Fibermart

Optical Transmission Network System
Product Description

ISAP161 Series
ISAP261 Series
ISAP561 Series

Fibermart Co., Ltd

Optical Transmission Network System

Product Description

Version	Date	Author	Reviewer	Notes
V1.0	2020/6/28	Wang		Not open to the third party

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1 Overview

With the rapid development of industry's informatization, the demand in long distance and large capacity broadband has increased rapidly, resulting in the rapid growth in the traffic of the access layer, metropolitan area layer and backbone network. The dependence on the broadband rent or optical fiber direct-connection can no longer meet the need of industrial clients. Therefore, based on the existing service requirements, the optical transmission network system is designed to meet the demand of future network development, which creatively expands the WDM technology from the backbone network to the metropolitan area and access layer. It provides a reliable, flexible and efficient high broadband carrying solution for the operators, Broadcast and TV, IDC, finance, government, cloud service, massive data and other industries.

For meeting the increasingly higher demand to the integration of current optical network design, Fibermart developed independently the Integrated Transmission System Platforms, which are, according to the rack size, 1RU ISAP 161, 2RU ISAP 261, and 5RU ISAP 561 product. These platforms where can be inserted different kinds of business board card is able to meet the demand of united management and all kinds of optical transmission sub-system, to be specific, the business board cards include below products:

ISAP-Transponder   200G/100G coherenttransponderandsoon

ISAP-EDFA   Erbium Doped Fiber AmplifiersSeries Card

ISAP-MUX/DMUX   MUX/DMUXSeriesCard

ISAP-DCM   Dispersion Compensator Module

ISAP-SOA   100G SOA card

ISAP-OLP   Opticallineprotection

ISAP-OSC   Optical Supervisory Channel

2 ISAP161 (1U chassis)

The integrated service access platform of the optical transmission network system ISAP161 is mainly used in the metropolitan area access layer network. It can complete the functions such as optical fiber saving, service multiplexing and distance extension. It can also solve the shortage of fiber resources in the access layer network and provide clients a good solution of broadband multiple service access with low cost and high efficiency. ISAP161 cancooperate with other OTN series products and build networks according to different requirements.

Figure 2-1ISAP 161 Product Appearance

2.1 Performance

Table 2-1Performance

Performance Parameters	Technical Indicators
Product Model	ISAP161
Equipment Size	1U:44 mm (height)x482 mm (width)x240 mm (depth)
Service Slot	3 slots
Transmission Capacity of Single Equipment	12 * 10G bidirectional transmission 24 * 10G unidirectional transmission 2 * 100G bidirectional transmission
Wavelength	CWDM:1270nm~1610nm DWDM:C Band, 100 GHZ or 50 GHZ
Maximum Rate of Single Channel	200Gbit/ s

Service Interface Type	1.25G~100G all kind of services, including services of: STM-16/64,OC-48/192,GE,10GE,100GE,FC100/200/400/800/1200, FICON, ESCON, CPRI 1/2/3/4/5/6/7
Optical Transceivers	SFP/SFP +, LC type interface
Network Topology	Point to point, chain type, star type, ring type
Heat Dissipation	Fan cooling
Power Supply Mode	AC: 90~260 V or DC: -36~-72 V (support 1+1 backup power)
Power Consumption	40W (Typical),100W(Max.)

3 ISAP261 (2U chassis)

The integrated service access platform of the optical transmission network system ISAP261 is mainly used in the metropolitan area access layer network.   It can complete the functions such as optical fiber saving, service multiplexing and distance extension. It can also solve the shortage of fiber resources in the access layer network and provide clients a good solution of broadband multiple service access with low cost and high efficiency.ISAP261 cancooperate with other OTN series products and build networks according to different requirements.

Figure 3-1ISAP261 Product Appearance

3.1　Performance

Table 3-1Performance

Performance Parameters	Technical Indicators
Product Model	ISAP261
Equipment Size	2U: 88 mm (height)x482 mm (width)x240 mm (depth)
Service Slot	7 slots
Transmission Capacity of Single Equipment	28 *10G bidirectional transmission 56 *10G unidirectional transmission 6 *100G bidirectional transmission
Wavelength	CWDM:1270nm~1610nm DWDM:C Band, 100 GHZ or 50 GHZ
Max rate of Single Channel	200Gbit/s
Service Interface Type	1.25G~100G all kind of services, including services of: STM-16/64,OC-48/192,GE,10GE,100GE, FC100/200/400/800/1200, FICON, ESCON, CPRI 1/2/3/4/5/6/7
Optical Connector	SFP/SFP +, LC type interface
Network Topology	Point to point, chain type, star type, ring type
Heat Dissipation	Fan cooling
Power Supply Mode	AC: 90~260V or DC: -36~-72 V (support 1+1 backup power)
Power Consumption	100W (Typical),130W(Max.)

4　ISAP561 (5U Platform)

The ISAP561 type optical transmission network system, which is mainly used in metro convergence layer and metro core layer, is a new generation of optical transmission system with high integration, huge capacity and long distance. The equipment applies the advanced transmission technology and high integration technology, applicable to the whole IP transmission. It provides the function of wide broadband, high capacity and fully transparent

transmission, which can realize smooth capacity upgrade, offer a comprehensive, flexible and mature protection solution. It's a stable platform for multiple service operation and future network upgrade and expansion.

Figure 4-1ISAP261 Product Appearance

4.1   Performance

Table 4-1Performance

Performance Parameters	Technical indicators
Product Model	ISAP561
Equipment Size	5U: 220 mm (height)x482 mm (width)x240 mm (depth)
Service Slot	18 slots
Wavelength	DWDM：C- Band, 100GHz or 50GHz CWDM：1270nm~1610nm
Max Transmission Rate of Single Channel	200Gbit/s
Service Type Supported	1.25G~100G all kind of services, including services of STM-16/64,OC-48/192,GE,10GE,100GE, FC100/200/400/800/1200, FICON, ESCON, CPRI 1/2/3/4/5/6/7

Network Topology	Point to point, chain, star, ring, ring-with-chain, ring-cross, and ring-tangency type
Heat Dissipation	Fan cooling
Power Supply Mode	AC: 90~260V or DC: -36~-72 V (support 1+1 power input backup)
Power Consumption	200W (Typical),400W(Max.)

5 BD-OTU200G-C:Single-Board for 200G Coherent Service

BD-OTU200G-C is an access single-board for services of 2-channel 100Gbit/s rate. It adopts the key advanced technology such as DP-QPSK modulation formats and coherent reception, overcomes the challenge of the high-speed transmission system in the physical transmission effect on the aspects of OSNR requirements, CD tolerance, PMD tolerance and nonlinear, and it provides the transmission network with a solution of large capacity and large broadband 200G coherent transmission system.

Figure 5-1Product Appearance
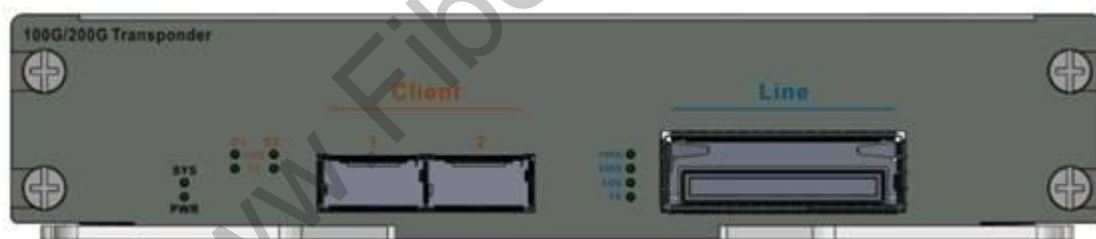
5.1 FunctionalStructure

Figure 5-2 Functionalstructure
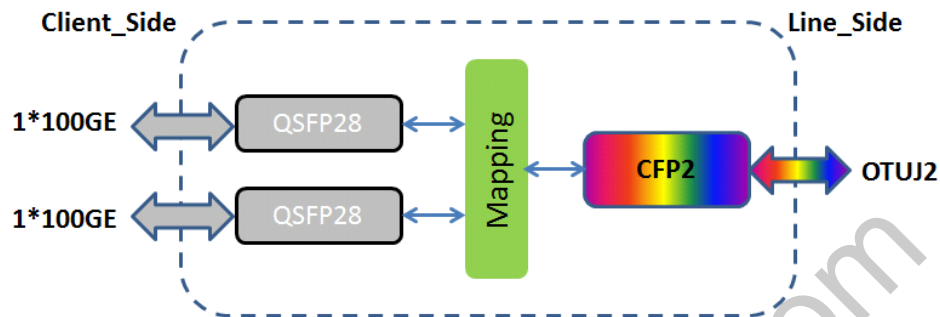
5.2 Product Specification

Table 5-1Productspecifications

Product Model	BD-OTU200G-C
Basic Function	Support 2-channel 100G transparent transmission and can convert 2-channel 100G service signal into 1*OTUJ2optical signals of a standard DWDM wavelength
Access Service Type	100G Ethernet
Occupied Slot Number	Occupy 2 slots, applicable to ISAP161/261/561
WDM Technology	Support DWDM: C Band, 100GHz or 50GHz
3R Technology	Support 3R function: Re-amplifying, Retiming, Re-shaping
Network Management Function	Support real time monitoring for port working state, including: transmitting optical power, receiving optical power, temperature, etc. Support port loopback and port shutdown
Client-side Interface	Support 2 pluggable optical port QSFP28, with LC type interface
Line-side Interface	Support 1 pluggable optical port CFP2, with LC type interface
Typical Power Consumption	30 w

