Huawei OTN P2P Premium Private Line Solution Introduction 01

2022-09-30

📋 Contents

01 / Status Quo and Challenges

📋 01-1 Private Line Services Are Profitable with Huge Market Potential

With the development of globalization, digitalization, and cloud services, private line networks are increasingly important for enterprises. According to Omdia, the global market share of private line services will exceed US$90 billion by 2023. This is linked to the development of low-latency connections for financial institutions, the interconnection between universities in the education sector, and the cloud-based services in various industries.

Global market share of private line services will exceed US$90 billion with a CAGR of about 10% by 2023

Source: Omdia
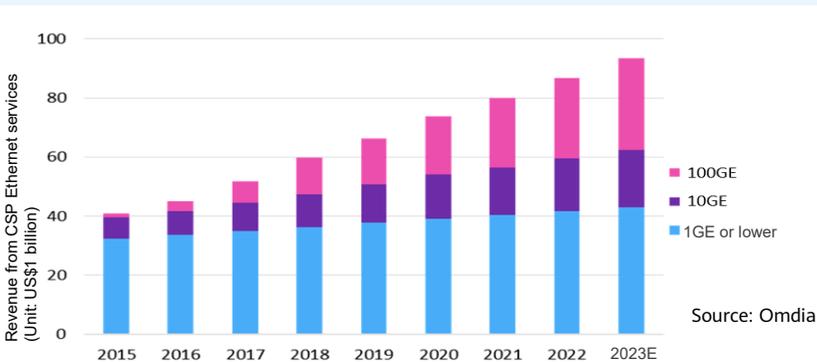
📋 01-2 SDH Devices on the Live Network Have Reached EOS and Need to Be Retired

Some private lines on the live network use traditional SDH devices to carry services. These legacy SDH devices have small capacity, use too many optical fiber and equipment room resources, and consume a lot of power, failing to meet the service bandwidth acceleration and intelligence requirements of industry users. Against this backdrop, carriers need a new network that can inherit the physical isolation of SDH and is intelligent enough to meet the differentiated requirements of industry users.

01-2 SDH Devices on the Live Network Have Reached EOS and Need to Be Retired

◆ SDH devices support rates lower than 10 Gbit/s and bandwidth utilization of over 80%, which cannot meet enterprises' acceleration requirements.

◆ SDH devices have been running for over 15 years, already exceeding their lifecycle expectancy. As a result, faults frequently occur.

◆ The SDH industry has started to shrink. SDH devices have reached EOS, so it is difficult to perform board capacity expansion and maintenance.

10 Gbit/s
35%

< 2.5 Gbit/s
50%

2.5 Gbit/s
15%

SDH rates on the live network
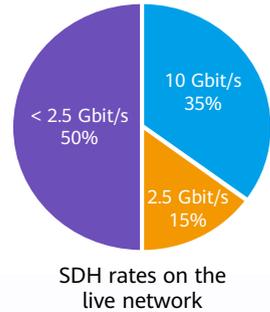
01-3 High-Value Users' Private Line Requirements Mainly Focus on Hard Pipes

High-value users like finance, healthcare, and large enterprises have strict requirements on private lines, mainly focusing on high bandwidth, high reliability, and low latency for hard pipe features. These requirements vary depending on industry characteristics, and private line services need to be able to meet them all.

User	Industry Characteristics	Requirement
Finance	Ultra-low latency, ultra-high download and upload rates, ≥ 99.99% reliability, 24/7 online services, exclusive links for ultimate security	Low latency, high reliability, high security
OTT	Numerous services migrated to the cloud for access to DCs, rapid bandwidth growth, traffic bursts, low latency needed by online services	Ultra-high bandwidth, bandwidth on demand, low latency
Enterprise	Real-time video conferences and conference calls, high security or even encryption for production data, low costs for common mail services	Low latency, high security, flexible scheduling
Healthcare	Cloud desktops, telepresence conferences, surgery live broadcasts, real-time information synchronization between regulators and grassroots institutions, considerable data transmission, elastic bandwidth adjustment	Low latency, bandwidth on demand, high bandwidth

02 / Huawei OTN P2P Premium Private Line

The Huawei OTN P2P premium private line solution combines MS-OTN and SDN to provide 5A premium private lines with physical isolation, high availability, assured low latency, high agility, and all-online experience through OTN CPE (fixed case-shaped or modular CPE), E2E OTN, and iMaster NCE. The solution's high private line quality meets the requirements of high-value users.

Huawei OTN P2P Premium Private Line Solution

iMaster NCE

Modular CPE

OTUk/STM-N

Core layer

Modular CPE

Enterprise branch

Fixed case-shaped CPE

OTUk/STM-N

CO

CO

Enterprise HQ
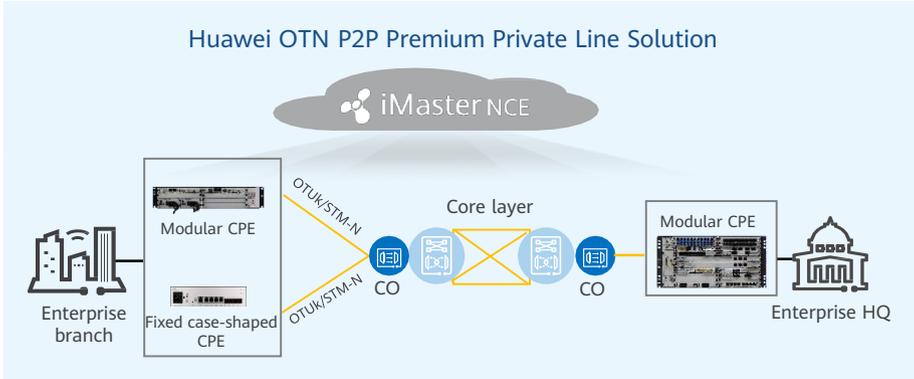
02-1 Solution Highlights

◆ Ultra-high security

OTN hard pipes are physically isolated to provide dedicated data channels. This ensures the high security of confidential data and prevents data leakage.

◆ Ultra-high reliability

OTN has diversified protection schemes, such as 1+1 active/standby protection and automatically switched optical network (ASON). This enables 99.99% reliability for OTN private lines and supports quick service recovery to protect production systems.

Ultra-high security, physical isolation

Enterprise

Enterprise

BANK

BANK

Banking

Banking

Fiber transmission
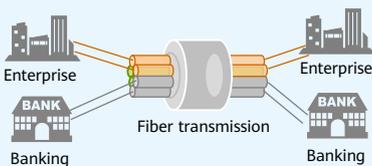
Ultra-high reliability, ≥ 99.99% availability
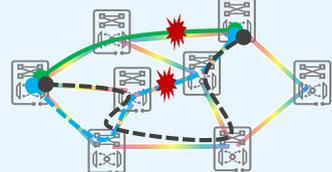
📋 02-1 Solution Highlights

◆ Ultra-low latency

An E2E optical-electrical converged network enables one-hop data transmission and detectable, visualized, planned, and millisecond-level private line latency, regardless of the traffic load.

E2E millisecond-level low latency

3.4 ms 2.5 ms Site Z

1.2 ms 2.7 ms

Site A
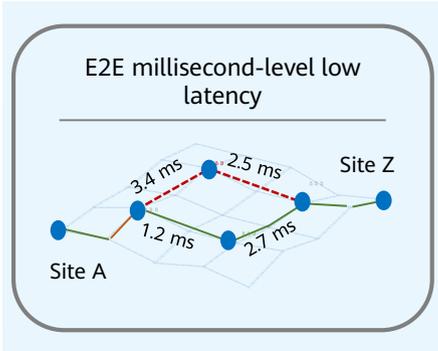
◆ Ultra-high bandwidth

OTN originates from wavelength division multiplexing (WDM) technology. It divides the available spectrum within the communication field into 120 channels. Each channel can carry up to 200 Gbit/s traffic.

