GIGALIGHT Marketing Report

DCI Data Center Interconnection

Coherent Optical Communications and
New WDM Solutions

Issue 3, 2023

1U 800G DWDM DCI BOX
Intelligent Optical Transport Platform

1U 3.2T DCI BOX 1.0
Coherent Optical Transport Platform

2U 6.4T DCI BOX 2.0
Coherent Optical Transport Platform

DCI Networks: Interconnection between Data Centers in Optical Network

Interconnection between Data Centers in Optical Network

Service Requirement

High Transaction Services
Financial and Electronics transaction services, etc.

UHD Broadcast
4K/8K UHD live and on-demandbroadcast services, UHD meeting,VR, etc.

Cloud Service
Continuous Migration, Data Hot Backup, Cloud Desk, Cloud Pay, etc.

5G Service
5G+Industrial Interconnection, etc.

Technical Requirement

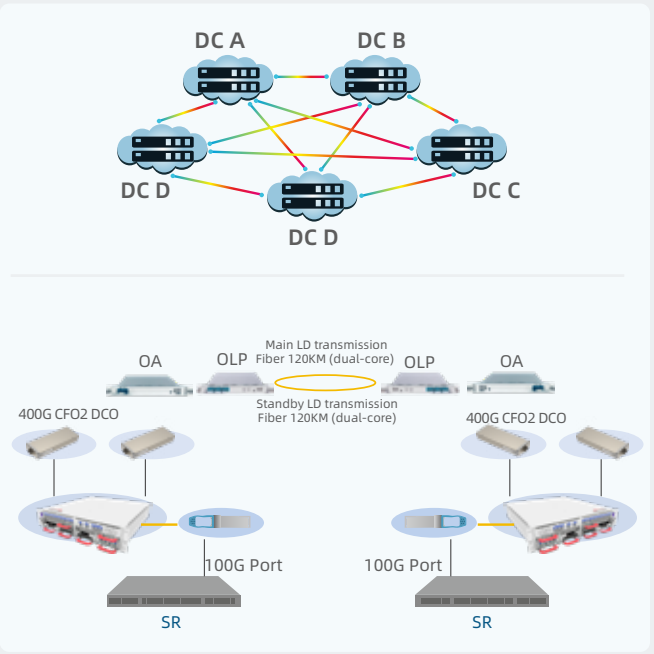
Simplified Architecture Requirement:
Large Existing Equipment, Complicated O&M, High Cost for Expansion, High Power Consumption

Latency Requirement:
High Latency in existing transmission network

High Bandwidth Requirement:
Ultra-high Transmission Bandwidth

Bandwidth Assurance:
Large Bandwidth Granularity Services

DCI Interconnection Equipment



DCI equipment that is economical, miniaturized, easy to expand, and quick to open up is on the market, as service and technical demands drive developments of DCI interconnection equipment.

GIGALIGHT DCI Series Solution

- **GIGALIGHT DCI Series Solutions**
  - Direct-drive Optical Module Solution — Generally refers to Grey Optical Modules
  - Economical Non-coherent Solution — 1U 800G DWDM DCI BOX Intelligent Optical Transmission Platform
  - Coherent Solution — 1U 3.2T DWDM DCI BOX 1.0 Coherent Optical Transmission Platform; 2U 6.4T DWDM DCI BOX 2.0 Coherent Optical Transmission Platform

1U 800G DWDM DCI BOX
Intelligent Optical Transport Platform

GIGALIGHT launches the latest 1U 800G DWDM DCI BOX (100G QSFP28 DWDM (2X50G PAM4) DCI BOX), an economical intelligent incoherent subsystem product. 1U 800G DWDM DCI BOX, a 1U box type multi-service wavelength division transmission platform, can meet the application scenario of maximum 8×100GE service point-to-point transmission. The conventional access capacity of the single box is 800G.

GIGALIGHT 1U 800G DWDM DCI BOX supports single-fiber or dual-fiber transmission, complex interfaces and redundant connection cables are thus replaced by simple panel design. We own internal adjustable dispersion module and power-controlled module, with automatic adjustment function of link dispersion and optical power, suitable for customers that are unprofessional enough in the field of optical transmission. Fully automatic configuration of optical layer-service can be achieved in 15 minutes after accessing the equipment, helping customers quickly open services, realizing easy operation and maintenance, reducing operation and maintenance costs of network construction.