# 6 BD-OTU100G-C:Single-Board for 100G Coherent Service

BD-OTU100G-C is an access single-board for services of 1-channel 100Gbit/s rate. It adopts the key advanced technology such as DP-QPSK modulation formats and coherent reception, overcomes the challenge of the high-speed transmission system in the physical transmission effect on the aspects of OSNR requirements, CD tolerance, PMD tolerance and nonlinear, and it provides the transmission network with a solution of large capacity and large broadband 100G coherent transmission system.
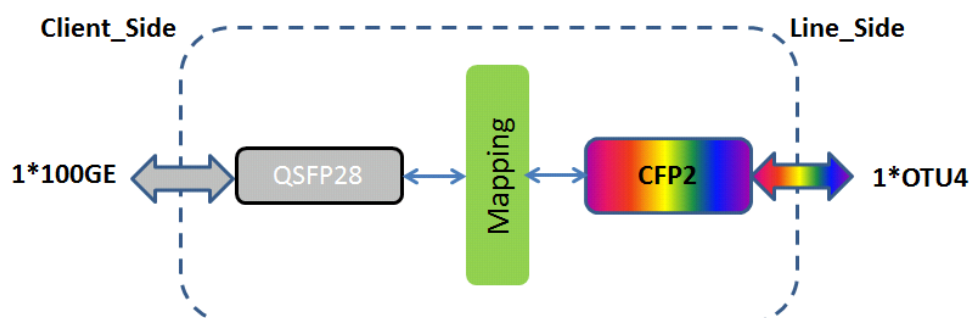
6.1 Product Diagram

Figure 6-1Product Appearance

6.2 FunctionalStructure

Figure 6-2 Functionalstructure

6.3 Product Specification

Table 6-1Productspecifications

Product Model	BD-OTU100G-C
Basic Function	Support 1-channel 100G transparent transmission and can convert 1-channel 100G service signal into a OTU4 optical signals of a standard DWDM wavelength
Access Service Type	100G Ethernet or 100G OTL4.4
Occupied Slot Number	Occupy 2 slots, applicable to ISAP161/261/561
WDM Technology	Support DWDM: C Band, 100GHz or 50GHz
3R Technology	Support 3R function: Re-amplifying, Retiming, Re-shaping
Network Management Function	Support real time monitoring for port working state, including: transmitting optical power, receiving optical power, temperature, etc. Support port loopback and port shutdown
Client-side Interface	Support 1 pluggable optical port QSFP28, with LC type interface
Line-side Interface	Support 1 pluggable optical port CFP2, with LC type interface
Typical Power Consumption	30 w

7 BD-OTU25G: 4x25GService Access Board

BD-OTU25G is a 4-channels25G service access card. Its main function is to finish the 3R regeneration of any 4-channel signals under any protocol within the access rate of 25.6Gbit/s~28.1Gbit/s, and then convert them into optical signals of the standard DWDM or CWDM wavelength, so that the MUX unit can multiplex the optical signals with different wavelengths and also achieve the reverse process. It's applicable to the wavelength division transmission solution for 25G services.
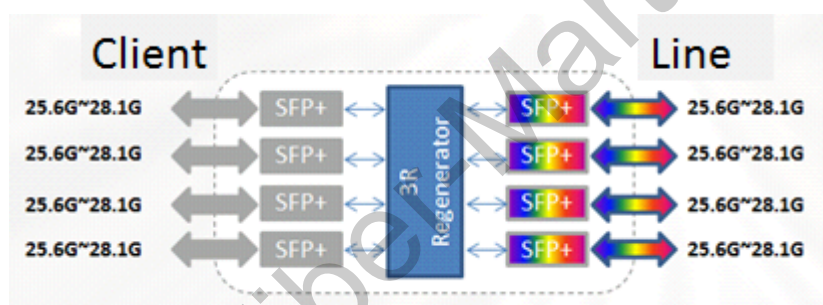
7.1 Product Diagram

Figure 7-1Product Appearance

7.2 FunctionalStructure

Figure 7-2Functionalstructure

7.3 Product Specification

Table 7-1Productspecifications

Product Model	BD-OTU25G
Basic Function	● It supports bidirectional transmission of 4-channel services with any rate within 25.6Gbit/s~28.1Gbit/s ● It supports unidirectional transmission of 8-channel services with any rate within 25.6Gbit/s~28.1Gbit/s
Access Service Type	25G Service
Occupied Slot Number	Occupy 1 slot, applicable to ISAP161/261/561
WDM Technology	Support DWDM: C Band, 100GHz or 50GHz Support CWDM：1270nm~1610nm

3R Technology	Support 3R function: Re-amplifying, Retiming, Re-shaping
Network Management Function	● Support real time monitoring for port work state, including: transmitting optical power, receiving optical power, temperature,etc. ● Support set for the work rate ofports
Interface	Support 8 pluggable optical port of SFP28
Typical Power Consumption	20 W

8 BD-OTU10G: 4x10GAny Service Access Board

BD-OTU10G is a 4-channel 10G service access card. Its main function is to finish the 3R regeneration of any 4-channel signals under any protocol within the access rate of 1.25 Gbit/s~11.3 Gbit/s, and then convert them into optical signals of the standard DWDM or CWDM wavelength, so that the MUX unit can multiplex the optical signals with different wavelengths and also achieve the reverse process. It's applicable to the wavelength division transmission solution for any access of services with the rate of 10G or below.
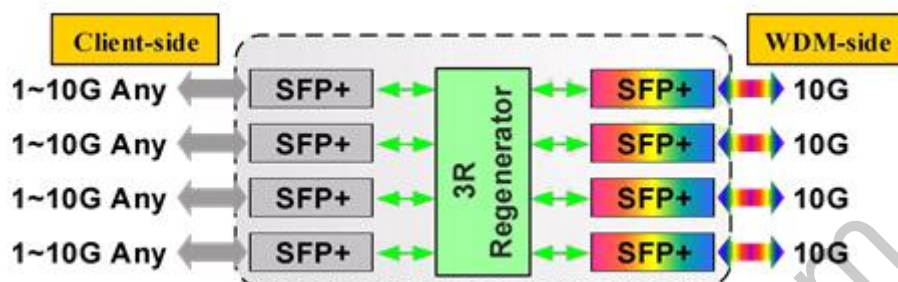
8.1   Product Diagram

Figure 8-1Product Appearance

8.2 FunctionalStructure

Figure 8-2Functionalstructure

8.3 Product Specification
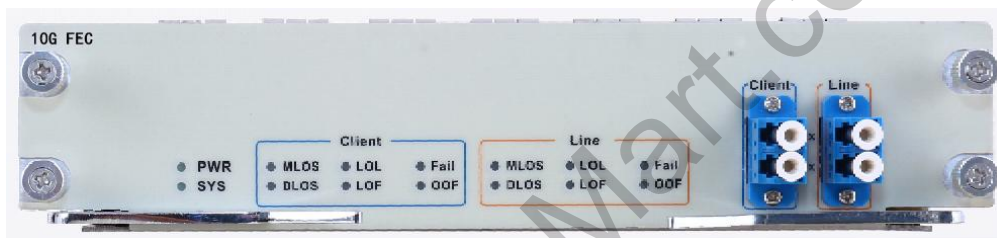
Table 8-1Productspecifications

Product Model	BD-OTU10G
Basic Function	• It supports bidirectional transmission of 4-channel services with any rate within 1.25 Gbit/s~11.3Gbit/s • It supports unidirectional transmission of 8-channel services with any rate within 1.25 Gbit/s~11.3Gbit/s
Access Service Type	• GE, 10GE,STM-16/64,OC-48/192 • FC 1G/2G/4G/8G/10G, FICON, FICON Express,ESCON • CPRI1/2/3/4/5/6/7,OTN:OTU2，OTU2v
Occupied Slot Number	Occupy 1 slot, applicable to ISAP161/261/561
WDM Technology	Support DWDM: C Band, 100GHz or 50GHz Support CWDM：1270nm~1610nm
3R Technology	Support 3R function: Re-amplifying, Retiming, Re-shaping
Network Management Function	Support real time monitoring for port work state, including: transmitting optical power, receiving optical power, temperature,etc
Interface	Support 8 pluggable optical port of SFP/ SFP+
Typical Power Consumption	20 W

9 BD-FEC10G:10G FECBoard

FEC10Gcard integrates FEC(Forward Error Correction)which is a bi-directional forwarding device with FEC encoding and decoding functions,specially for SDH STM-64/SONET OC192/10GELAN transmission system.10G FEC can improve the optical OSNR and increase the output power with EDFA function to extend transmission distance effectively.
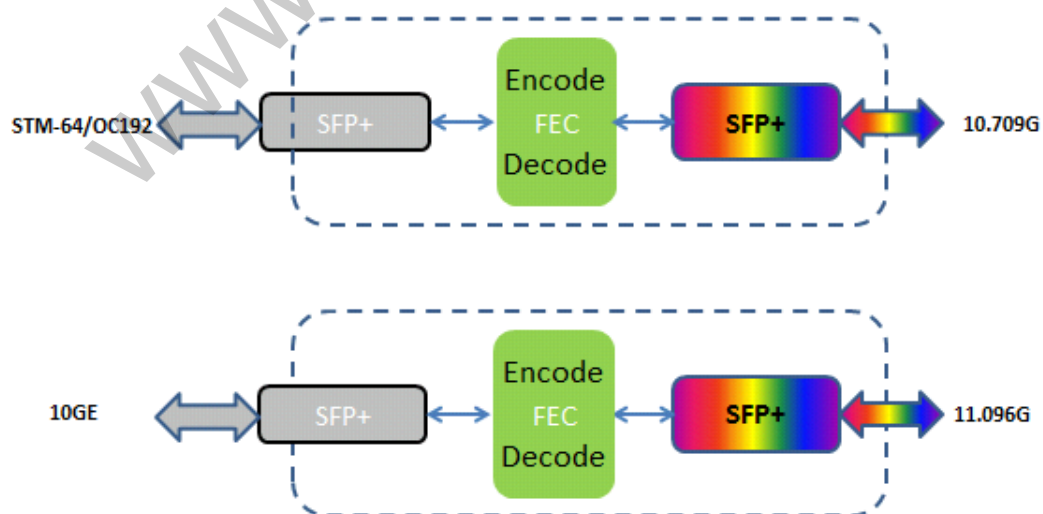
9.1 Product Diagram

Figure 9-1Product Appearance

9.2 FunctionalStructure

Figure 9-2Functionalstructure

9.3 Product Specification
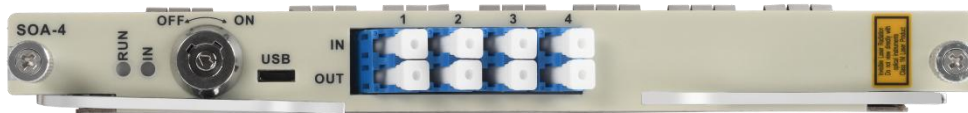
Table 9-1Productspecifications

Product Model	**BD-FEC10G**
Basic Function	It supports bidirectional transmission of 1-channel services with STM-64(OC192)/10GELAN
Access Service Type	● STM-64,OC192 ● 10GELAN
Occupied Slot Number	Occupy 2 slot, applicable to ISAP161/261/561
WDM Technology	Support DWDM: C Band, 100GHz or 50GHz
3R Technology	Support 3R function: Re-amplifying, Retiming, Re-shaping
Coding Gain	8dB@BER=E-15
Network Management Function	● Support real time monitoring for port work state, including: transmitting optical power, receiving optical power, temperature,etc
Interface	LC/UPC
Typical Power Consumption	20 W

10 SOA-4: 100G Semiconductor Optical Amplifier

SOA-4 is an O-band semiconductor optical amplification board. Its main function is to amplify the optical signal within the range of 1260~1330nm. It has characteristics such as stable output power, low output noise and low polarization dependent gain. The single-board supports the access to 4-channel independent optical signals.

