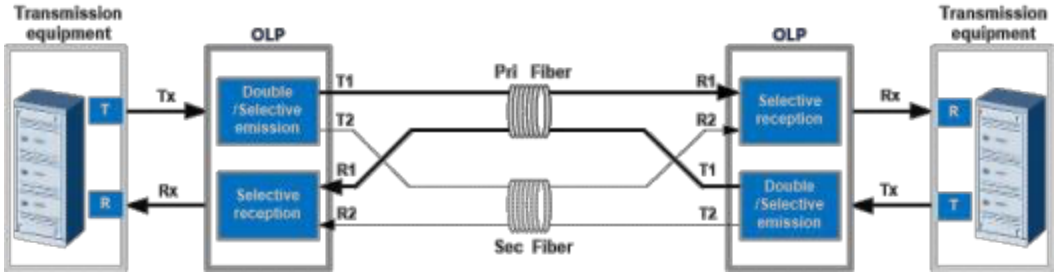
Parameter		Min.	Typ.	Max.	Unit
Working Wavelength		1528		1565	nm
Input Power	OBA	-14		+8	dBm
	OPA	-28		-5	
Output Power				23	dBm
Gain				33	dB
Noise Figure			5.0		dB
Gain Flatness			1.0		dB
Polarization Dependence Loss				0.3	dB
Polarization Dependence Gain				0.4	dB
Return Loss		45			dB

OLP: 1 +1 Protection Module

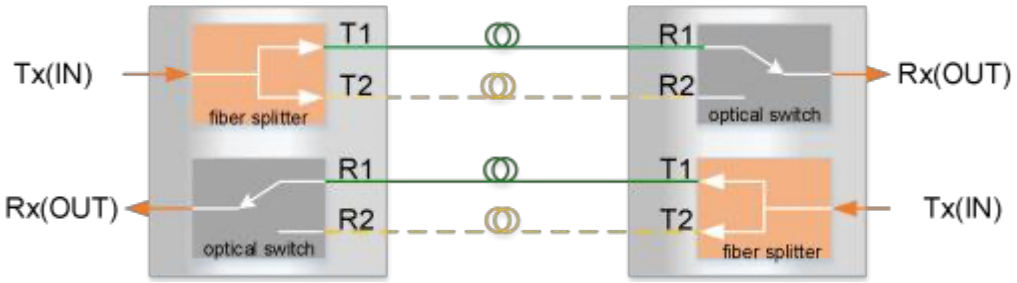
The main function of the OLP optical protection module box is to assist the integrated DWDM equipment to complete optical layer protection solutions such as optical line 1 +1 protection and optical wavelength 1 +1 protection. It can monitor the signal status of the main and standby routing optical paths in real time. Once an optical signal occurs If the signal is interrupted or the performance deteriorates, it can automatically switch safely between the main and standby routes to ensure the rapid recovery of the

system optical signal; OLP technology is to complete the routing switching operation in the optical layer. Optical layer protection has incomparable advantages over upper layer service protection, and it is the best solution to provide users with unblocked communication.

1. Engineering Link Diagram



2. Signal View



3. Technical Parameters

Parameter	1:1	1+1	Unit
Working Wavelength	1310±50nm &1550±50nm		nm
Optical Power Range	+23～-50		dBm
Accuracy of the Optical Power	±0.25		dB
Monitoring optical power resolution	±0.01		dB
Return Loss	≥55		dB
Polarization Dependent Loss	≤0.05		dB
Wavelength Dependent Loss	≤0.1		dB
Insertion Loss	Tx <1.2; Rx <1.2	Tx <4; Tx<1.2	dB
Switch Speed	<30	<15	ms

ODM04: Multiplexer & Demultiplexer Module

ODM04 is a multiplexing module based on wavelength division multiplexing (WDM) technology. The multiplexing module multiplexes multiple standard DWDM or CWDM wavelengths on the same optical fiber for transmission. The demultiplexer module resolves multiple standard DWDM or CWDM wavelengths transmitted on a single optical fiber.

1. Technical Parameters

Parameter		Specification	Unit
Channel Wavelength		ITU Grid	nm
Channel Spacing		100GHz	Ghz
Channel		4	
Channel Passband		> 0.3	nm
Insertion Loss Flatness		<0.5	dB
Insertion Loss		<1.8	dB
Channel Isolation	Adjacent	25	dB
	Non-adjacent	40	dB
Polarization Dependent Loss		<0.1	dB
Directivity		>50	dB
Return Loss		>45	dBm
Maximum Power Handling		26	mw