Fully Automatic Intelligent Provisioning

Automatic Dispersion Compensation and Power Budget
Fully Automatic Provisioning

Plug and Play

Immediate Activation of Client side/Line side Fiber Insertion
Reduce complicated Fiber connection

High Transmission Rate 100G Dual PAM4

Adopts 100G dual PAM4
Large Service Granularity, High Utilization

Economical, High Integration

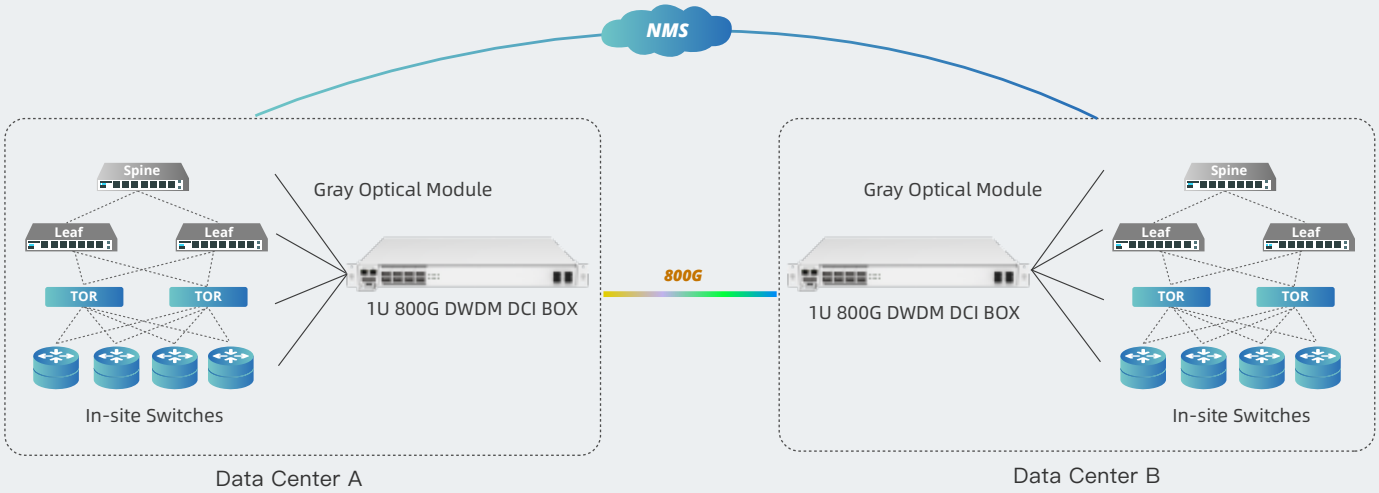
1U Cabinet, Integrated Module
Integrated EDFA, DCM,MUX/DEMUX

Support Single Fiber

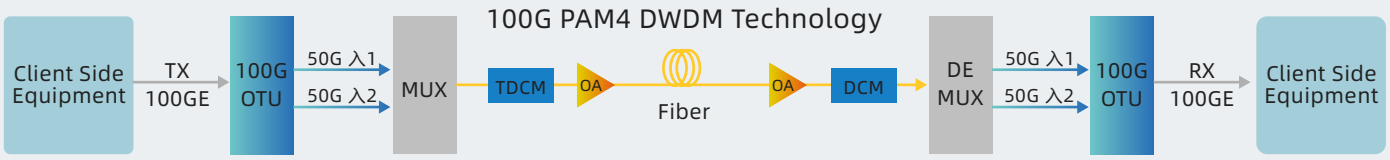
Single Fiber Reduce Fiber Resources
Using 1 fiber or 4 fiber

Typical Network and Application

100G~800G Point-to-Point Interconnection



Single Fiber Transmission



Application Scenarios

Incoherent Solution Scenario 1:
100G Data Center Interconnection

Low-cost data center point-to-point operations

Customer-side service type: 100GE
Customer skills & characteristics: Digital communication type, optical transmission is unprofessional
Budget: Cost-sensitive
Delivery schedule: Time is tight
Line changes: Line parameters are unstable and may vary
System capacity demands: Not too large

Incoherent Solution Scenario 2:
100G Economic Private Line

Fast private line plug-n-play scenarios

Customer-side service type: 100GE
Customer skills & characteristics: Digital communication type, optical transmission is not specialized
Budget: Cost-sensitive
Delivery schedule: Time is tight
Line variation: Line parameters are unstable and may vary

1U 3.2T DCI BOX 1.0
Coherent Optical Transport Platform

GIGALIGHT launches large-capacity service access, ultra-long distance transmission, simple and convenient operation and maintenance management,reliable operation, energy saving and emission reduction, effectively meeting the needs of Internet companies, carriers, cloud service providers and other users of data center interconnection.

DCI BOX 1.0 single chassis height 1U, compatible service boards: 2*400G OTU, single wavelength conversion card supports 2xCFP2, 2xQSFP-DD interfaces, supports 3.2T dual-way transmission: client-side service access 400G QSFP-DD service; line-side support 400G CFP2 DCO; network management system based on B/S architecture, to create intelligent and open network architecture for users. We can also support Web, CLI, SNMP and other management methods for convenient operation and maintenance.