10.1 Product Diagram

Figure 10-1Product Appearance

10.2 FunctionalStructure
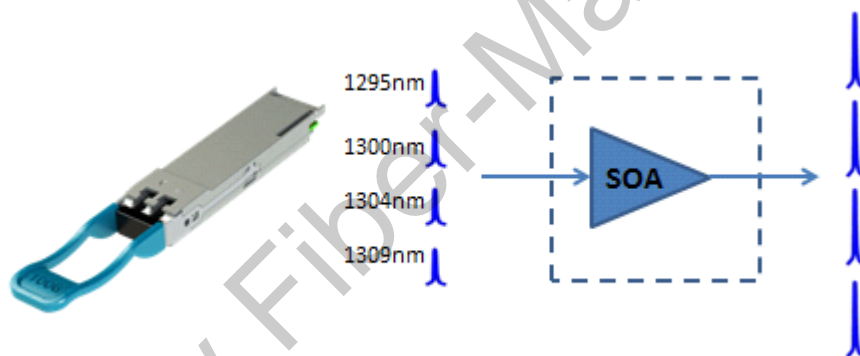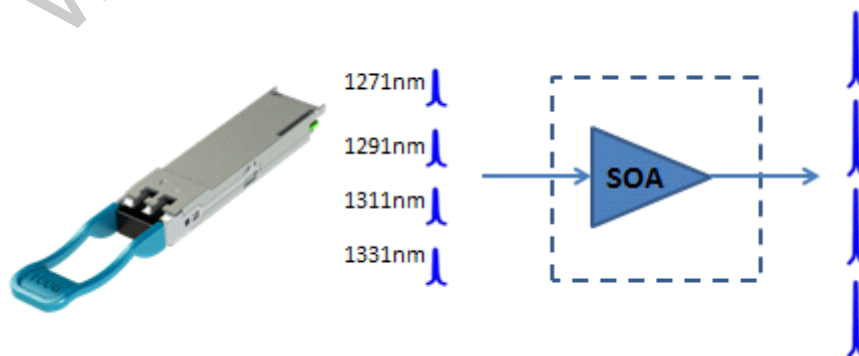
Figure 10-2LR4 SOA Functionalstructure

Figure 10-3CWDM4 SOA Functionalstructure

10.3 Product Specification

Table 10-1Productspecifications

Parameter	Minimum Value	Normal Value	Maximum Value	Remark
Work Wavelength Range	1280nm		1320nm	@LR4 SOA
	1260nm		1330nm	@CWDM4 SOA
Input Optical Power Range	-18dBm		-6dBm	
Saturated Output Power		8dBm		
Gain		14dB		
Noise		7.5 dB		
Occupied Slot Number	Occupy 1 slot, applicable to ISAP161/261/561			
Network Management Function	Support real-time monitoring of work state, including input optical power, output optical power, gain, temperature,etc			
Optical Interface	All interfaces are LC type			
Typical Power Consumption	15 w			

11 EDFA: Erbium-doped Fiber Amplifier

EDFA is the erbium-doped fiber amplification board. Its main function is to compensate the power of the signal optical in the transmission line, and it can amplify the optical signals of up to 48 channels with 100 GHZ's interval) or 96 channels with 50 GHZ's interval) at C band at the same time. It has characters of flat gain, locked gain, low noise index, etc. It's an indispensable and important component for DWDM system, future high speed system and all-optical network long-distance transmission.
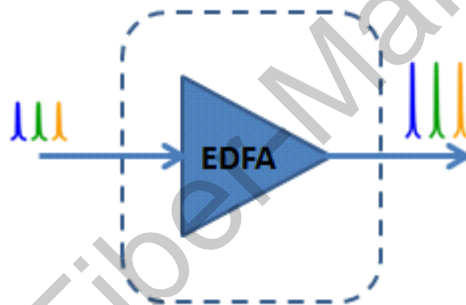
11.1 Product Diagram

Figure 11-1Product Appearance

11.2 Functional Structure

Figure 11-2Functionalstructure

11.3 Product Specification

Table 11-1Productspecifications

Work Wavelength Range	**Standard type:**1528nm~1561nm, suitable for 40wavelength (100 GHZ) or 80 wavelength (50 GHZ) DWDM systems		
	Extension type:1528nm~1568nm, suitable for 48 (100 GHZ) or 96 wavelength (50 GHZ) DWDM systems		
EDFA Type	BA (boost amplifier)	LA (line-amplifier)	PA (pre- amplifier)
Minimum Input Optical Power	-22~+8dBm	-32~0dBm	-32~0 dBm

Maximum Output Optical Power	16/20/22dBm	16/20/22dBm	16/20dBm
Maximum Gain	10~20dB	15~25dB/22~32dB	20~30dB
Noise Factor	＜6dB	＜6 dB	＜6 dB
Gain Flatness	＜1.5dB	＜1.5dB	＜1.5dB
Occupied Slot Number	Occupy 1 slot, applicable to ISAP161/261/561		
Network Management Function	Support real time monitoring for EDFA's work state, including: optical power, optical pumping, temperature, etc		
Unique Technology	Support gain locking technology, transient control technology automatic shut-off technology of output optical power		
Optical Interface	All interfaces are LC type		
Typical Power Consumption	15 w		

12 RFA:Raman amplifier card

The RFA card is a backward Raman amplifier card, which is generally used in the receiving end of the system. By transmitting high-power pump light to the transmission fiber, the signal light can be amplified in the transmission project. RFA card is generally used in long span sections, which can effectively restrain OSNR degradation and improve transmission distance. Raman amplifiers are not used independently and need to be configured with EDFA.
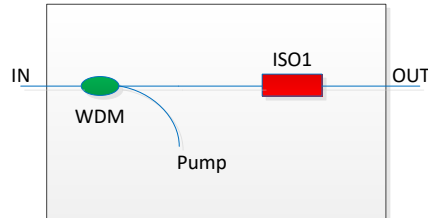
12.1 Product Diagram

Figure 12-1Product Appearance

12.2 Functional Structure

Figure 12-2Functionalstructure

12.3 Product Specification

Table 12-1Productspecifications

Parameter	Specifications	Remarks
Working wavelength range	1525 ~ 1565nm	
Pump wavelength	1425~1505nm	
Pump output power	＜1W	
Open loop gain*	10dB	Open loop gain optional
Noise Figure	-3dB	
power consumption	＜30W	

(1)The open-loop gain of Raman is related to fiber quality and fiber length.

13 OLP: Optical Line Protection

OLP is an optical wavelength/line protection board. Its main function is to perform a real-time monitoring on the state of signals in the main and backup fiber. Once the fiber core is blocked or under degradation, it can switch automatically and safely between the main and backup fiber to guarantee prompt recovery of optical signals on the system line. OLP technology is to complete the routing switch operation at the optical layer. The optical layer protection has the incomparable advantages over the upper services protection, and it is the best solution to provide users with an uninterrupted communication.
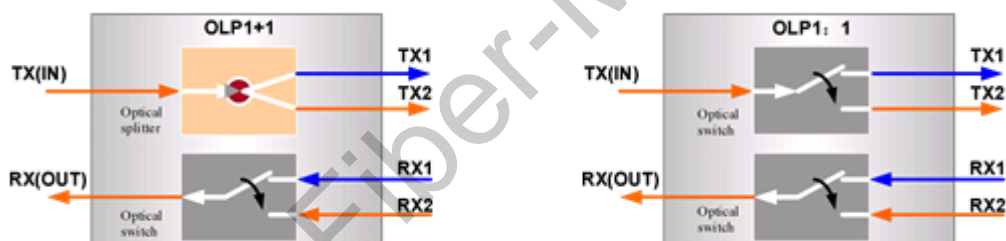
13.1 Product Diagram

Figure 13-1Product Appearance
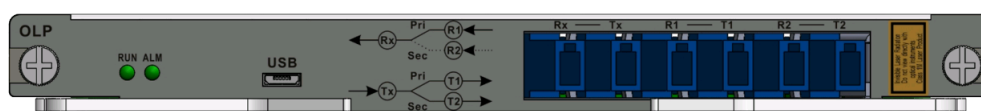
13.2 Functional Structure

Figure 13-2Functionalstructure

13.3 Product Specification

Table 13-1Productspecifications

Product Model	OLP(1+1)	OLP(1:1)
Work wavelength range	1260nm~1650nm	
Occupied slot number	Occupy 1 slot, applicable to ISAP161/261/561	
Switch mechanism	Selectively receiving from double transmitting, and then single-end switches	Selectively receiving and transmitting, and then both-ends simultaneous switch

Switch time		< 20ms	< 40ms
Introduction loss	TX-TX1	<4.0 dB	<1.0dB
	TX-TX2	<4.0 dB	<1.0dB
	RX1-RX	<1.5dB	<1.5dB
	RX2-RX	<1.5dB	<1.5dB
Monitoring of optical power range		-50 dBm~+ 25 dBm	
Network management function		It supports the OLP optical power real-time monitoring, active switch scheduling, performance management, routing management, and other management functions	
Optical interface		All interfaces are LC type	
Typical power consumption		5 w	