Ultra-high bandwidth, up to 120 channels, 200 Gbit/s per channel

ODUk
ODUk Wavelength 1
Wavelength 2 Optical fiber
Wavelength 3
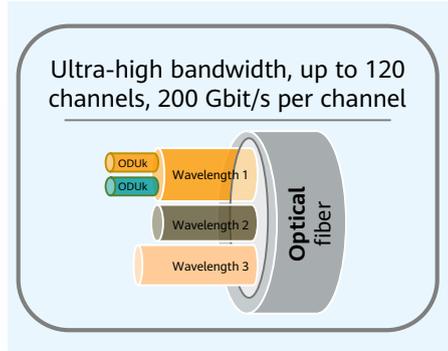
◆ Flexible and agile

The advanced intelligent management and control system iMaster NCE and the flexible hard pipe OSU technology are used to implement service provisioning within days and seamless bandwidth adjustment within minutes to meet urgent bandwidth requirements.

Flexible and agile, seamless bandwidth adjustment within minutes

Bandwidth
4G   4G   4G
2G
1G   2G   2G
OM   1G   1G   Current traffic
   Jul. Aug. Sept. Oct. Nov. Dec.
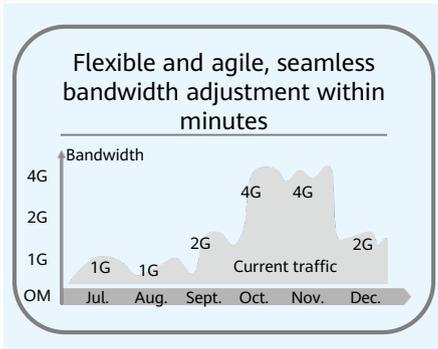
◆ Self-service

OTN uses an intelligent management and control system to implement centralized management and enable full automation of service processes. It enables the real-time visualization of network resources and real-time awareness of private line KPIs for high-value enterprise users.

Self-service, visualized key indicators, all-online operation

📋 02-2 Key Technology 1: OSU, Flexible 2 Mbit/s Hard Pipe

The optical service unit (OSU) technology is a next-generation OTN technology evolved from the existing OTN technology system.

- ◆ OSU defines a lower-rate optical service unit flex (OSUflex) container to carry smaller-granularity services, thereby serving more high-value users per 100 Gbit/s.

- ◆ OSU optimizes the multiplexing mapping path. Client-side signals can be encapsulated and mapped to ODUflex using OSUflex or directly mapped to higher-order ODUk, allowing a flexible coexistence with already established OTN networks.
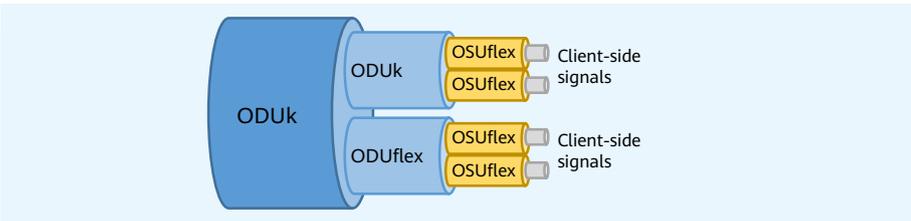
- ◆ OSUflex SNCP protection and hitless bandwidth adjustment in original paths provide users with refined private line services. Features include high flexibility, low latency, and hitless adjustment.
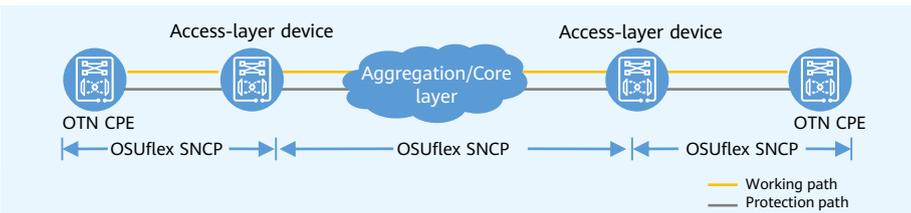
As a next-generation optical transmission technology, OSU has the following advantages:

- ◆ Simplified architecture: Multi-service and multi-plane bearing evolves to multi-service access and unified bearing, simplifying the bearing architecture.

- ◆ Ubiquitous connectivity: The flexible and elastic new container OSUflex is defined to implement hard network slicing at a granularity of 2 Mbit/s and increase the number of network connections to more than 1000, 12.5 times higher than that of traditional OTN.

- ◆ Ultra-low latency: OSU significantly simplifies network transmission layers and reduces per-site latency, adapting to different latency-sensitive scenarios.

- ◆ High flexibility and efficiency: OSU supports hitless bandwidth adjustment from 2 Mbit/s to 100 Gbit/s, ensuring 100% network resource utilization.

02-3 Key Technology 2: ASON 2.0, Intelligent Network with High Reliability

Automatically switched optical network (ASON) is a new technology in the transport network field. Huawei ASON solutions are divided into three types: optical-layer ASON, electrical-layer ASON, and SDH ASON (OCS ASON).

- ASON implements automatic discovery of nodes, topologies, and resources by introducing signaling to transmission networks and providing a GMPLS control plane. This enables the optical transport network to automatically allocate network bandwidth and dynamically configure trails. This way, private line services can be automatically established in an E2E manner and provisioned within seconds.
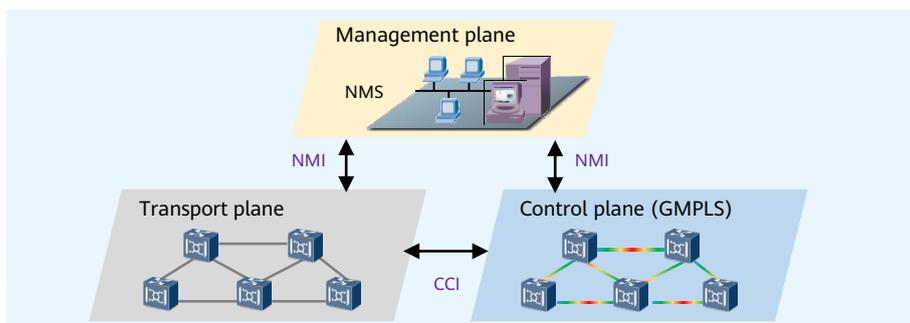
- ASON uses label switching paths (LSPs) to support signaling-control establishment and removal of network connections, automatic service recovery within a few hundred milliseconds upon a fault, and service protection against multiple fiber cuts.
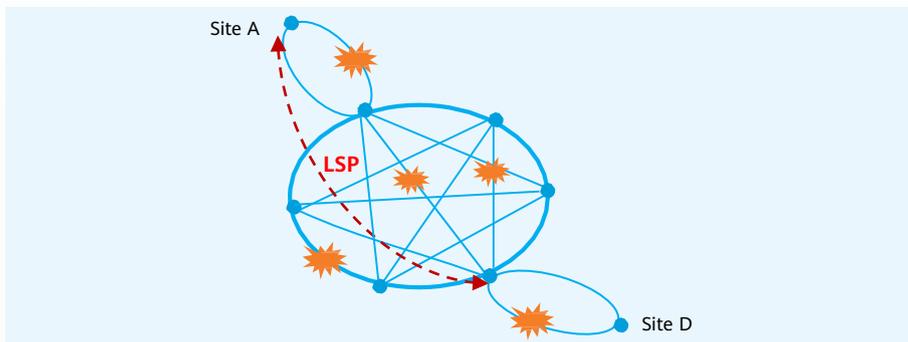
- ASON services share the same granularities with traditional WDM services. This means they can be interconnected and managed in a unified manner.

- If Huawei OptiX OSN products deployed on the live network meet the conditions for provisioning ASON services, users can download the required software and upgrade their live network to an ASON network.