Modular Design

On-demand configuration, smooth upgrade

Power-supply and fan of AC/DC are modular design, supporting hot-pluggable , flexible replacement according to demands.

Front-to-Back Airflow Design

AC/DC power supply, reasonable height, width and depth design

Suitable for data center server rack needs, can be deployed with the server co-rack.

Ultra-low Power Consumption.

Single lambda support 400Gbps

Based on state-of-the-art single-carrier 200G/400G coherent DSP and photonics integration technologies, including CFP2-DCO and termination optics.

Simple Operation and Maintenance

Based on SDN-based design concepts, offering open APIs

Enable rapid automation and integration in any IT operating environment, enabling rapid service deployment.

Ultra High Capacity, Ultra High Density

Supports 3.2Tbps line-side access in a compact 1U chassis

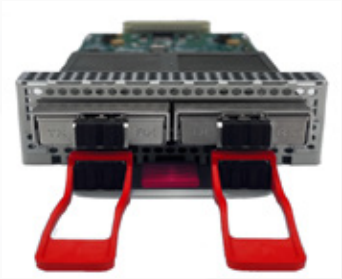
Enabling 3.2Tbps of electrical layer processing capacity in dual directions. Up to 3.2Tbps of processing capacity per 1U chassis.

Support SNMP-based Unified Network Management Platform

Network management mode CLI (telnet and console), Web, NetRiver (graphical interface)

Multi-service Access Card Board (1U CFP2 to QSFP-DD OTU)

1U DCI service board



- Support DWDM transmission, wavelength conversion.
- Single board card supports 2-way 400G bidirectional.
- Line-side supports 2 x 400G CFP2 coherent optical modules.
- Customer-side support service interface: 400G QSFP-DD.
- Support SNMP-based unified network management platform, network management mode CLI, Web, NetRiver (graphical interface).
- Support CDR function to optimize output, DDM signal monitoring, ALS.
- Support software to close the port.

400G OTU-11D board is used for optical fiber-link 400G service access board, can realize 1xQSFP-DD 400G to CFP2 400G, with adjustable CFP2 coherent optical module wavelength and DWDM multiplexer/demultiplexer to achieve wavelength division multiplexing transmission and address fiber resource shortage, fiber-line loss of transmission lines to provide quality solutions.

2U 6.4T DCI BOX 2.0
Coherent Optical Transport Platform

GIGALIGHT launches the latest 2U 6.4T DCI BOX 2.0 Coherent Subsystem product with a maximum capacity of 6.4T in a single chassis. 2U 6.4T DCI BOX 2.0 Coherent WDM Transmission System is a customized service platform for Data Center Interconnection (DCI) and Metro WDM/Backbone WDM applications, which enables optical layer equipment and electrical layer equipment to share or separate chassis, saving chassis and providing convenience for expansion. The platform adopts front and rear cooling design and is equipped with multiple high-speed fans to ensure excellent cooling performance; the optical layer supports Raman, EDFA boards, WSS boards, OP boards, etc.; the electrical layer supports 100G/200G/400G coherent boards; management supports SNMP/Netconf protocol, CLI/Web/BS management, dual master backup, OSC communication The powerful transmission and management capabilities are ideal for data center and metro network use.

Full Service Access Ability

Support Full DC Services
(Network, Service, Storage)

Optical-electrical Integration Design Subrack

Share optical layer and electrical layer
Optical-electrical integration design subrack, applicable to various scenario

Ultra-large Granularity Bandwidth

Support Single wavelength 400G Transmission Rate
Suitable for Metro, Medium Scenario