14 MDU: Multiplexer/De-multiplexer Board

MDU is multiplexer/de-multiplexer board based on WDM technology, and the multiplexer board is to combine multiple standard DWDM or CWDM wavelengths at the transmitting end and multiplex them on the same optical fiber for the transmission. The de-multiplexer board is to separate the multiple standard DWDM or CWDM wavelengths which are carried on the single fiber. They are used to transmit optical signals of different wavelengths on the same optical fiber at the same time, which greatly saves the clients' fiber resources. Flexible configuration can be set according to the client's demand, with the support of multiplexer/ de-multiplexer for up to 40 DWDM wavelengths.
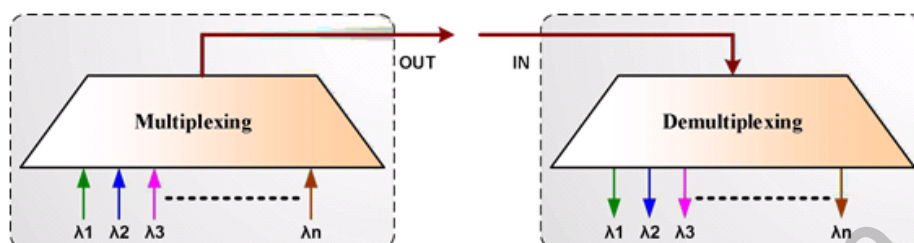
14.1 Product Diagram

Figure 14-1 Product Appearance
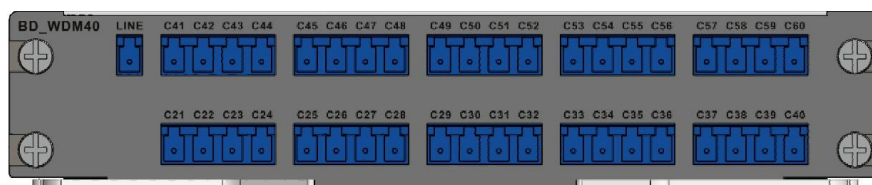
14.2 Functional Structure

Figure 14-2Functionalstructure

14.3 Product Specification

Table 14-1Productspecifications

Commonly Used Channel Number	2x4	2x8	1x16	1x40
Occupied Slot Number	1	1	1	2
WDM Specifications	DWDM& CWDM	DWDM& CWDM	DWDM& CWDM	DWDM
Insertion Loss of Each Channel	< 1.5dB	< 2.5dB	< 3.5dB	< 5.5dB
Isolation Ratio of Adjacent Channels	> 30dB	> 30dB	> 30dB	> 25dB
Isolation Ratio of Non-adjacent Channels	> 40dB	> 40dB	> 40dB	> 30dB
Reflection Coefficient	< -45dB	< -45dB	< -45dB	< -40dB
Interface Type	All interfaces are LC types			

15 WSS:ROADM card

The WSS card is an twin 1*9 port wavelength selective switch, it comprises two independent 1*9 port switches in a single module composed of an optical block and control electronics. It

dynamically attenuates and/or switches an individual wavelength channel or sets of channels independently. The card will operate over the full range of the C-Band. Channels can only be configured to and from ports associated with their common input/output port. Channels can not be configured between WSS modules.
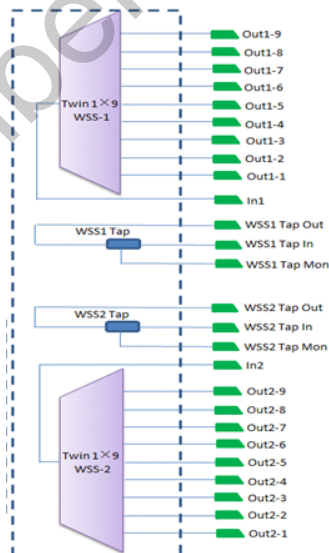
15.1 Product Diagram

Figure 15-1Product Appearance
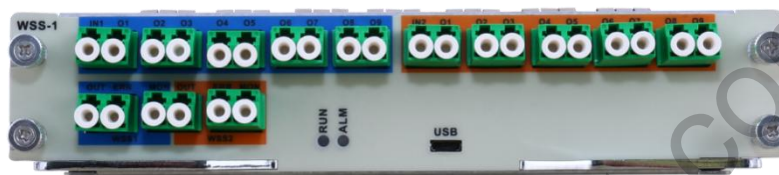
15.2 Functional Structure

Figure 15-2Functionalstructure

15.3 Product Specification

Table 15-1Productspecifications

Parameter	Unit	Min	Typical	Max	Note

Operating Wavelength	nm	1528.77		1567.54	
Port Configuration		Twin 1×9			
Max Input Power	dBm			24	Total power
	dBm			9	12.5GHz Window
Bi-directional				Yes	
Flexible Grid Granularity	GHz			6.25	
Insertion Loss	dB		2.5	8	
Insertion Loss Uniformity	dB			1.5	Channel
	dB			2.5	Port
Insertion Loss Ripple	dB			1.0	
PDL	dB			1.2	
Port Isolation	dB	30			
Extinction Ratio	dB	35			
Directivity	dB	15			
Return Loss	dB	35			
Response Time	ms			3000	
Extra Input Tap			2%		
Power Consumption	W	30	35	55	
Connector Type		LC/APC			

16   OCM:OCM card

OCM card can monitor the central wavelength, power value, signal-to-noise ratio and light wave number of optical signals online. The monitored wavelength, power value and light wave number are reported to the network management system. OCM cards can detect six optical signals, providing convenience for service operation, maintenance and fault location.

16.1 Product Diagram

Figure 16-1Product Appearance
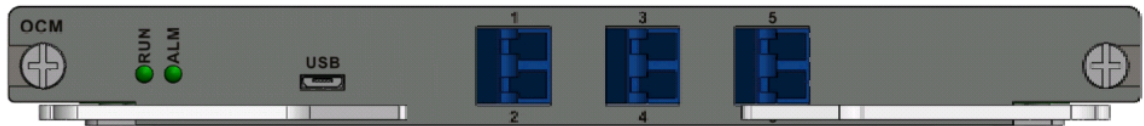
16.2 Product Specification

Table 16-1Productspecifications

Parameter	Min	Typical	Max	Unit
Operating Wavelength	1528.		1566.72	nm
Number of Input Ports		6		
Input Power Range	-55		0	dBm
Scanning Time(per port)			500	ms
Dynamic Range			20	dB
Absolute Power Accuracy			±1.0	dB
Relative Power Accuracy			1.2	dB
Frequency Reporting Accuracy			±6.25	GHz
Power Repeatability			0.4	dB
Port Crosstalk	35			dB
Port Directivity	35			dB
Optical Return Loss	30			dB
Power Consumption		5	10	W
Optical Switch	Latching			
Connector Type	LC/APC			

17   DCM: Dispersion Compensation Board

DCM is the negative dispersion optical fiber, which is a new kind of single mode optical fiber designed for current G.652& G.655standard single-mode optical fiber; the dispersion of G.652 optical fiber in the vicinity of 1550nm wavelength is positive (17-20) ps/nm (km), and the dispersion of G.655 standard optical fiber in the vicinity of 1550nm wavelength is positive (4-6) ps/nm (km), with a positive dispersion slope. So we need to add dispersion compensation fiber with negative dispersion into the optical fiber to carry out the dispersion compensation and make sure that the total dispersion of the whole optical fiber line is near zero. Thus high speed, large capacity and long distance communication can be realized.

17.1   Product Diagram

Figure 17-1Product Appearance

Dispersion is one of the transmission properties of optical fiber, and the optical pulse signal will be broadened in time after transmission in the fiber for a distance, which produces inter-symbol interference, thus increasing the error rate and affecting the quality of communication.

● The higher the data rate is, more easily the inter-symbol interference will occur

● The longer the transmission distance is, more easily the inter-symbol interference will occur

Figure 17-2Functionalstructure
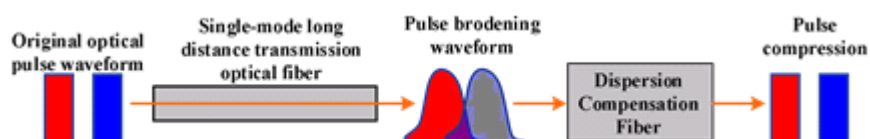
17.2 Product Specification

Table 17-1Productspecifications

Product Model	DCM20	DCM40	DCM60	DCM80	DCM100
Equivalent G.652 Compensation Distance	20km	40km	60km	80km	100km
1545nm Wavelength Dispersion(ps /nm)	-340±20	-670±30	-1000±40	-1340±50	-1670±60
Insertion Loss	≤3.6 dB	≤4.8 dB	≤6.8 dB	≤8.0 dB	≤9.0dB
Polarizatio n Mode Dispersion	≤0.6 ps	≤0.9 ps	≤1 ps	≤1 ps	≤1 ps
Optical Interface	All interfaces are LC type				
Typical Power Consumption	0W (passive components)				
Occupied Slot Number	1 slot (dispersion compensation board used for over 40km needs to be configured individually with DCF passive frame)				

18 TDCM

TDCM card is a tunable dispersion compensation module, which can be used to wavelength shift dispersion management. User can tune the different dispersion of the transmission link.

18.1 Product Diagram

Figure 18-1Product Appearance
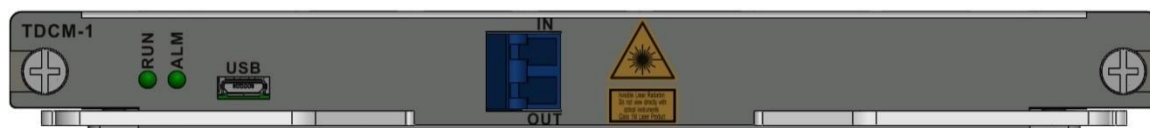
18.2 Functional Structure

Figure 18-2Functionalstructure
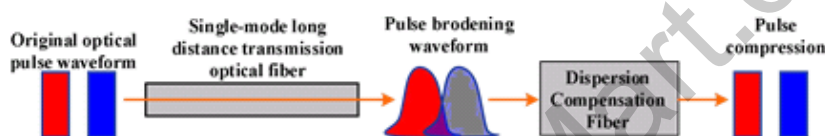
18.3 Product Specification

Table 18-1Productspecifications

Parameters		Specifications			
		Min.	Typ.	Max.	Units
Wavelength Range		1528		1568	nm
Operation Bandwidth		ITU±18			GHz
Channel Spacing		100			GHz
Wavelength Shift Capability		50GHz (starting wavelength:196.0THz)			
Dispersion Tuning Range [1]		±800 [1]			ps/nm
Operation Bandwidth (OBW) and Dispersion tuning range (DTR)	DTR: ±400 ps/nm	ITU±25			GHz
	DTR: ±800 ps/nm	ITU±18			GHz
Dispersion Setting Resolution				10	ps/nm
Dispersion Accuracy	DTR: ±400 ps/nm	-15		15	
	DTR: ±800 ps/nm	-30		30	

Relative Dispersion accuracy	10ps/nm≤ Step <20ps/nm	-10		10	ps/nm
	Step≥20ps/nm	-15		15	ps/nm
Tuning Stability		-5		5	ps/nm
Phase Ripple(peak-to-peak)				0.2	rad
Group Delay Ripple (peak-to-peak, non-smoothing)				15	ps
Insertion Loss		3		6	dB
Insertion Loss Ripple within OBW			0.5	1	dB
IL Uniformity(over All Channels)				1	dB
Return Loss		40			dB
Tuning Time	Dispersion Step: Full Range [2]			25	Sec
Polarization Dependent Loss			0.1	0.2	dB
Polarization Mode Dispersion				0.7	Ps
Operation Temperature		-5		65	°C
Power Consumption			4.5	8	W
Module Warm-Up Time				180	Sec

Note:

1. Transient dispersion during switching changes smoothly and nearly linearly versus to tuning time. The tuning range will differ slightly according to card model, it maybe ±200~±800

2. For the tuning range ±800ps/nm TDCM model, the full range means dispersion switching directly from -800ps/nm to 800ps/nm or reversely.