02-4 Key Technology 3: BSS/OSS Seamless Convergence, Private Line Automation

iMaster NCE converges with BSS/OSS to visualize private line latency resources, quickly provision services, and allow users to flexibly adjust bandwidth. Users have access to customized value-added services through apps provided by carriers.
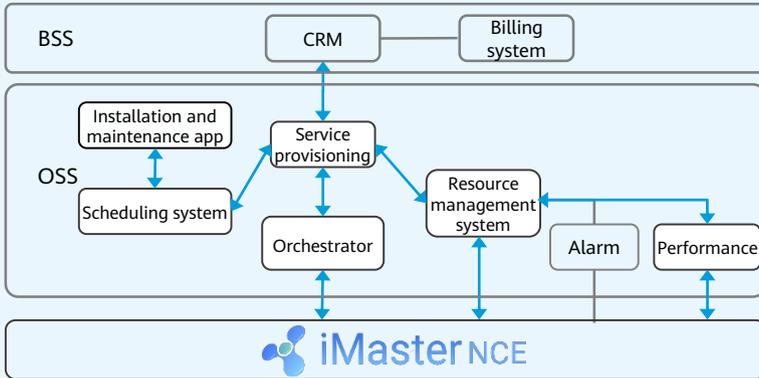
◆ Resource visualization

Displays marketable resources on the shelf in real time based on users' SLA requirements on bandwidth, latency, and service availability to help carriers expand the market.
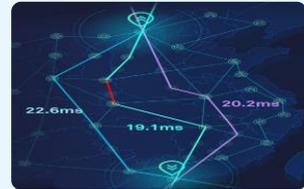
◆ Fast provisioning

Supports E2E service provisioning and CPE plug-and-play, minimizing service provisioning complexity and the provisioning period. This makes bandwidth adjustment flexible and reduces O&M costs.

◆ Self-service

Supports bandwidth on demand and one-click rate adjustment within minutes. Allows users to view the various performance data of private lines in real time, including basic information, bandwidth, traffic, and latency to improve customer satisfaction.

03 Introduction to Huawei OTN P2P Premium Private Line Products

The Huawei OTN P2P premium private line E2E transport network uses a Layer-3 networking architecture consisting of the integrated access layer (CO nodes), aggregation layer, and core layer. It provides diversified OTN CPEs for client-side nodes to meet the requirements of various enterprises.

03-1 Case-shaped OTN CPE

Huawei OptiXstar OTN CPE boasts high quality, low power consumption, a lightweight, flexible deployment, commissioning-free, and easy maintenance.

OptiXstar C805 S
Managed upon power-on and automatically enabled

Item	Description
Dimensions	250 mm (W) x 180 mm (D) x 44 mm (H) Various installation environments
Power consumption	5 W
Client-side port	1 x FE/GE (electrical)
Access service type	Ethernet services
Uplink bandwidth	1 Gbit/s
Configuration-free during deployment	Available upon power-on, working with NCE, automatic rollout as a board, and automatic service extension
Management and control	• Supports visualization on NCE and E2E service provisioning • Reports optical power, duplex status, port up/down status, packet loss rate, and RMON status
Recommended scenarios	SMEs and existing MSAP users

📋 03-1 Case-shaped OTN CPE

Opti**X**star C810 A Smart management and control with high quality

Item	Description
Dimensions	250 mm (W) x 180 mm (D) x 44 mm (H) Various installation environments
Power consumption	30 W~40 W
Client-side port	2 x GE/FE electrical port + 2 x GE/FE optical port+ 4 x E1 port
Access service type	OTN, SDH, PDH, and Ethernet services
Service model	EoS, EoSoO, EoO, and SDH (E1)
Uplink bandwidth	2.5 Gbit/s
Configuration-free during deployment	Available upon power-on, and working with NCE for automatic rollout
Management and control	Supports full-intelligent features such as E2E provisioning, flexible bandwidth adjustment, and latency maps
Recommended scenarios	Top enterprises within sectors like finance and industrial

Opti**X**star C820 A Comprehensive protection for secure data transmission

Item	Description
Dimensions	442 mm (W) x 220 mm (D) x 44 mm (H) 1 U, high integration, easy to deploy, and high environment adaptability
Power consumption	116 W (AC-powered chassis), 97 W (DC-powered chassis)
Client-side port	10GE/GE/FE/STM-64/STM-16/STM-4/STM-1 Supports a maximum of eight optical ports and four electrical ports.
Access service type	OTN, OSU, SDH, PDH, and Ethernet services
Service model	EoS, EoSoO, EoO, OSU, SDH, MPLS-TP, and Client
Uplink bandwidth	2 x 10 Gbit/s
Configuration-free during deployment	Commissioning-free, plug-and-play, and service availability upon power-on
Management and control	Supports visualization on NCE, E2E provisioning, and status reporting
Recommended scenarios	Top enterprises within sectors like finance and industrial

📋 03-2 Overview of MS-OTN Private Line Devices

MS-OTN devices support OTN, packet, and TDM services. They have a unified-switching architecture. OptiX OSN 9800 is mainly used at the backbone/core layer and metro/aggregation layer. OptiX OSN 1800 is used for metro edge nodes or used as a modular CPE on the client side.

OptiX OSN 9800

The OptiX OSN 9800 series (OSN 9800 U64 E/U32 E/M24/M12) consists of next-generation large-capacity OTN products dedicated for 100G services and beyond. OptiX OSN 9800 provides various management and protection functions and is the leading 100G/400G OTN platform in the industry.

OptiX OSN 1800

Integrated with both WDM and OTN features, OptiX OSN 1800 series products support the access of services ranging from 2 Mbit/s to 100 Gbit/s. The series supports the unified switching of OTN/SDH/packet services as well as the unified transmission of various services including broadband, private line, and mobile services on metro edge nodes.

📋 03-3 Service Networking

The Huawei OTN P2P premium private line solution allows users to select CPE/CO dual uplinks as needed to provide E2E 1+1 active/standby protection for services. It utilizes EoS and EoO service models alongside other service protection methods.

▬ Dual-Uplink
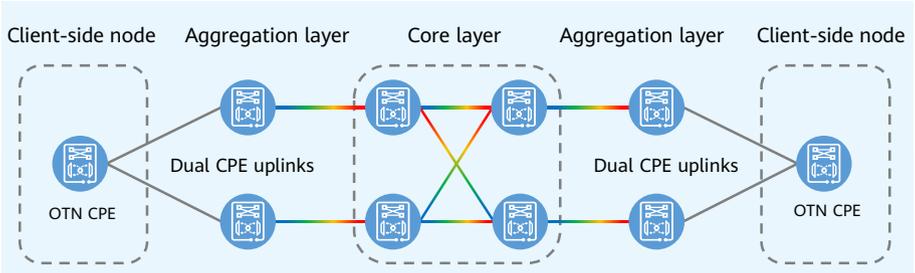
▬ EoS Service Model
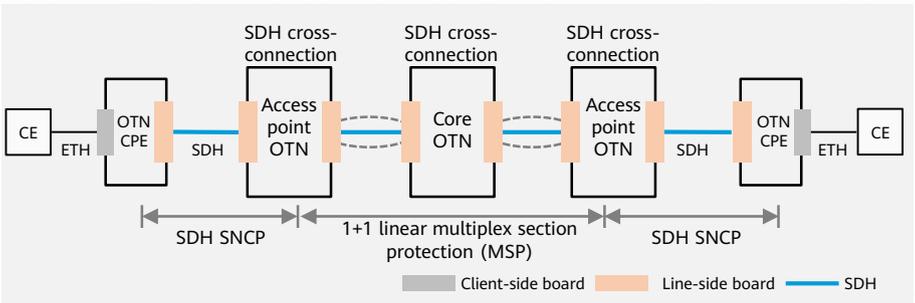
▬ EoO Service Model
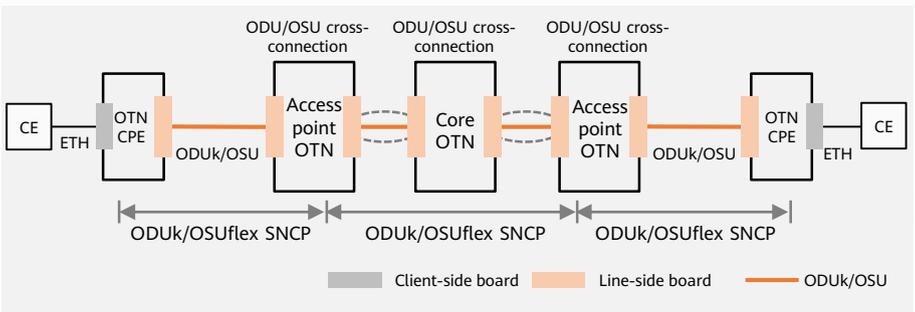
* For more service models and auxiliary devices, contact Huawei engineers.