Simplified Dimension

WEB/SNMP/CLI
Support Flexible Equipment Management

Modular Design

Modular Components
Flexible Deployment, Smooth Expansion

Ultra-high Access Capacity

6.4T Single Cabinet
400G*80channel wavelength with 32T capacity

Fully Support ROADM

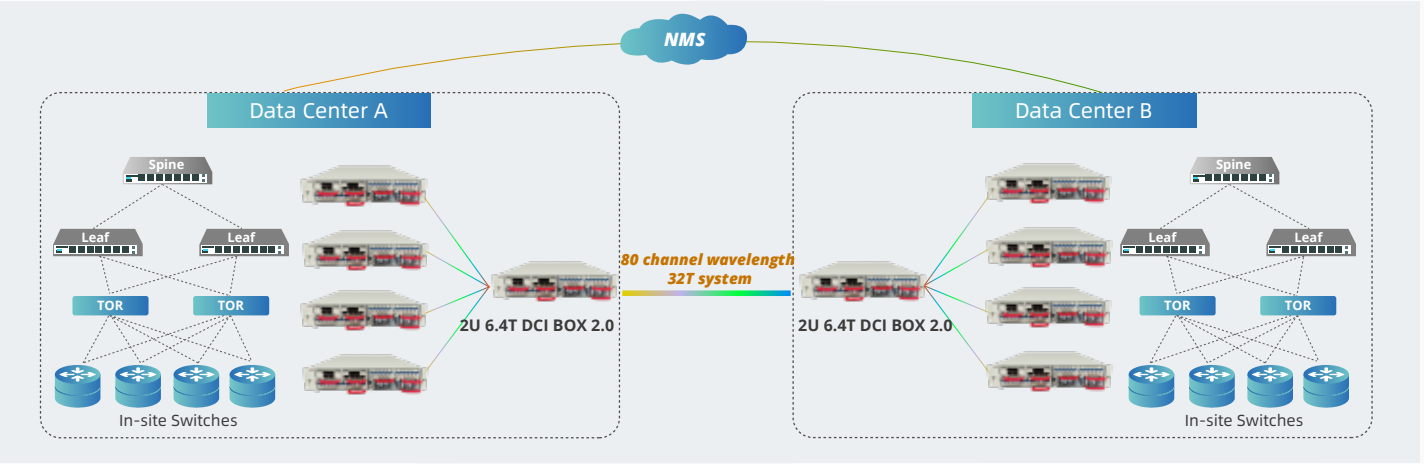
Support 3rd generation of ROADM,FLEX GRID
Support up to 9 degree ROADM and Flexible Grid

Open System Structure

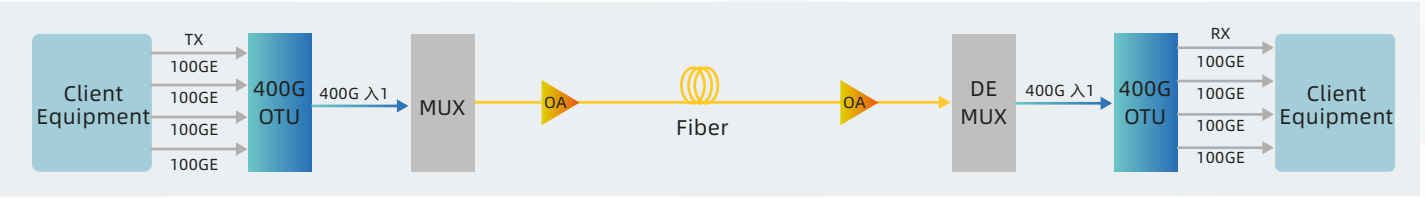
Network Structure Decoupling
Suitable for GIGALIGHT and third party solution

Typical Networks and Applications

100G/200G/400G Coherent DWDM Transmission



100G/200G/400G Coherent DWDM Technology



Functional Service Boards

Electrical Layer Service Board

2*200G Muxponder Service Board (1/4 board)

- Support 100GE/OTU4 service access
- Line-side coherent 100G QPSK/200G 16QAM
- Support 96-channel wavelength and power adjustment
- Support Pre-FEC BER, Post-FEC BER, OSNR, Dispersion monitoring before correction
- Power consumption <75W (including client-side and line-side optical modules)
- Support hot-pluggable, online program upgrade, reset

It supports 4-channel 100G service transparent transmission, can convert 2-channel 100G service signal to 1 single wavelength 200G coherent optical signal or convert 4-channel 100G service signal to 2 single wavelength 200G coherent optical signal.

2*400G Transponder Service Board (1/4 board)

- Support 400GE service access
- Line-side coherent 400G 16QAM
- Support 80-channel wavelength and optical power adjustment
- Support Pre-FEC BER, Post-FEC BER, OSNR, dispersion monitoring
- Power consumption <135W (including client-side and line-side optical modules)
- Support hot-pluggable, online program upgrade, reset

It supports transparent transmission of 2-way 400GE service, and can convert 1-way 400GE service signal to 1 single-wavelength 400G coherent optical signal or convert 2-way 400GE service signal to 2 single-wavelength 400G coherent optical signals.

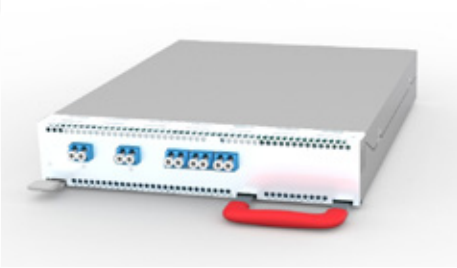
Optical Layer Service Board

1*9 WSS Service Board (1/2)

- Support WSS TWIN 1*9 structure or splitter + WSS combination (customizable)
- Built-in wide range of adjustable gain EDFA/VOA (customizable)
- Multi-dimensional networking is possible
- Support power compensation
- Support single-port channel attenuation adjustment
- Support for configuration management
- Power consumption <120W
- Support hot-pluggable, online program upgrade, reset

The board is usable in core backbone DWDM network system, which can be composed of multiple functional units such as WSS, EDFA, VOA, etc. It is mostly applied to various complex networks such as ring, multi-ring and mesh networks, which can be remotely configured to realize the service signal broadcasting function and complete the dynamic configurable combining function of any wavelength combination, and any node on the ring network and chain network can broadcast the received signal of the main optical channel as 9 signals, and input any wavelength combination of local interpolation from any port, with super service scheduling capability of multi-dimensional and network-wide wavelength resource reconstruction.