3. During dispersion switching, ∆Dispersion / ∆t <= 40ps/nm/100ms

19 OSC: Optical Supervisory Channel

The OSC card is a key part of the ISAP products, the service maintenance channels based on Ethernet technology. OSC card is using two optical fiber to connect the devices. It will help standardize the management. OSC boards can be used for OA stations, OTM stations and OADM stations.

19.1 Product Diagram

Figure 19-1Product Appearance

19.2 Functional Structure

Figure 19-2Functionalstructure
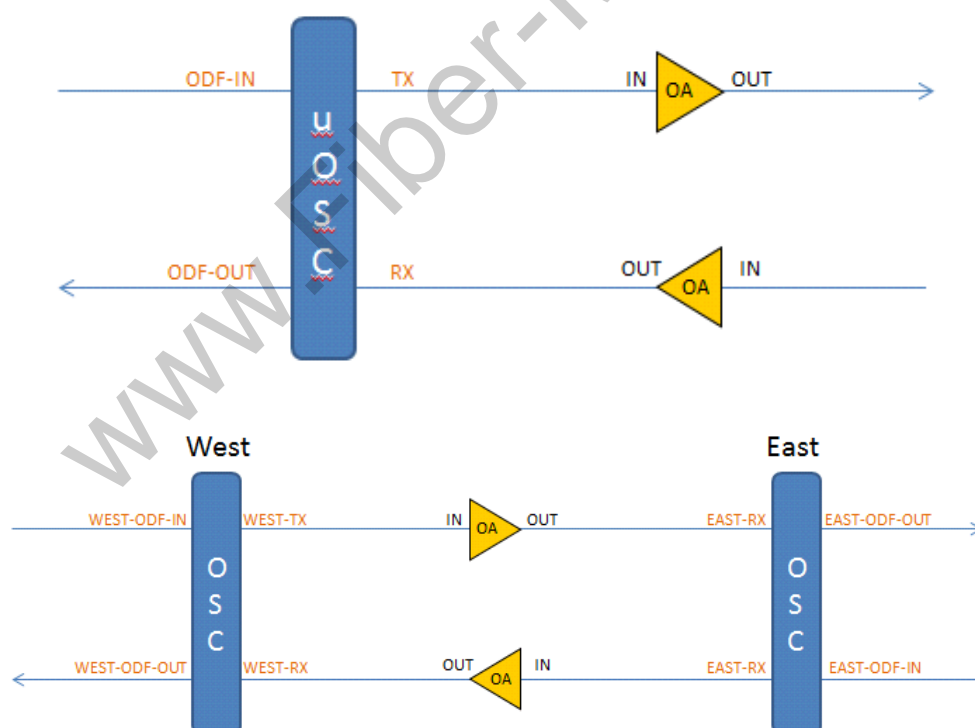
19.3 Product Specification

Table 19-1Productspecifications

Product Model	OSC
OSC operatingwavelength	1490/1510nm
Occupied slot number	Occupy 1 slot, applicable to ISAP161/261/561
Interface	3*RJ45+2*Optical Interface(uOSC) 2*RJ45+4*Optical Interface(OSC)
Optical Interface	All interfaces are LC type
Typical power consumption	5 W

20   NMU:Network Management Unit

NMU is a network management function module. It is specially designed for ISAP products. The main function is to provide interfaces for equipment and network management system. The module, together with the ISAP NMS network management system, completes management and maintenance of every board and transmission of management signal, and realizes the real- time monitoring, maintenance and management for equipment network elements and the whole synchronous equipment network. Thus it offers a good solution for equipment monitoring.

20.1 Product Diagram

Figure 20-1Product Appearance
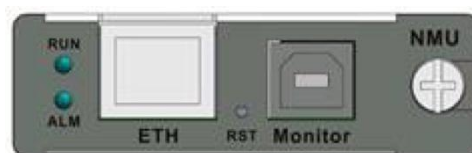
20.2 Product Features

● Adopt the high speed ARM processor, provide powerful data processing ability, collect state information, alarm events and performance parameters of all single- board functional modules to transform, process and store, and also transmit the control and management information to other functional modules of the equipment at the same time;

● Provide 1 USB B type female interface, support simulation terminal operation;

● Provide 1 SNMP interfaces, support graphical SNMP support based on IP modes;

● Network management module supports hot plug. The normal working of the current service module will not be affected even it failures.

20.3 Product Specification

Table 20-1 Product specifications

Product Model	NMU
Occupied Slot Number	NMU slot, suitable for ISAP161/261/561
local Management Serial Port	Support one USB B type female connector of local management
Remote Management Ports	Support one RJ45 Ethernet ports, self-adaptive to 10/100/1000M
Network Management	Support a variety of network management ways of CLI, Telnet, SNMP, Web
Reset Button	Support to restore factory Settings operation
Maintenance Functions	Support online upgrade of local or remote software
Typical Power Consumption	5W

21 NMS: Network Management System

NMS is a sub-network level integrated network management system for the optical transmission network, which can manage all the ISAP equipment in the unified management and provides standard external interface to be used by the upper network management at the same time, thus providing a complete solution for the transmission network management.

21.1 Basic Function

NMS provide all management functions for the network element layer (security management, topology management, alarm management, performance management, configuration management, logmanagement).

21.2 NMS Interface:

Figure 21-1Topology Management:
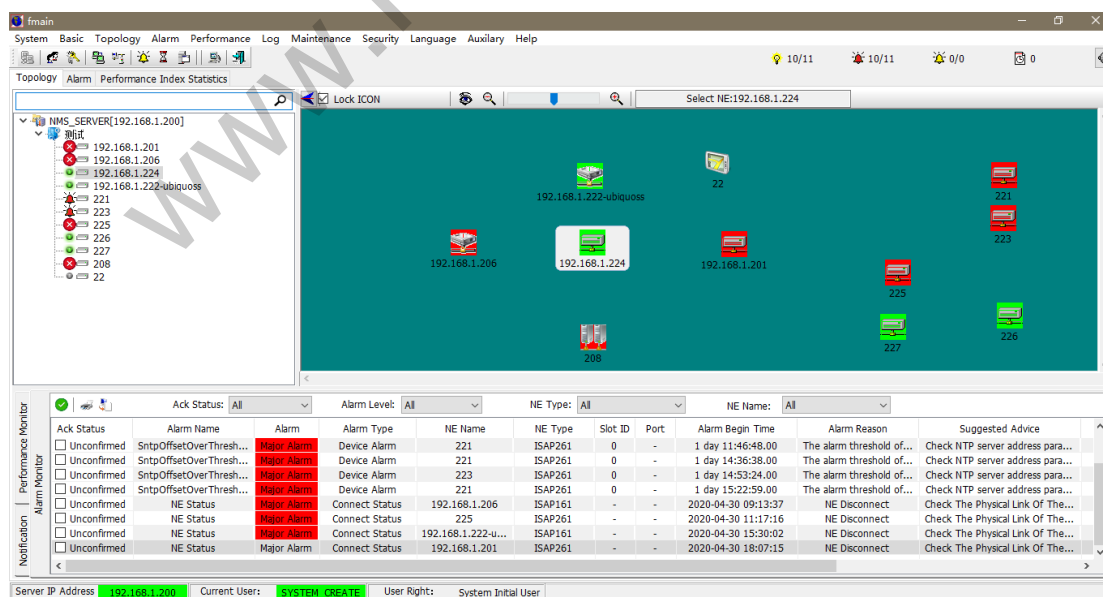
Topology Management support for topology scaling, NE location, NE state indicationand other related operations.

21.3 NE Front-Panel View

Figure 21-2NE display
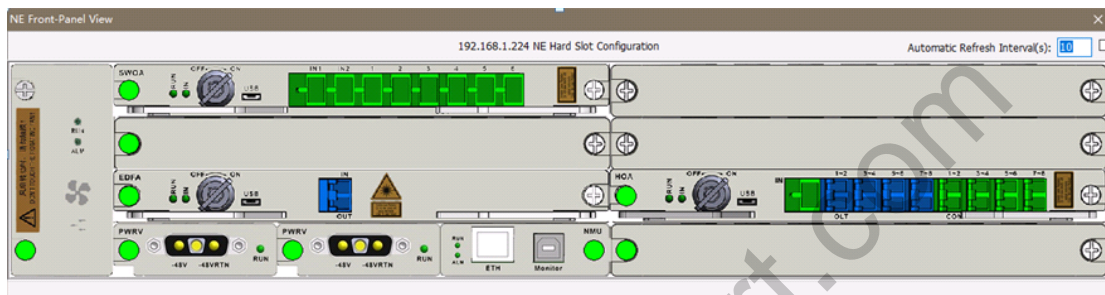
NE Front-Panel display the card information and card status.