📋 04-1 Securities

Requirements of Securities

The securities market can be considered as a competition of speed. Users who spot updates in the market first and put in the fastest transaction order to the exchange are the ones who benefit the most. Therefore, securities and futures companies are constantly in need of lower latency. They need ultra-fast transaction systems and low-latency networks to implement ultra-fast market data viewing and transactions.

The securities industry has the following requirements on networks:

◆ Low latency: Even 1 ms longer latency may bring losses of around US$1 million.

◆ High reliability: A highly reliable and always-online network is mandatory for securities trading.

◆ High bandwidth: Transaction and market data is updated quickly, with hundreds of thousands of transactions per second.

◆ Adjustable bandwidth: During the transaction period, securities users need multiple concurrent connections that can remain online for a long time.


Securities trading networking
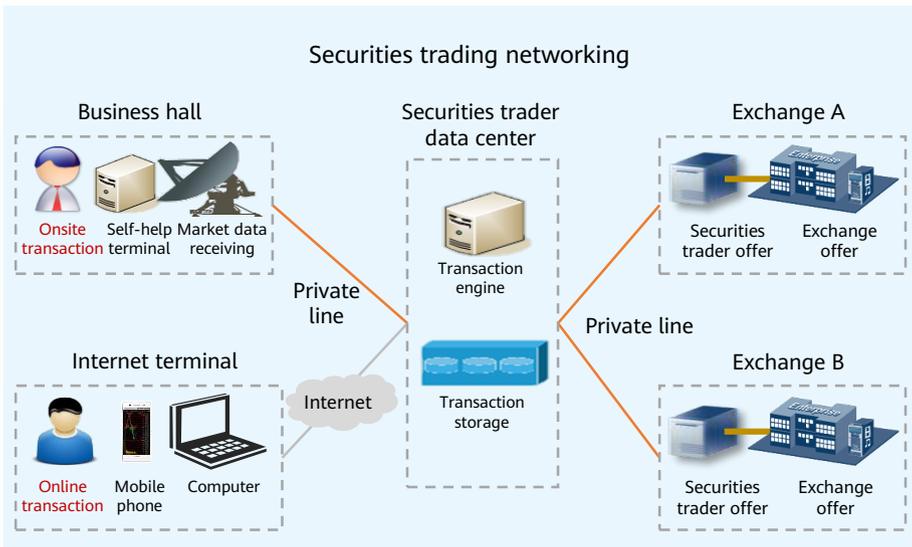
📋 04-1 Securities

Securities Application Case: Low-Latency Network Improves High-End Customer Satisfaction

▬ Customer Requirement

Securities company D, which has 220 branches in 29 cities and autonomous regions, needs to accelerate digital and intelligent transformation, attract high-end customers, and avoid securities DR data loss in geo-redundancy. As such, it poses the following network requirements with three DCs in two sites:

◆ Ultra-fast transaction speed to complete entrusted orders

◆ Zero loss of DR data and lower network latency

◆ Intra-city and remote DR: RTO ≤ 5 minutes, RPO ≤ 30 s

▬ Solution
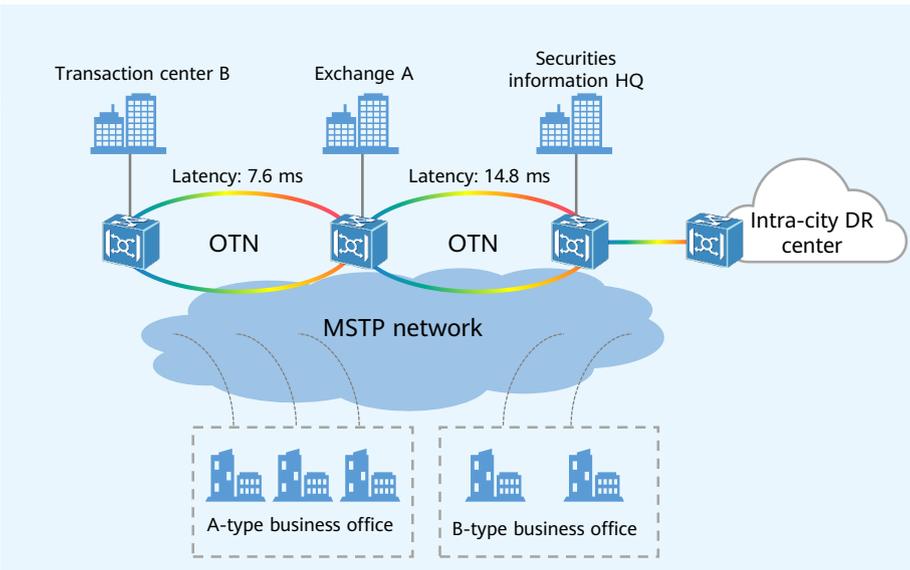
▬ Customer Benefits

◆ Ultra-low latency: millisecond-level latency to ensure high stability

◆ Ultra-high reliability: switchover time ≤ 50 ms, availability ≥ 99.99%

◆ Ultra-high security: exclusive pipes, L0/L1 physical isolation

📋 04-2 Banking11

Requirements of Banking

The banking sector is facing digital and delayering transformation. Banks need to migrate their banking systems to clouds to reduce operations costs as well as leverage digital processing on cloud platforms to improve the automation rate. They mainly have the following requirements for networks:

- High security: Secure and reliable backup paths are required for centralizing and fully cloudifying bank services and data to HQ data centers.

- High bandwidth and low latency: Technologies such as interactive robots and AR are required to provide video-based banking services and zero-wait online transactions.

- High reliability: Ultra-high-speed and highly reliable network connections are required in scenarios with burst transactions during online shopping festivals.

Banking networking
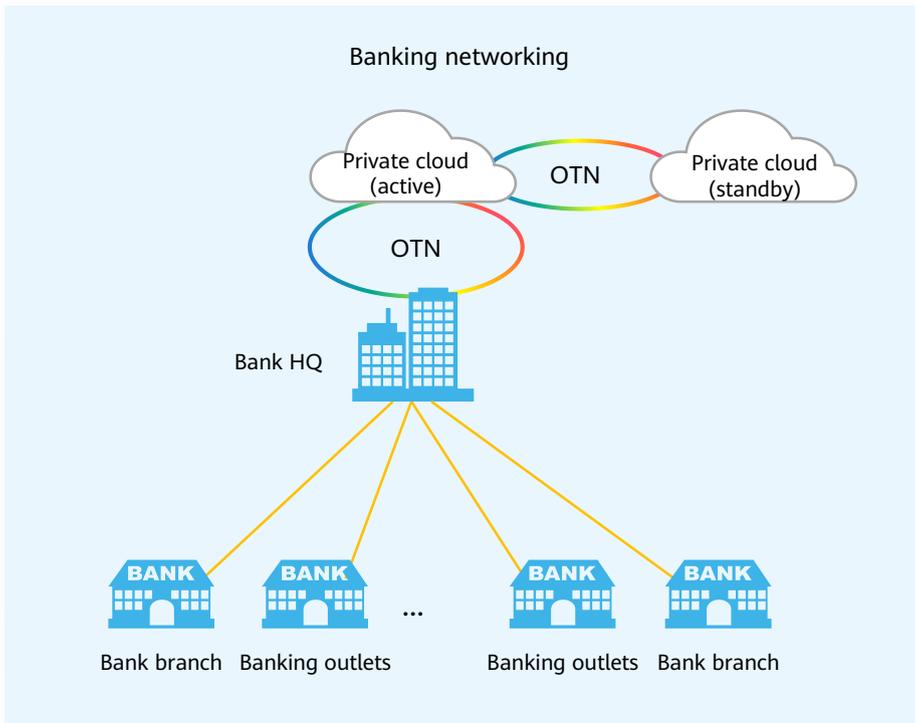
📋 04-2 Banking

Banking Application Case 1: Flattened Network Reconstruction and Upgrade

▬ Customer Requirement

Bank B's SDH devices have been running for over 10 years and have a high fault rate. In addition, bank B uses a traditional network that features long-link transmission and centralized data. If the network is attacked or faulty, a large scope of services will be affected. Bank B needs an OTN private network that meets the following requirements for flattened reconstruction:

◆ High bandwidth to support video-based banking

◆ Ultra-high security ensured by network hard pipes

▬ Solution
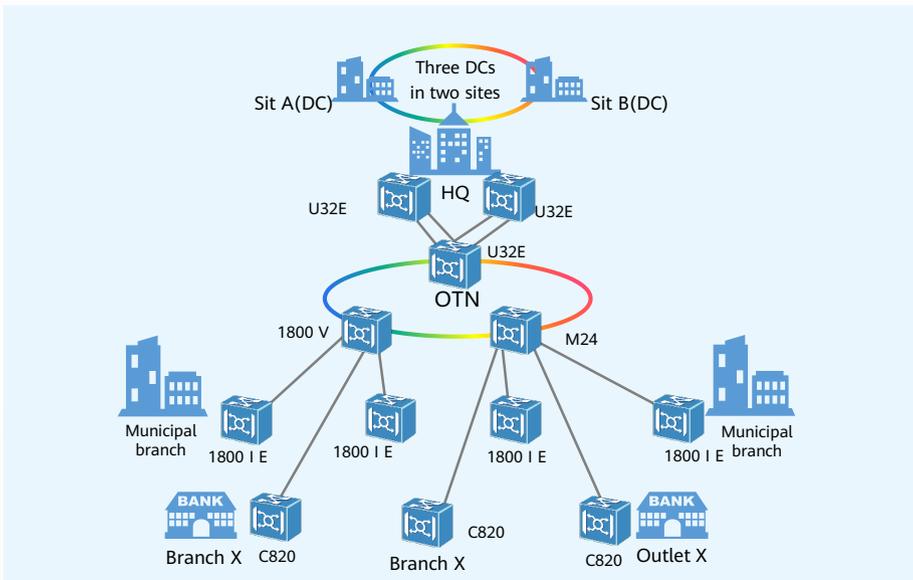
▬ Customer Benefits

◆ High bandwidth: bandwidth increased from 16 Mbit/s to 30 Mbit/s

◆ Ultra-high security: hard pipe isolation with OTN encryption

◆ Ultra-low latency: millisecond-level latency to support hot spare and redundancy across DCs

◆ Self-service: real-time performance visualization and self-service bandwidth adjustment

Banking Application Case 2: Rapid Deployment and Network Upgrade for Bank Outlets

Customer Requirement

Bank A has 262 business outlets, 536 self-service machines (ATMs and CRSs), and 51 ITMs in its service region. It poses higher requirements on the quantity, quality, and reliability of network connections. However, its existing network devices cannot meet transformation requirements as the MSAP links consume too much bandwidth and the end SDH CPE only provides a small buffer. Its key requirements for the network include:

- No video stuttering in video services
- Timely response on the production page

Solution
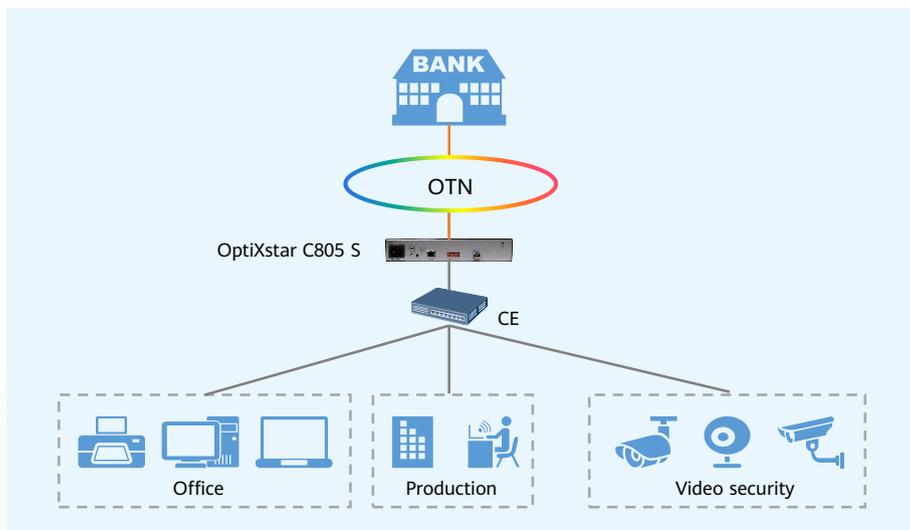
Customer Benefits

- High bandwidth: 20 Mbit/s service bandwidth and hitless bandwidth adjustment
- Ultra-low latency: one-hop connection and millisecond-level latency between any two nodes
- Fast provisioning: C805 S plug-and-play and fast E2E service provisioning
- Self-service: real-time visualization of KPIs like service latency

📋 04-3 Healthcare

Requirements of Healthcare

The efforts made to tackle the COVID-19 pandemic have inevitably accelerated the digital transformation of the healthcare industry. Medical data has been migrated from intra-hospital applications to regional applications and from local storage to cloud storage to implement medical applications such as remote consultation and remote diagnosis and treatment. In addition, countries are investing heavily in the healthcare industry, accelerating the digital development of healthcare and promoting the informatization of hospitals.

Healthcare digital transformation requires the following from networks:

◆ High bandwidth: Image data accounts for about 80% of the total data volume in hospitals, requiring high bandwidth.

◆ Low latency: After medical data is migrated to clouds, millisecond-level latency is required for real-time information exchange between doctors and hospitals.

◆ Adjustable bandwidth: During diagnosis and treatment peak hours, the PACS rate can be limited to ensure access to the HIS.

◆ High security: Medical data is critical, and must be stored with high security.

Healthcare networking

Industry cloud
HIS, CIS, EMR, and PACS

Scheduled backup and system migration to the cloud

Private line

Private cloud
HIS, CIS, EMR, and PACS

Internet

Private line

Diagnosis and treatment data

Public user

Patient   Public

Other healthcare organizations

Medical personnel   Medical college

Intra-hospital

Doctor   Nurse
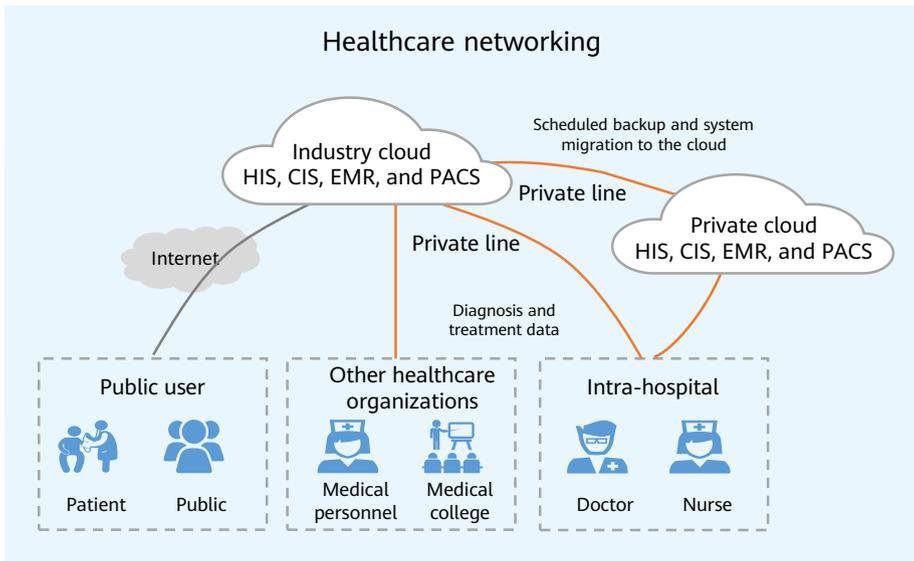
📋 04-3 Healthcare

Healthcare Application Case: Superior-Experience and High-Reliability Network Helps Migrate All Healthcare Systems to the Cloud