EDFA Service Board(1/2)



- Supports a wide range of variable gain or fixed gain (customizable)
- Good channel flatness
- Low noise
- Control mode AGC/APC/ACC
- Built-in 1510 OSC (customizable)
- Built-in VOA (customizable)
- Built-in 1625nm OTDR monitoring channel reservation (customizable)
- Built-in monitor interface (customizable)
- Support for configuration management
- Power consumption <80W (bidirectional amplification)
- Support hot-pluggable, online program upgrade, reset

The board is an erbium-doped fiber amplifier EDFA, specially designed for DWDM transmission system, and can be flexibly customized according to the needs of a wide range of adjustable gain or fixed gain, the product can support ACC/APC/AGC working mode. The product can support ACC/APC/AGC operating modes. The use of high-performance devices and temperature control technology drive good operating characteristics of products in a wide range of temperatures.

OP Service Board (1/4)

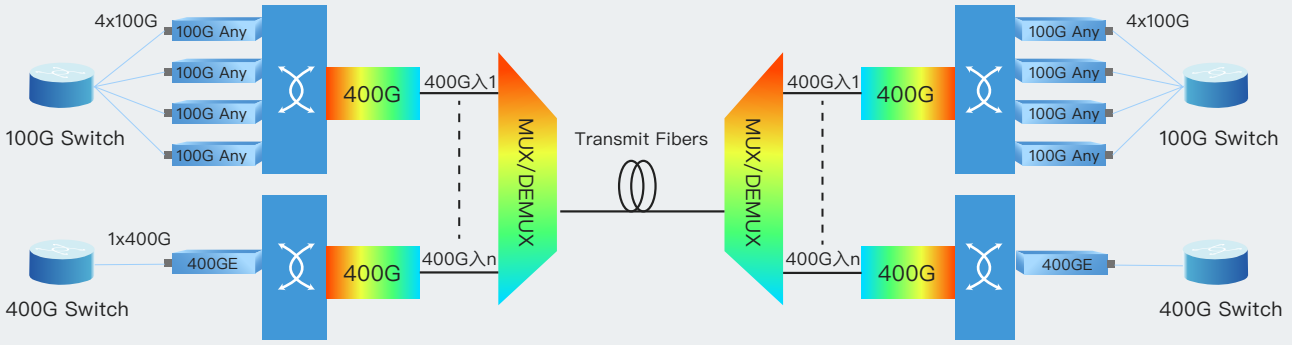
- Support 1 or 2 groups of bidirectional optical service signal access
- Millisecond switching speed
- Support manual switching / automatic switching / back cut / delayed switching
- Power down channel hold
- Can be used for individual service end-to-end protection
- Can be used for fiber optic cable line protection
- Support hot-pluggable, online program upgrade, reset

It is an optical protection board, which can be used for optical cable routing protection or service channel protection, and the protection mode is 1+1 dual transmitting and receiving, when the optical cable or equipment failure causes abnormal service receiving, the system will automatically switch to the protection channel to ensure that the service is not interrupted.

DCI Coherent Solution Usage Scenarios

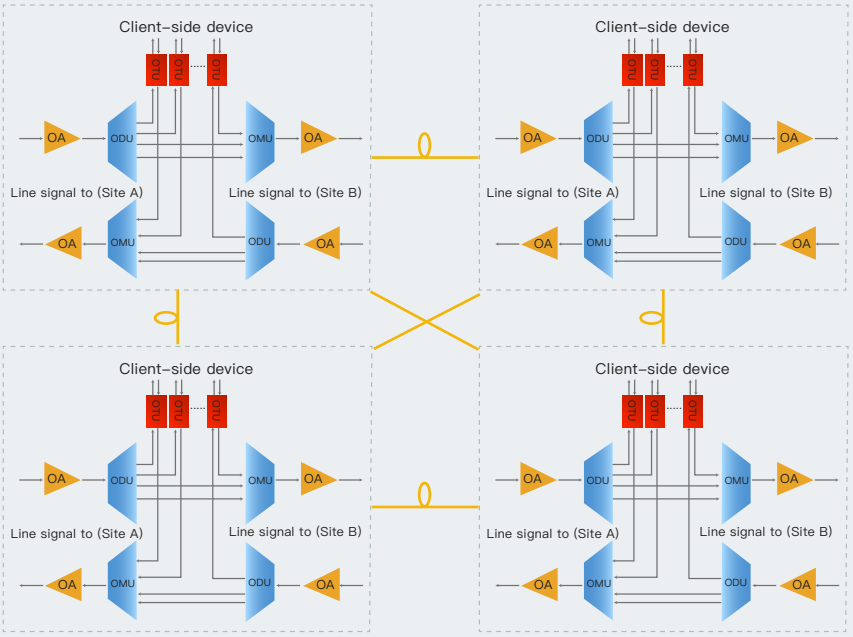
Dry Solution Scenario 1: Data Center Interconnection