21.4 Configuration Management

Figure 21-3Configuration Management:
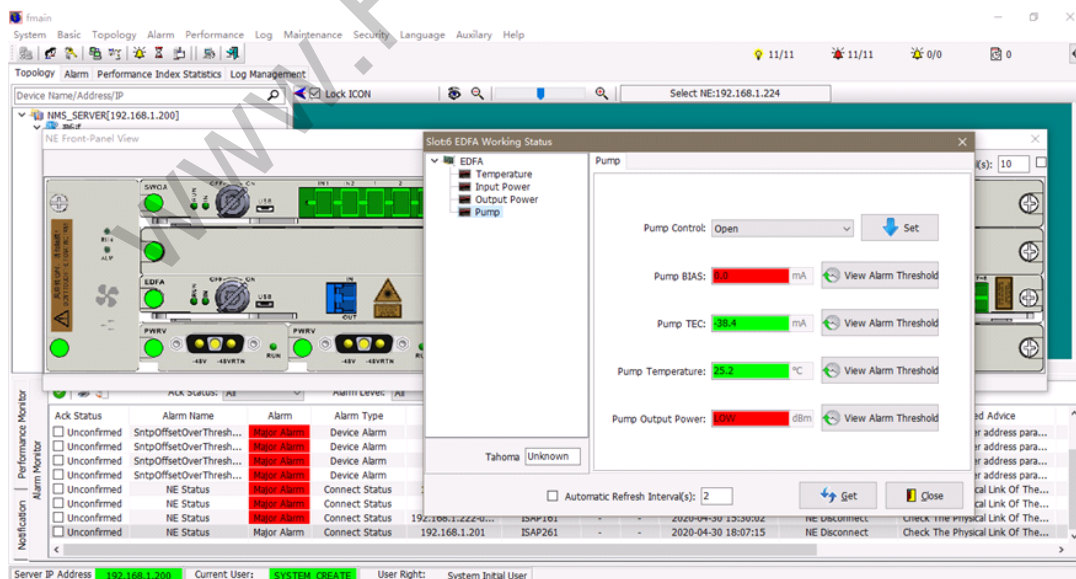
The interface supports the card parameter configurationand modification.

21.5 Alarm Management

Figure 21-4Alarm Management:
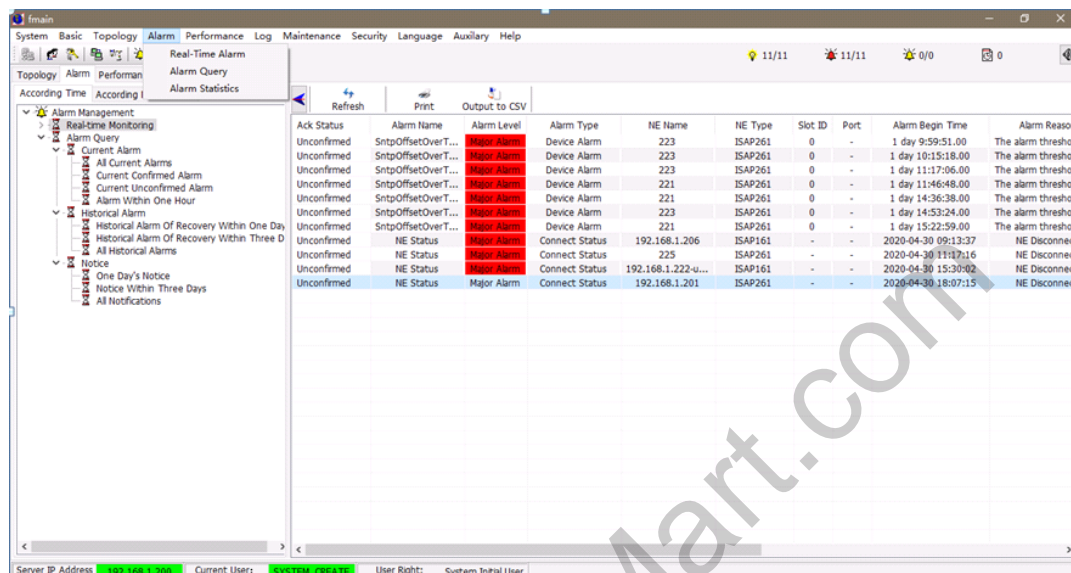
Alarm management supports current alarm and history alarm view, statistics.

21.6 Performance Management
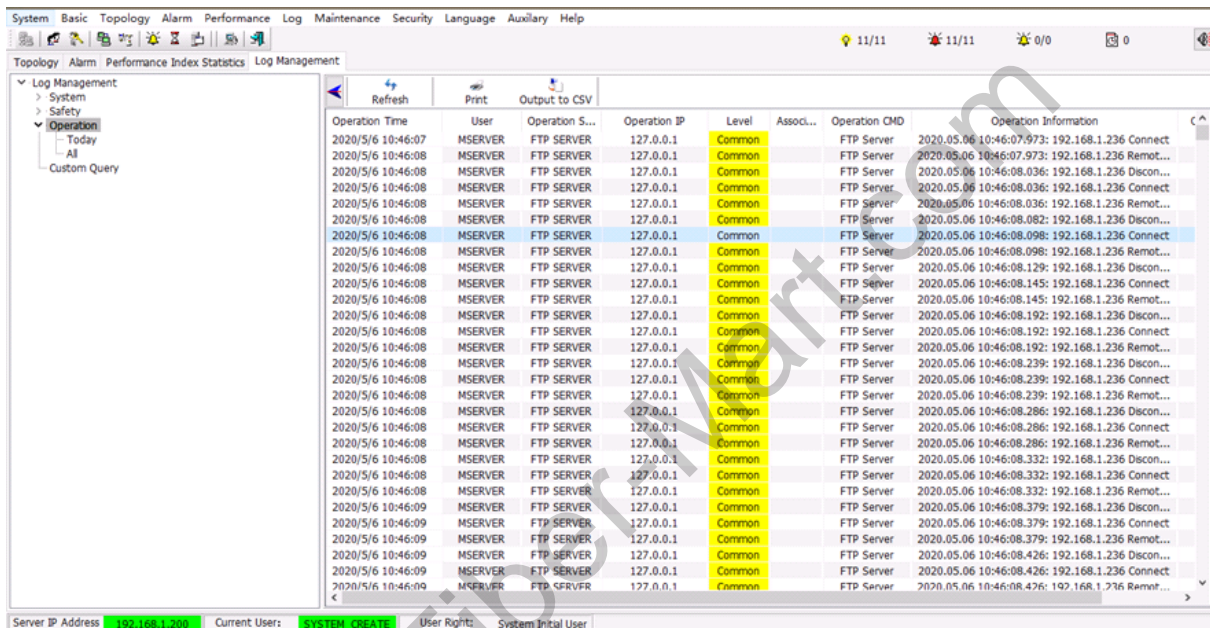
Figure 21-5Performance Management:
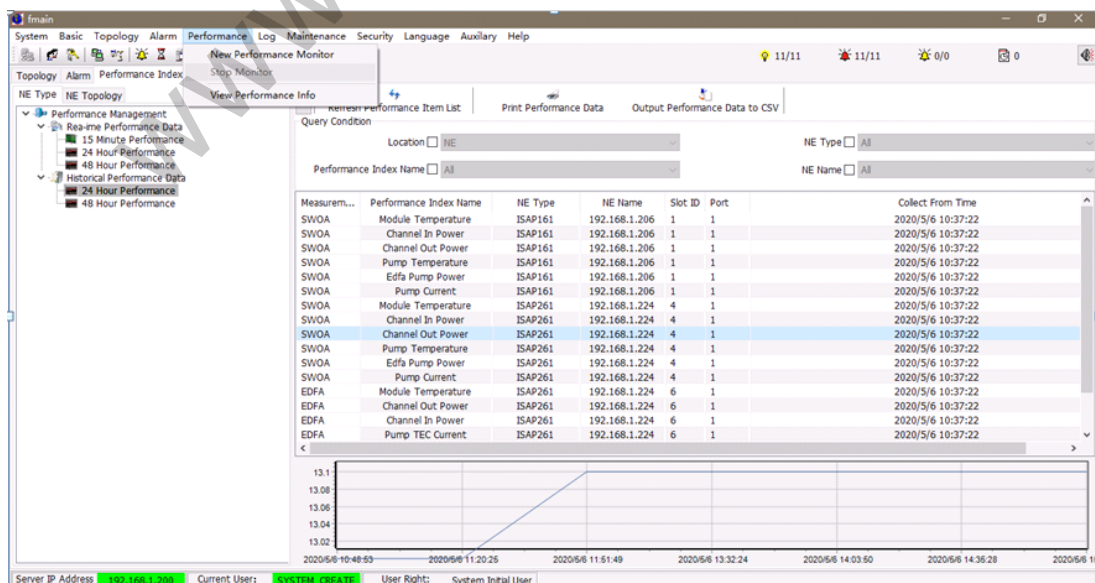
Performance management supports performance creation, stopping, 15min, 24h, 48h real-time performance and historyperformance queries.