▰ Customer Requirement

Hospital B needs to migrate all its business, including 85 subsystems, 179 services, and core systems like HIS, PACS, and LIS to the cloud if it wants to go from informatization to cloudification. It has the following requirements on the network:

- Physical isolation to avoid being attacked
- RTO < 30 minutes, RPO < 1 minute
- Zero packet loss on the network, and remote image diagnosis in any hospital within seconds
- Sufficient bandwidth to migrate 500+ TB image data to the cloud and support peak-hour diagnosis and treatment at the same time

▰ Solution
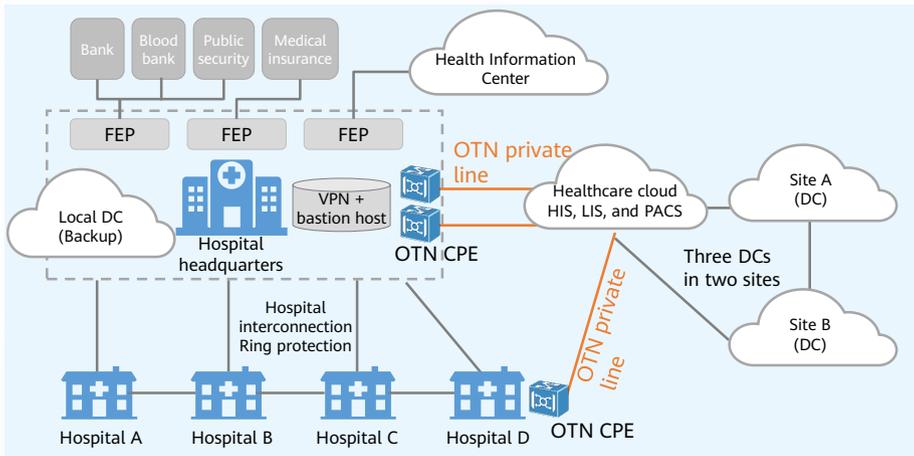
▰ Customer Benefits

- Ultra-high security: three DCs in two sites and PACS physically isolated from HIS to improve security
- Ultra-high reliability: 24/7, remote DR, and active/standby service switchover time ≤ 50 ms
- Ultra-low latency: zero jitter, millisecond-level network latency, and remote image diagnosis in any hospital within seconds
- Elastic bandwidth: 2 Gbit/s bandwidth adjustable for data transfer to the cloud, periodic upload of images, and guaranteed diagnosis and treatment during peak hours

📋 04-4 Education

Requirements of Education

Education networks are going through informatization. The education metro network connects all-size education institutions across regions to provide network services for national education. In addition, learner-centric remote education such as online education (live broadcast), video open classes, and knowledge payment promotes the cloudification of resources and systems within educational institutions.

Education poses the following key requirements on networks:

- ◆ High bandwidth: Online education focuses on videos and requires ultra-HD, 4K, VR, and AR live broadcast. Therefore, high-bandwidth networks must be provided to carry heavy traffic.

- ◆ Low latency: Live videos must be free of stuttering and packet loss. Therefore, low-latency, jitter-free networks are required to bring the best experience to users.

- ◆ Adjustable bandwidth: Online education features high concurrency and heavy traffic, requiring bandwidth on demand (BoD).

Education networking

Education cloud

Media transcoding   VOD   Live broadcast

Private line

Teaching platform

Online learning platform   Remote interactive teaching & learning platform   Enterprise internal training platform

Terminal

Mobile phone   Tablet   Laptop   Computer
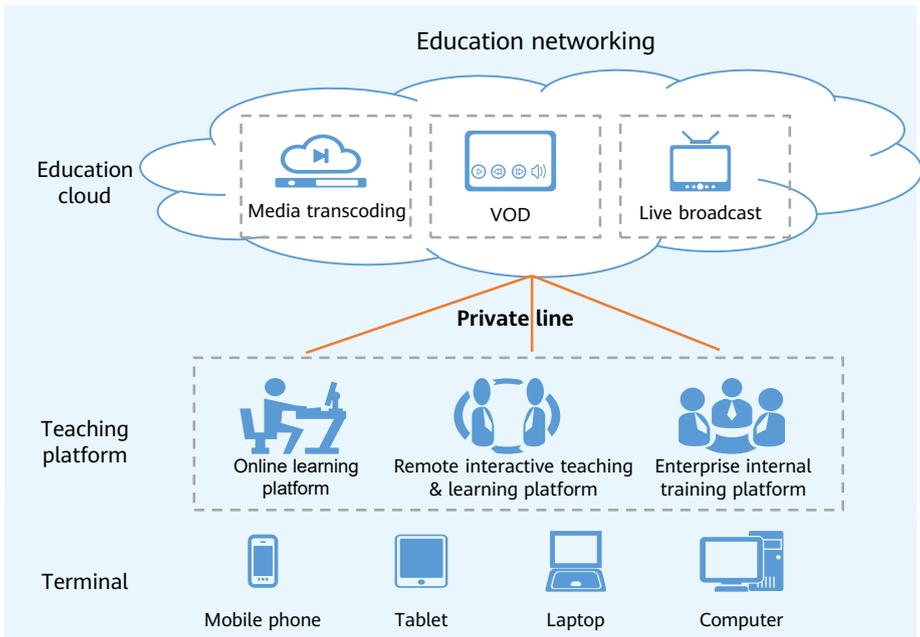
📋 04-4 Education

Education Application Case: Premium Private Lines Build a Provincial Education Network

▬ Customer Requirement

Province A has established a provincial education network, covering all types of schools within its jurisdiction. According to the network plan, three core nodes are deployed in each of the two central cities. Nodes in the other 12 cities aggregate services which connect to the core nodes. There are 13 aggregation nodes in total. The network requirements are as follows:

◆ High bandwidth for transmitting voice and video information at all levels

◆ Network protection and quick fault recovery

▬ Solution
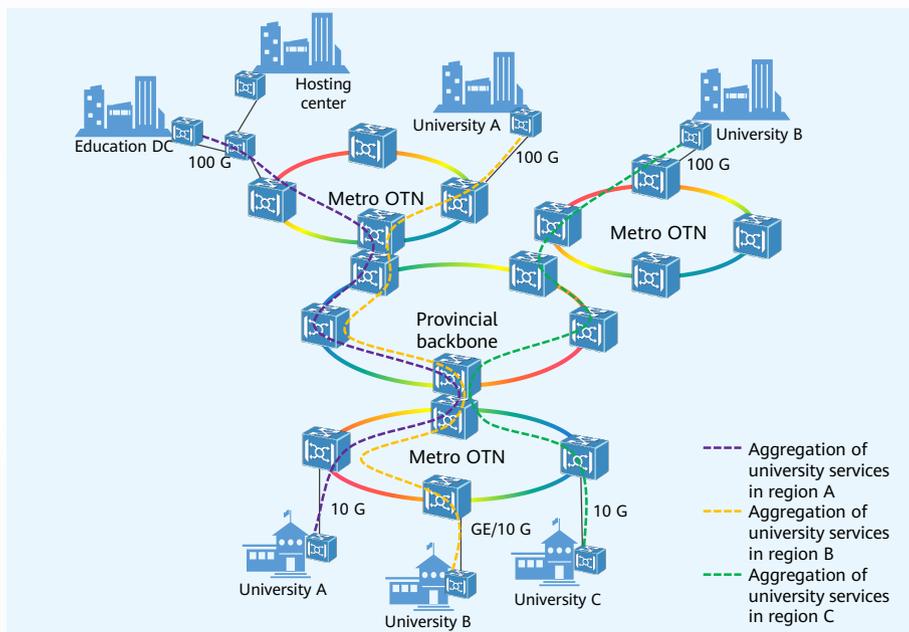
▬ Customer Benefits

◆ Ultra-low latency: all-optical transmission with millisecond-level latency

◆ High bandwidth: 10 Gbit/s bandwidth for aggregation nodes and 100 Gbit/s bandwidth for backbone core nodes