Point-to-point DCI

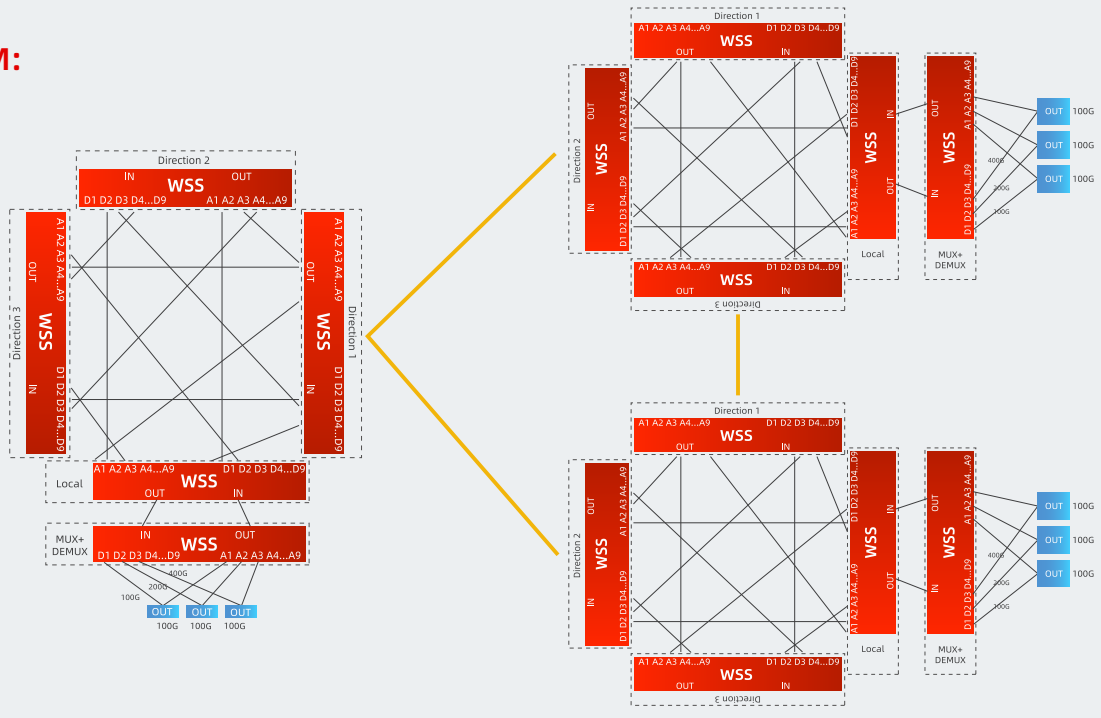


Point-to-multipoint DCI

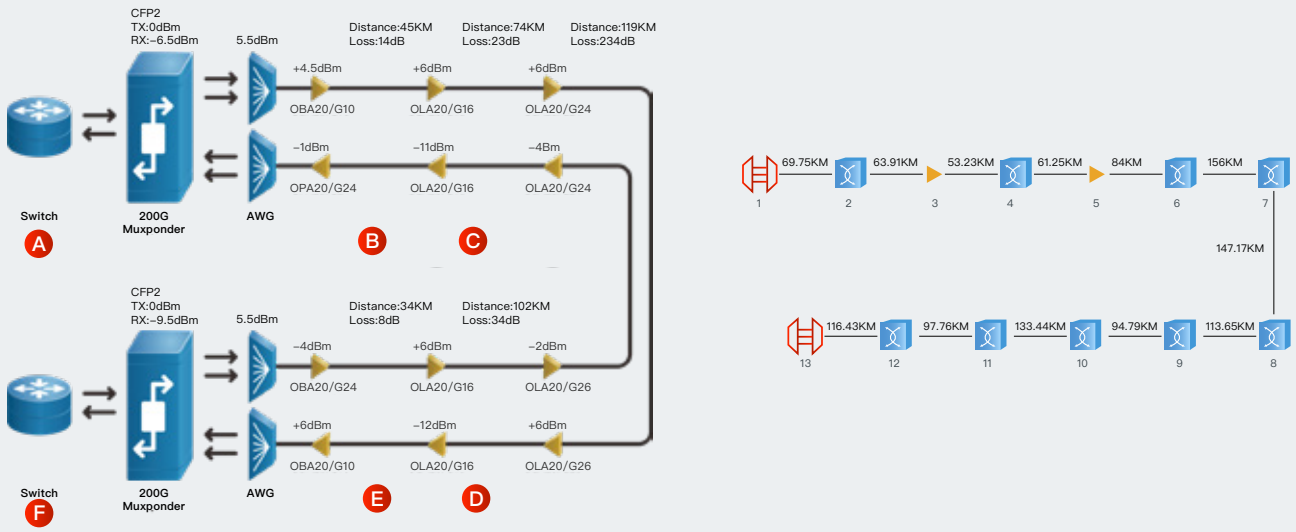
FOADM:



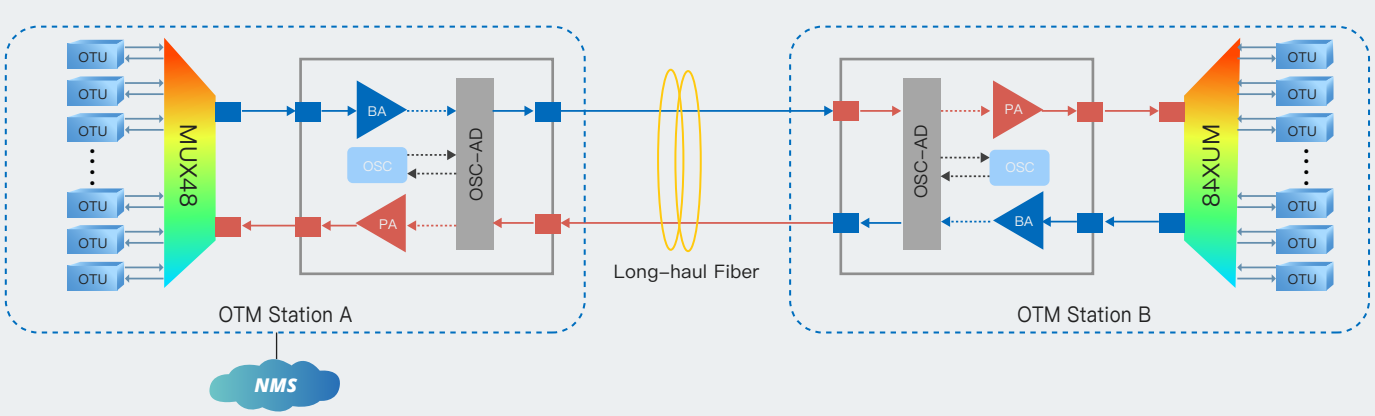
ROADM:



Coherent Solution Scenario 2: Telecom Midhaul / Backhaul Network, Telecom or Broadcasting MAN WDM / Backbone WDM Construction



Coherent Solution Scenario 3: Construction of private lines and private networks for industries such as petroleum, transportation, and power grids



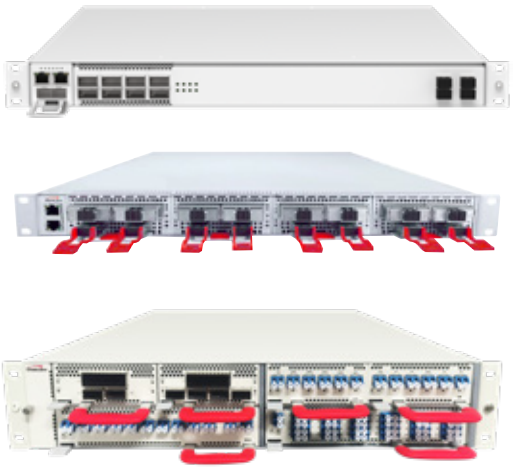
Comparison of Key Elements of GIGALIGHT DCI Series Products

Key Elements of Network Construction		1U 800G DWDM DCI BOX	1U 3.2T DCI BOX 1.0	2U 6.4T DCI BOX 2.0
Customer Planning, Maximum Interconnection Capacity		1*100G~8*100G	100G service: 96*100G 200G service: 96*200G 400G service: 64*400G	100G service: 96*100G 200G service: 96*200G 400G service: 64*400G
Transmission Distance		⩽120KM	>120KM	>120KM
Technical Solutions		PAM4 DWDM	Coherent DWDM	Coherent DWDM
Access to System's Service Signals	Service Type	Ethernet	Ethernet/OTN	Ethernet/OTN
	Service Speed	100Gpbs	100G/400G	100G/400G
	Service Wavelength	850/1310nm	850/1310nm	850/1310nm
Network Planning		Point-to-Point	Use with optical layer to support point-to-point/chain/ring network, etc.	Point-to-point/chain/ring network, etc.
Fiber Optic Resources		Single Fiber / Dual Fiber	Dual Fiber	Dual Fiber
Equipment Cost		Low	Relatively High	Relatively High
Use and Maintenance		Simple operation, low requirements for use and maintenance personnel	Relatively complex operation, relatively high requirements for use and maintenance personnel	Relatively complex operation, relativelyhigh requirements for use and maintenance personnel