21.7 Log Management

Figure 21-6Log Management:

Log management supports system log, security log and operation log view.
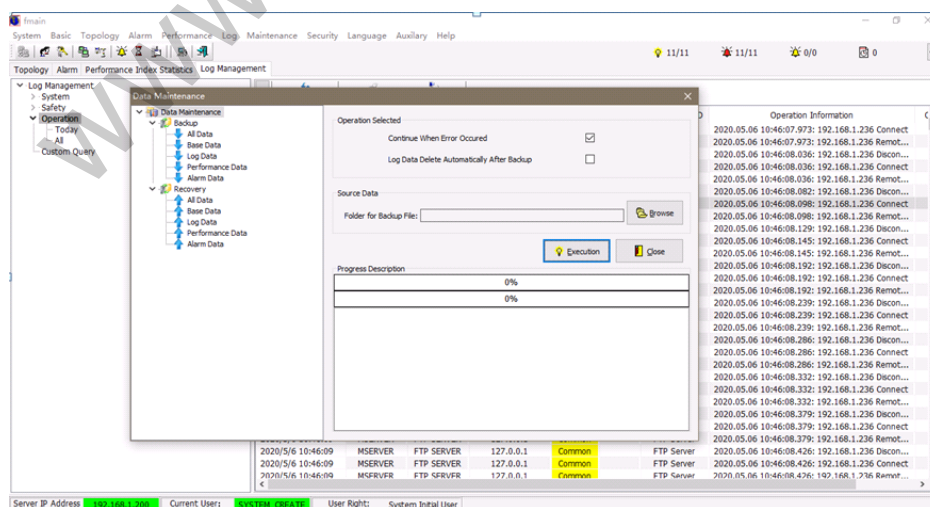
21.8 Security Management

Figure 21-7Security Management
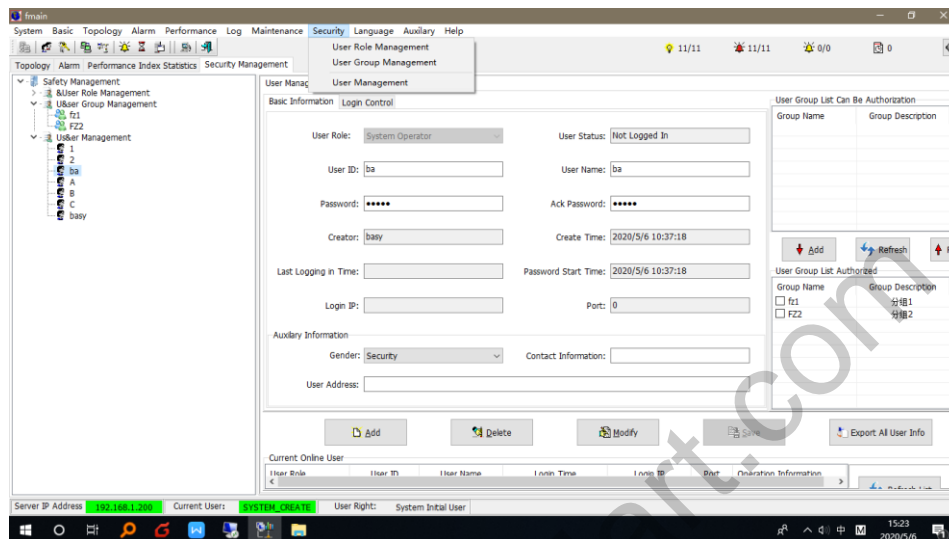
Security management supports the creation, modificationand deletion of user roles, user groupsand users.

21.9 Data Maintenance

Figure 21-8Data maintenance

Data maintenance supports database backup and recovery.

22 Applications of Double Fiber Bidirectional Transmission

22.1 Scene Description

With the increase of bandwidth demand, the transmission capacity of a single fiber is required to continuously increase, in the case that the number of wavelengths cannot be increased, improve the capacity of a single wavelength to improve the utilization of a single fiber, to solve the problem of insufficient optical fiber resources.

Figure 22-1System diagram
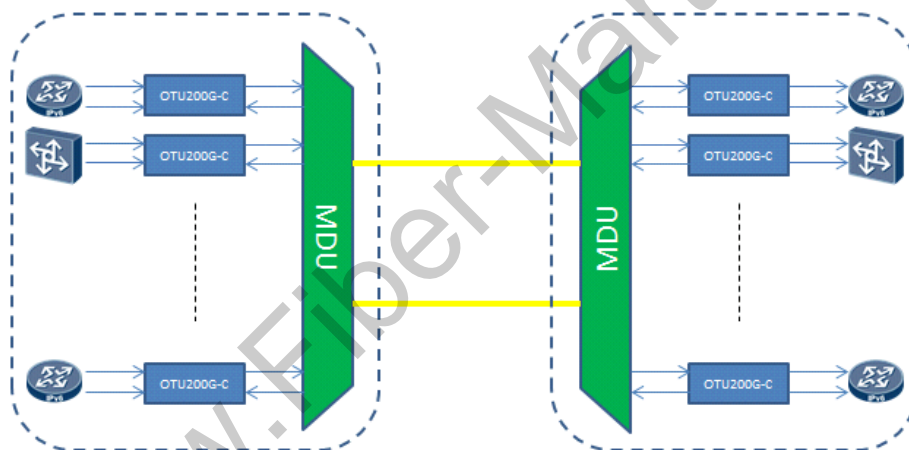
22.2 Highlights in the Solution:

● Single wavelength support 200G, single fiber support 96 waves, single fiber to achieve 19.2T of transmission capacity;

● It supports 1.25G~100G full-service access;

● Metro fiber cable loss is generally high and the system can be configured with opticalamplification to solve the problems of long distance transmission and fiber loss;

● It support various network topologies: Point to point, chain type, star type, ring type

23 Applications of Single Fiber Bidirectional Transmission

23.1 Scene Description

Due to the absence of their own optical fibers, the interconnection between government centers and enterprise parks mainly adopts the way of broadband renting currently. But as the growth of the broadband requirements, the demand of renting the bare fiber for self- built wavelength division load network have increased. In order to further save network construction costs, a new solution is proposed to construct large-capacity wavelength division based on the single fiber bidirectional technology.

Figure 23-1System diagram
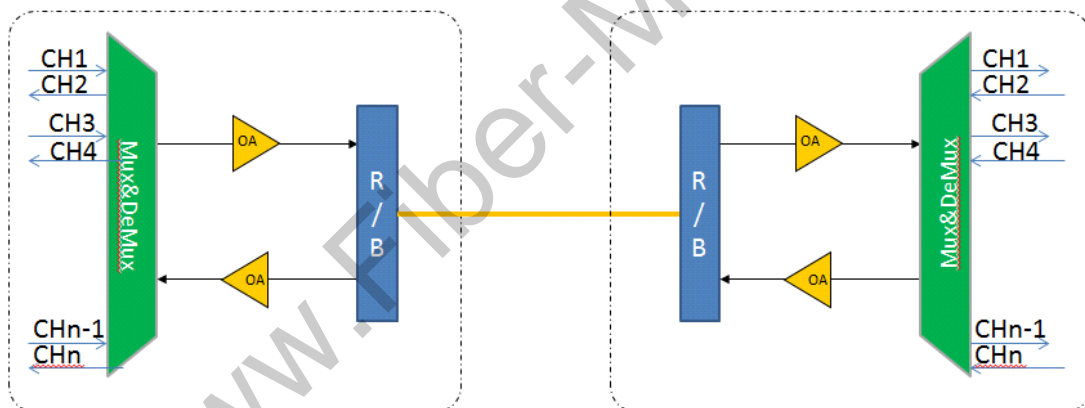
23.2 Highlights in the Solution:

● Single fiber system supports 10G transmission, which makes a good solution to the contradiction between optical fiber andbroadband;

● It supports 1.25G~10G full-service access;

● Physical isolation between the services, and dedicated network for special purpose;

● Metro fiber cable loss is generally high and the system can be configured with opticalamplification to solve the problems of long distance transmission and fiber

loss;

24 Applications of WDM Transmission Networks for Disaster Tolerance Backup

24.1 Scene Description

With the construction of the data center construction for private network clients from such as cloud network, IDC and big enterprises, the demand for the disaster tolerance backup system demand is increasing. Clients choose the self-built wavelength division method to solve the contradiction between the fiber and large broadband which not only can improve network reliability by "private network for special purpose" but also achieve high- broadband service transmission and even meet the flexible extension of long-term service.

Figure 24-1System diagram
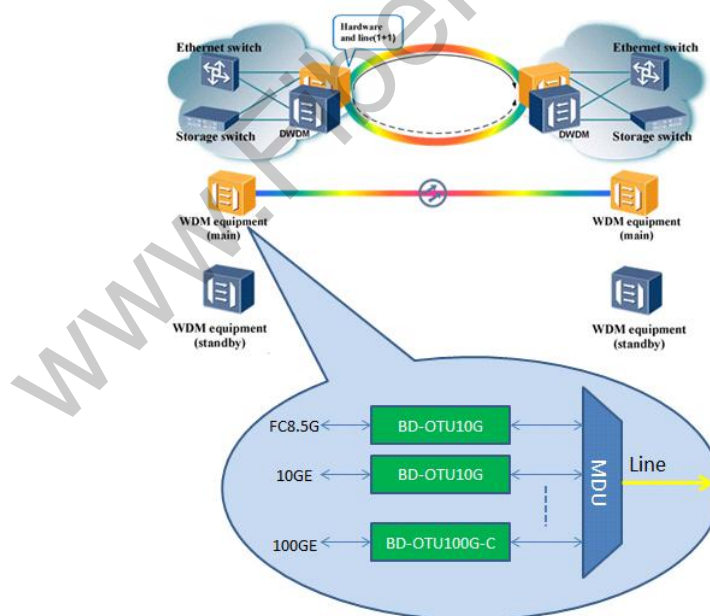
24.2 Highlights in the Solution

- The most comprehensive IP and SAN service interface, which supports almost all of the IP and SAN services at present;

- The scope of disaster backup expands to 130 km, meeting the demand of the large volume of disaster backup for multiple physical nodes;

- 1+1 backup protection for wavelength division hardware and line achieves the highest network protection.

25 Applications of WDM Unidirectional Transmission Network

25.1 Scene Description

Big data era is formally arriving with the development and popularity of the age of the Internet, the core of the construction of the cloud services based on large data is to conduct data collection and analysis in order to show the value of the data. Because of the network various sources and huge amount of the data, the large-scale network data analysis platform is usually established in equipment room in non-local locations. The WDM unidirectional transmission solution can provide real-time, reliable, safe and stable data transmission for non-local network data analysis platform.

Figure 25-1System diagram
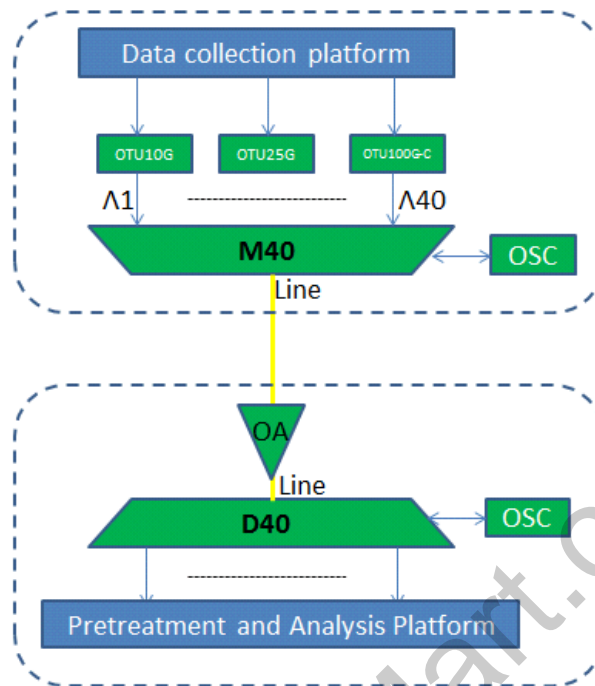
25.2 Highlights in the Solution:

- It supports GE~100G full-service access, all types of services can access system, and they are all transmitted on a single fiber by multiplexing;

- It supports the transmission upon the expansion from 40 wavelength to 80 wavelength or the convergence from 10G to 100G, which maximizes the use of fiber core and channel resources;

- Network transmission signals and service signals are jointly transmitted to the pretreatment equipment room, so as to realize a unified network for the entire network equipment.