◆ Ultra-high reliability: optical line protection (OLP) provided for multiple sections on the provincial backbone network to ensure high network security and reliability

📋 04-5 Media & Entertainment

Requirements of Media & Entertainment

In live broadcast scenarios like sports events, art shows, and large-scale activities, users need multi-site and multi-device interactive live broadcast solutions that feature super clarity and ultra smoothness to create an immersive viewing experience.

The media & entertainment industry has the following network requirements:

◆ High bandwidth: SDI 6G/12G/24G for uncompressed signals, and SDI 2G~3G for slightly compressed signals.

◆ High reliability: zero service interruption, zero packet loss, and zero video stuttering during the live broadcast of major sports events/activities.

◆ Low latency: real-time rebroadcast and video backhaul in milliseconds.

◆ High security: 100% physical isolation in the design and implementation of the rebroadcast aggregation network.

◆ Adjustable bandwidth: E2E fast service provisioning in temporary collection scenarios, and flexible bandwidth adjustment to quickly cope with emergencies.

Live video backhaul and push network
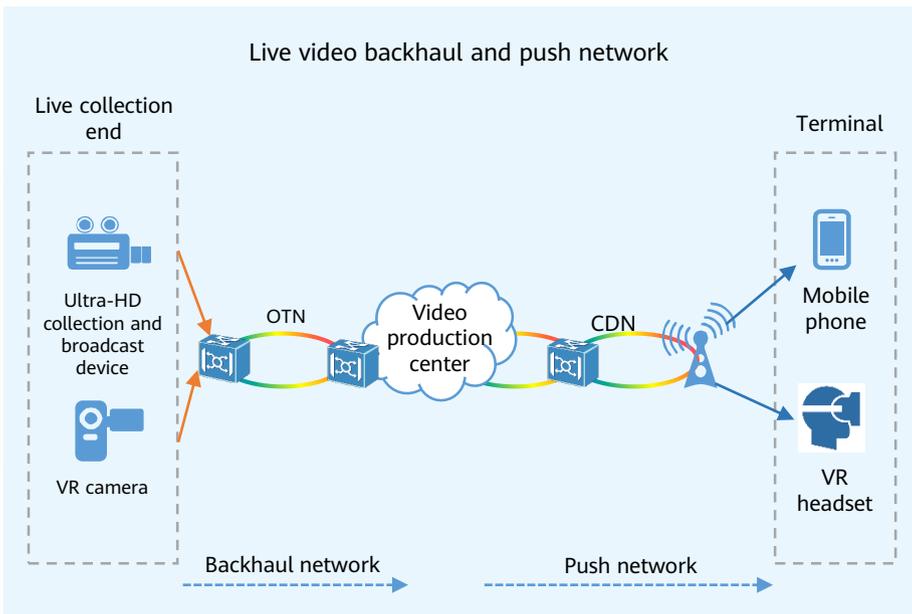
📋 04-5 Media & Entertainment

Media & Entertainment Application Case: Premium Private Lines Guarantee 4K Live Broadcast of Sports Events

▦ Customer Requirement

Sports event A will be broadcast globally, involving two competition stadiums, 32 training centers, and four off-site demonstration centers. This poses the following requirements for the network:

◆ High bandwidth for the backhaul of 4K live videos

◆ Zero service interruption, zero packet loss, and zero video stuttering during live broadcast

◆ Real-time rebroadcast of situations and video backhaul within milliseconds

▦ Solution

International broadcast center

— Primary link
— Secondary link

2 x 500 Gbit/s   2 x 10 Gbit/s   2 x 100 Gbit/s

Broadcast compound   Broadcast compound   Broadcast compound

Gymnasium

Stadium   Training site   Outside presentation facility
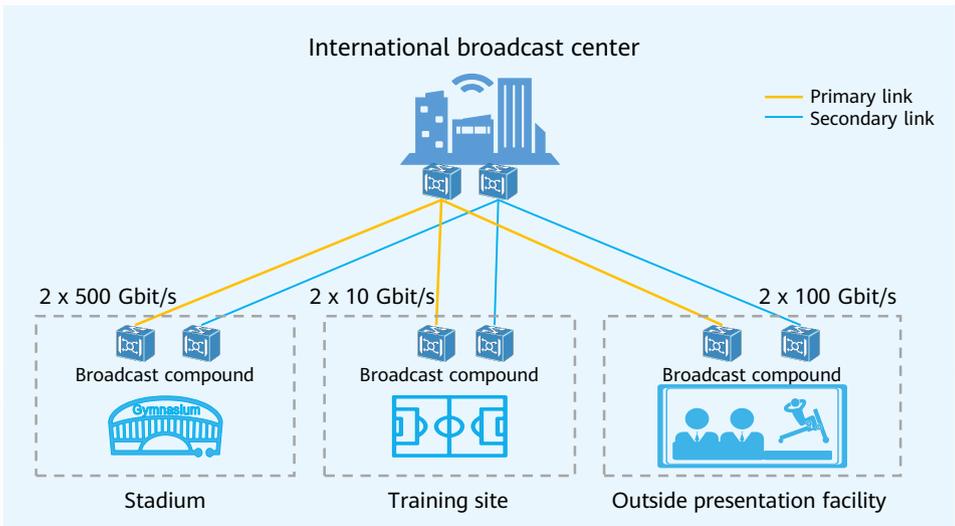
▦ Customer Benefits

◆ Ultra-high bandwidth: 10 Gbit/s~500 Gbit/s bandwidth on demand

◆ Ultra-high reliability: dual CPE uplinks and E2E 1+1 protection to safeguard sports event rebroadcasting

◆ Ultra-low latency: E2E millisecond-level latency and zero video stuttering

◆ Self-service: real-time visualization of KPIs such as latency, bandwidth, and provisioning status of live broadcast services

📋 04-6 Industrial

Requirements of the Industrial Sector

Industrial clouds cover campus networks and external networks. In scenarios of cloud access from external networks, data is transmitted in real time to implement the access of industrial entities, cross-region interconnection and isolation, interconnection between industrial networks and hybrid clouds, and multi-cloud collaboration. This integrates ubiquitous optical networks and nearby cloud services.

The industrial sector has the following requirements on cloud private lines:

- High bandwidth: 1 Gbit/s~10 Gbit/s bandwidth to support interconnection between large industrial campuses.

- Low latency: cloud access links with millisecond-level latency to support real-time transmission of industrial control data.

- High security: physical isolation to protect industrial control data (production data that must be highly secure).

- Adjustable bandwidth: flexible bandwidth scheduling to cope with different types of services.