Extended Reading

Difference between DCI BOX and Traditional WDM/OTN Devices

Traditional WDM/OTN Equipment



Three types of GIGALIGHT DCI BOX

The main difference between DCI BOX and WDM is the difference between "small but fine" and "large but complete", which is mainly reflected in the following aspects:

Equipment appearance

DCI BOX equipment is a standard DC cabinet-size box-device with a height of 1~2U, which can be expanded by stacking equipment. WDM equipment generally adopts special cabinets and subchassis, the height of the chassis is more than 12U, and the capacity is expanded by inserting and placing the board card in the subchassis, and then stacking the subchassis after the slot is full.

Equipment capability

Most of the current applications of DCI BOX are point-to-point networking, and WDM/OTN will be widely used in complex networking modes of point-to-point, point-to-multipoint, and multipoint-to-multipoint. DCI BOX generally adopts higher bit rates, short and medium distance transmission; WDM/OTN can better meet the needs of ultra-long-distance transmission. The DCI BOX service board is a branch line integration without the complex ODU particle electrical crossover structure of OTN, which simplifies service processing.

System capacity

DCI BOX single-chassis (1~2U) access capacity can reach 1.6T-6.4T and above, single-channel rate is more than 200G, single-fiber 48/96 wave system can be realized through multiple equipment stacking, and the customer-side port generally supports 400GE, 200G, 100GE and other larger particle services. In WDM/OTN equipment, the access capacity of a standard 12U high OTN subrack can reach several terabits. It supports single-channel rates of 100G/200G/400G on the line side and offers a variety of interface options to accommodate a wider range of rates on the client side.

Equipment power consumption

DCI BOX equipment per 100G capacity corresponding power consumption is basically less than 30W, WDM/OTN equipment may be less than 100W.

Equipment structure

The service boards, optical amplifiers, multiplexer/demultiplexer, power supply, and fan of the DCI BOX equipment adopt a small modular design. Compared with WDM, it is more compact and has higher space utilization.

DCI BOX vs. Universal WDM/OTN

	DCI—BOX	Universal WDM/OTN
Equipment Appearance	600 deep, can be in the same rack as the router	300 or 600 deep, not in the same rack as the router
Equipment Size	1U~3U, stackable according to service capacity	Initial configuration 10U/44U
Power Supply Design	Support 220V AC, 48V DC	48V DC
Heat Dissipation Method	Front inlet air and rear outlet air to meet the requirements of data rooms	Front inlet and outlet air, suitable for special transmission room
Crossover Capabilities	No electrical cross matrix	OTN cross-connection, which can meet the transparent transmission of large-grained services and aggregation of small and medium-sized services on demand/ cross demand
Business Interface	100G mainly	FE/GE, STM-N, 10G, 100G... Total class multi
Protection Capability	Support typical OLP, OMSP and other optical layer protection	Perfect optoelectronic layer protection capability, using intelligent control plane with MESH architecture network can resist multiple fiber breakage
Device power Consumption	<30W per 100G	>100W per 100G
Openness	Open Decoupling	Difficult to support compatibility with different manufacturers
Ease of Deployment	Compact, easy to stock , and convenient to deploy	Not easy to stock, need larger installation location/power supply/ perfect air conditioner set

Overall, the DCI BOX simplifies some of the WDM/ONT functions, strengthens the functional adaptation to DCI scenarios, and supports open decoupling, making the deployment and on-demand expansion of optical transmission systems more economical, easy and convenient.

Price Inquiry

If you would like to know the pricing and customized solution for your DCI scenario, simply provide the following information and reply to sales@gigalight.com. We will tailor the optimal solution for you.

Client Background Information:
Main Services, DWDM Technical Ability, Budget, Future Expansion

DCI Sub System Requirement Information

Design Selection and Design Requirement Information

Scenario
Equipment type, system type?

Network Topology
Physical Topology:
Chain? Ring? Meshed?

Transmission Parameters
Fiber Type, Fiber Length, Fiber Attenuation Coefficient, Dispersion Coefficient, Fiber Condition

Service Condition
- How many G? Single lambda 200G? 400G?
- Desired system and Design Capacity
- **Service Matrix:** What type of services? How many services? To and From?

Protection Requirements
- **Equipment Protection:** Board Protection Requirement
- **Service Protection:** OSMP 1+1? OLP 1+1?

Network Management System (NMS)
- WEB/CLI
- B/S NMS

GigaLight

Open Optical Network Device Explore

For any needs, please contact sales@gigalight.com. Thanks!

https://www.gigalight.com/