26 Applications of Optical Amplification

26.1 Scene Description

With the development of the network security technology, currently, in many key links of the optical fiber network, there will be many security systems which require the traffic on this link; the image and copy for the optical data links in the industry basically adopts the optical splitting approach as a solution, so as to ensure the reasonable traffic collection under the condition of not affecting the original link transmission. The copying link which has gone through the optical splitting approach can amplify the signal with the optical amplifier, so as to guarantee to provide more high quality data flow for the security management platform. The ISAP platform has characteristics of compact structure, flexible configuration and low power consumption and it supports the optical amplification for full modes of 1.25G~100G as well as for full rates, which are widely applied to the fields of operators, private networks and information.

Figure 26-1System diagram
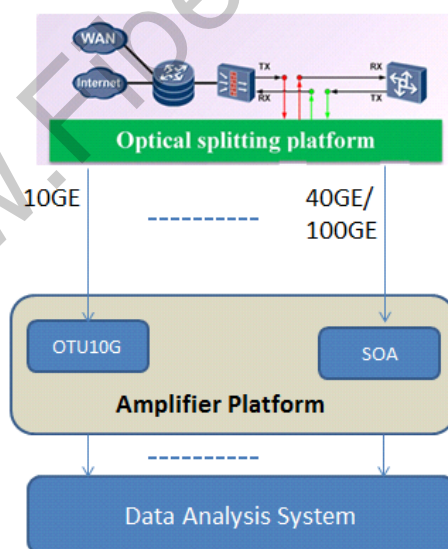
26.2 Highlights in the Solution:

- It supports optical amplification for SDH/SONET services at various rate levels and

services such as GE, 10 GE, 40 GE and 100 GE, which can be adaptive to any scene.

● High level of integration:1U platform can support the amplification for 1.25G~10G signals of up to 12 links (including a total of 24 channels uplink and downlink) or the amplification for 100G signals of up to 6 links (including a total of 12 channels uplink and downlink).

● 2U platform can support the amplification for 1.25G~10G signals of up to 28 links (including a total of 56 channels uplink and downlink) or the amplification for 100G signals of up to 14 links (including a total of 28 channels uplink and downlink).

● 5U platform can support the amplification for 1.25G~10G signals of up to 72 links (including a total of 144channels uplink and downlink) or the amplification for 100G signals of up to 36 links (including a total of 72 channels uplink and downlink).

27 Application of Optical Line Protection(OLP)

27.1 Scene Description

Optical line protection (OLP) technology is a kind of simple, flexible, economic and practical means of protection, which can effectively decrease the times of interruption of optical transmission system and has had a large number of applications in the first- and second-level DWDM transmission systems.

1+1 protection:

Figure 27-1System diagram
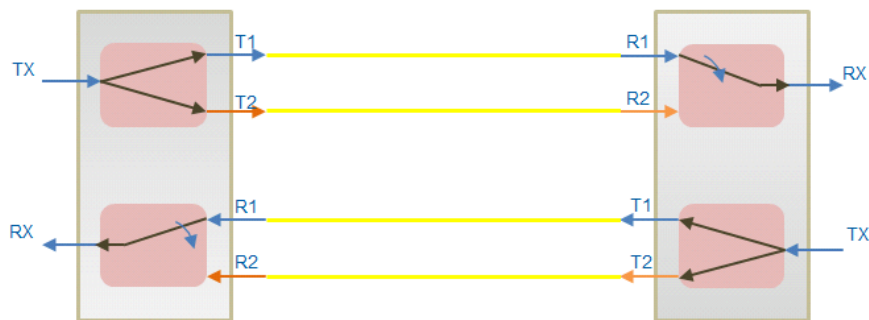
It's a hot standby mechanism of double transmitter or receiver and single-end rearrangement where OLP transmitter will split the signal into two parts at the same time to transmit them to the optical fiber of working and protection line, the OLP receiver inspects and compares the optical power of the signals in the working and protection line and then select the superior signal from one of two channels through optical switch.

1:1 protection:

Figure 27-2System diagram

The OLP transmitting end and receiving end are linkage optical switches. During normal working, the switch selects the line of the service channel for the optical signal transmission, and the line of protection line is used for the monitoring of signal communication for OLP on both ends. During the rearrangement, automatic optical switch at the home end and remote end conducts an automatic negotiation and implements switch through protection channel line.

27.2 Highlights in the Solution:

- Applicable to arbitrary scene: used for all kinds of optical communication system and transparent transmission, having nothing to do with the line data, format and multiplex;

- Safe and reliable: OLP adopts the design of the advanced optical switch and high-quality passive splitter, with a high reliability; and it is independent from network management board, without affecting each other;

- Automatic switch function: automatically switch to the protection line when the optical fiber in the working channel line is blocked, so as to ensure no blocking for communication services;

- Monitoring features for line insertion loss: conduct a real-time monitoring on the status of line insertion loss in the non-working optical channels and send out alarm prompt according to established alarm threshold, so as to ensure the validity and reliability of the protection system;

- Function of keep running for the power off and on: no matter the OLP power is off or on, it does not affect the switch state of the main and standby routing and guarantees the normal working of the system; and it also has the hot plug function;

- Network management function: support various management methods such as SNMP, CLI, Telnet and Web, implement the real-time monitoring, configuration and management on the OLP equipment state and the routing line status;

- Fast response: Switching time of 1+1 protection <20ms, Switching time of 1:1 protection <40ms;

- Unified platform architecture: OLP can work with our EDFA optical amplification and DCF dispersion compensation in the same chassis, and provide a one-stop solution for the protection and transformation of the DWDM network.

28 Environmental Requirements

Table 28-1 Environmental Parameters

Parameter	Min.	Typ.	Max.	Unit
Operation Temperature	-5	------	+55	℃
Storage Temperature	-40	------	+85	℃
Operation Humidity	5	------	95	%
Storage Humidity	5	------	95	%

29   Physical Structure

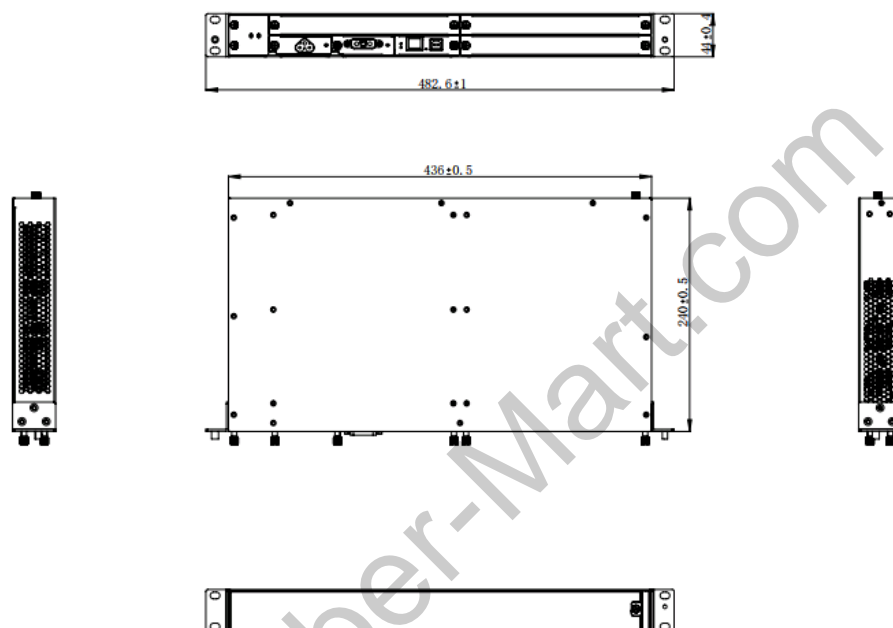Figure 29-11U PlatformStructure Diagram 482*240*44mm

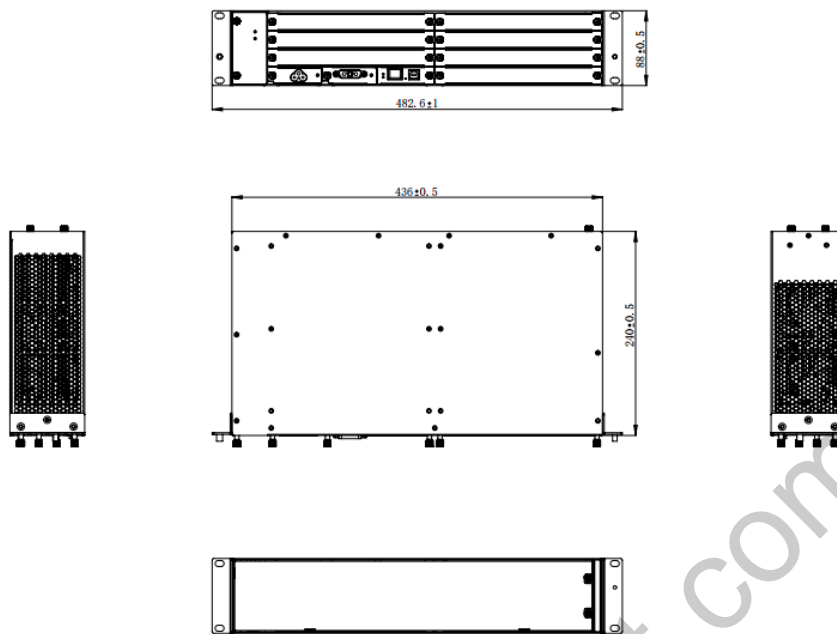

Figure 29-22U PlatformStructure Diagram 482*240*88mm

Figure 29-35U PlatformStructure Diagram 482*240*220mm