Industrial networking

Edge cloud

Carrier Huawei Cloud

Third-party cloud

OTN

Inside campus

Private cloud

CE

Campus network

OTN CPE

Industrial PON

Industrial AP

----- Inter-cloud data transmission
----- Data transmission to the cloud
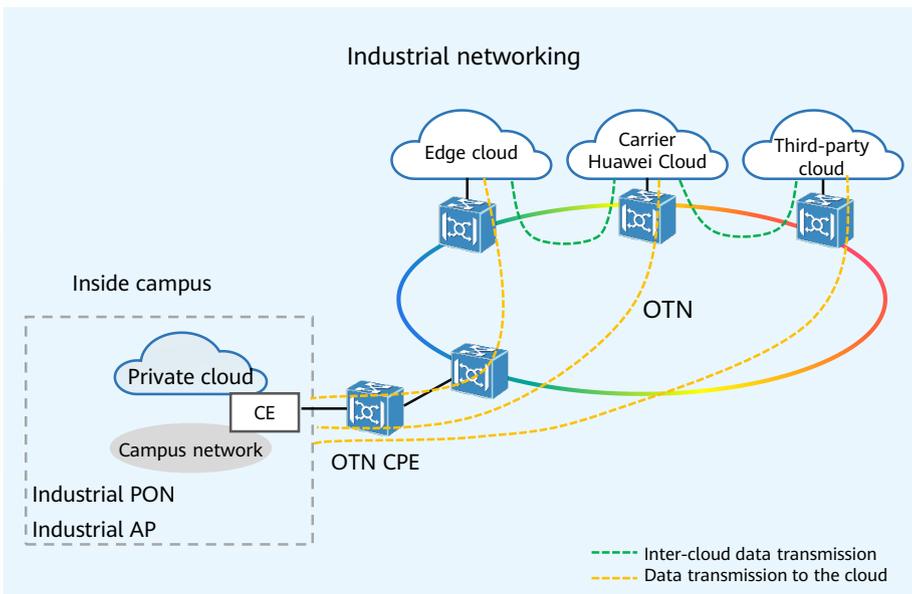
📋 04-6 Industrial

Industrial Application Case 1: Premium Private Lines Connect Cloud Computing Power to Build a New Intelligent Manufacturing Mode

▬ Customer Requirement

Large manufacturing enterprise A needs to implement final assembly integration, key component manufacturing (including integrated equipment, components, and system tests), maintenance, and self-check capabilities. As such, it poses the following network requirements:

- ◆ Latency ≤ 20 ms under the experimental measurement data volume of 30 TB/day in the integrated production system

- ◆ High bandwidth to transfer video generated by 100 cameras deployed for automatic inspection and intelligent recognition

- ◆ Low latency for data flow and process collaboration between workshops and factories

▬ Solution
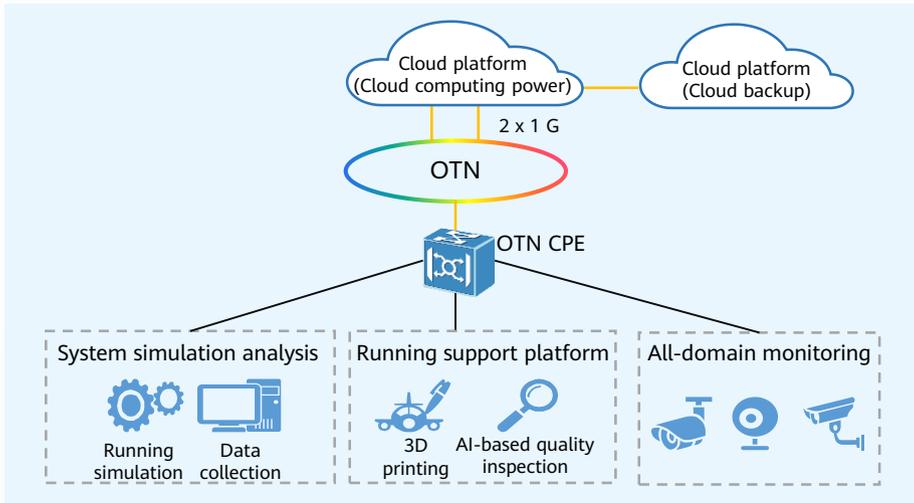
▬ Customer Benefits

- ◆ Ultimate computing power: all-optical one-hop connection to the cloud to meet factory requirements of fast computing

- ◆ Ultra-high reliability: 24/7 active-active DCs, availability ≥ 99.99%

- ◆ Ultra-high bandwidth: flexible adjustment of 2 Mbit/s to 100 Gbit/s bandwidth

- ◆ Ultra-low latency: millisecond-level latency for both data transmission and massive image detection inference

Industrial Application Case 2: ASON Network Safeguards Power Supply

▰ Customer Requirement

The electric power industry attaches great importance to information security. Electric power group A needs a network for production and office communication between the centralized control center and plants in each base/river basin. The network needs to meet the following requirements:

- High security to prevent malicious network attacks and intrusions that may cause power grid accidents

- High reliability to construct robust intelligent power grids to support power supply.

▰ Solution
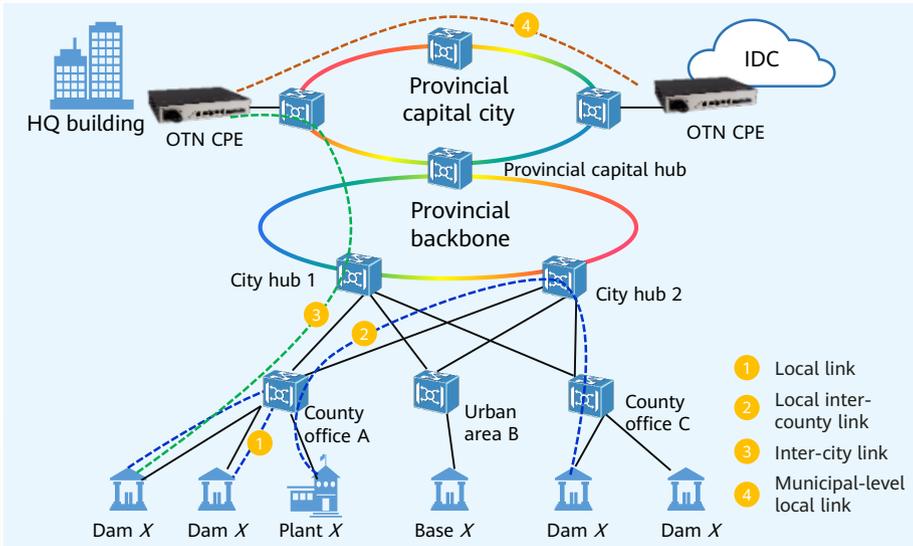
▰ Customer Benefits

- Ultra-large bandwidth: 10 Gbit/s bandwidth on demand

- Ultra-low latency: network latency shorter than 10 ms to safeguard data transmission

- Ultra-high security: physically isolated E2E MS-OTN private lines with exclusive bandwidth

- Ultra-high reliability: network-wide ASON protection to achieve availability of higher than 99.999%

05 Acronyms and Abbreviations

Acronym/Abbreviation	Full Spelling
ASON	Automatically Switched Optical Network
BSS	Business Support System
CAGR	Compound Annual Growth Rate
CCI	Connect and Control Interface
CDN	content delivery network
CE	Customer Edge
CIS	Clinical Information System
CO	Central Office
DC	Data Center
EMR	Electronic Medical Record
EoO	Ethernet over OTN
EOS	End of Service and Support
EoS	Ethernet over SDH
GMPLS	Generalized Multi-Protocol Label Switching
HIS	Hospital Information System
IDC	Internet Data Center
KPI	Key Performance Indicator
LIS	Laboratory Information Management System
LSP	Label Switching Path
MSAP	Multi-Service Access Platform
MS-OTN	Multi-Service Optical Transport Network
MSTP	Multiple Spanning Tree Protocol
NMI	Network Management Interface
ODUflex	Optical Data Unit flexible
ODUk	Optical channel Data Unit-k
OLP	Optical Line Protection
OSS	Operation Support System
OSU	Optical Service Unit
OSUflex	Optical Service Unit flex
PACS	Picture Archiving and Communication Systems
QoS	Quality of Service
RPO	recovery point objective
RTO	Recovery Time Objectives
SDH	Synchronous Digital Hierarchy
SDN	Software Defined Networking
SNCP	Sub-network Connection Protection
WDM	Wavelength Division Multiplexing

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