CiTRANS 650 U5 Miniaturized Converged Optical Transport Platform

1 Quick Overview of Product

CiTRANS 650 U5 is a small- and medium-sized sliced and packetized intelligent transport device launched by FiberHome Telecommunication Technologies Co., Ltd. (hereinafter referred to as "FiberHome Telecommunication") for slicing transport network MTN, which is mainly used in the carrying network of various services such as mobile communication and group customers. The external view, positioning, features, architecture, specifications and indexes of this series of products are briefly described below.

1.1 Product Profile

With the large-scale deployment of LTE/5G network and the promotion of full-service development strategy, various emerging IP-based service applications have increasingly higher requirements for the bandwidth, scheduling flexibility and service quality of carrying network. Therefore, CiTRANS 650 U5MTN transport device is developed at the demand.

This product has the capabilities of Ethernet packet switching and SE-XC layer switching, which can not only flexibly schedule packet services, but also provide hard pipeline isolation and bandwidth guarantee for services through SE-XC switching, thus meeting the high-quality carrying requirements of mobile fronthaul/middlehaul/backhaul, enterprise dedicated line/dedicated network, home broadband and other services.

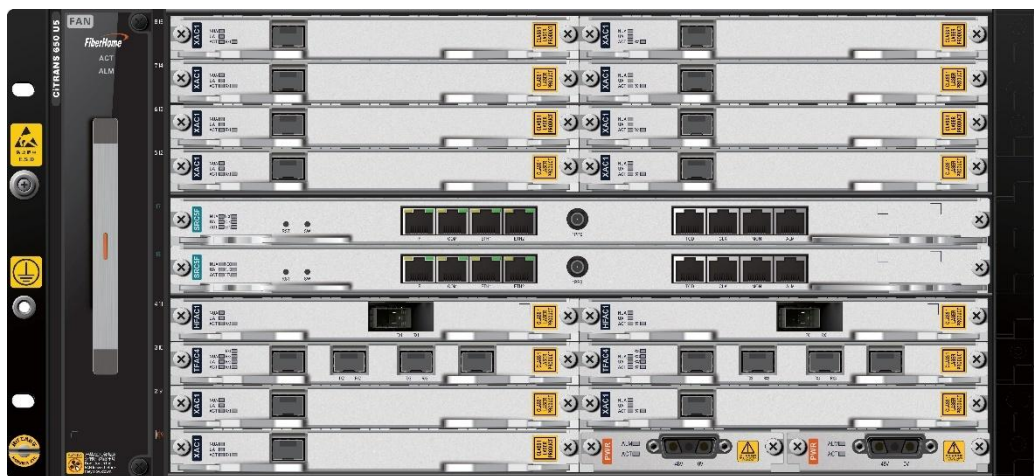The external view of CiTRANS 650 U5 is shown in the figure below.

Figure 1-1 CiTRANS 650 U5

1.2   Product Positioning

CiTRANS 650 U5 is a transport device located in MTN, which is mainly used in the access or edge aggregation node of MAN. As a multi-service convergence carrying platform, CiTRANS 650 U5 aggregates services into the core/backbone network. This product and CiTRANS690E series products consist of networking to provide end-to-end multi-service carrying.

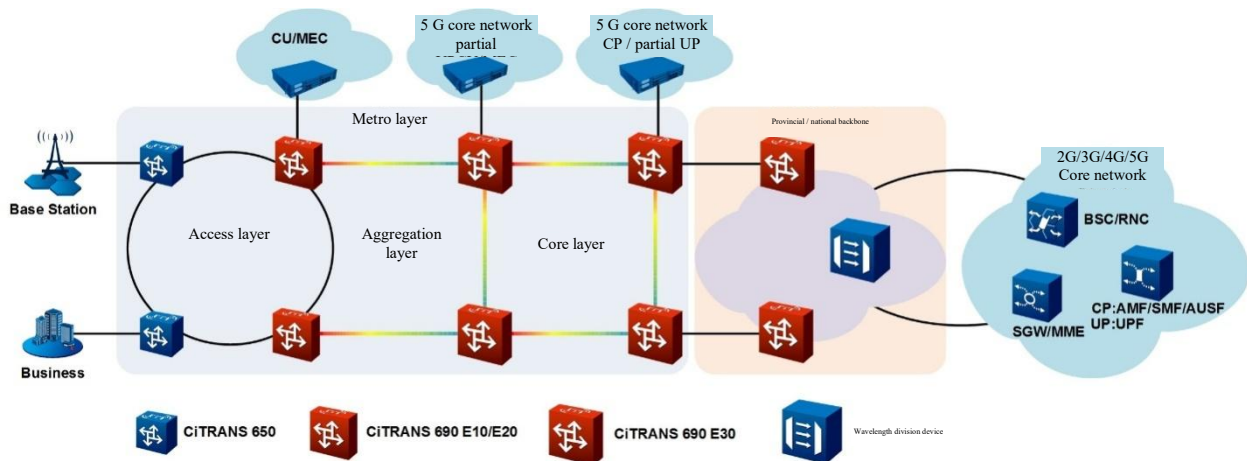The application of CiTRANS 650 U5 in the network is shown in Figure 1-2.

Figure 1-2 Application of CiTRANS 650 U5 in Network

1.3   Product characteristics

CiTRANS 650 U5 can support a variety of service types, have powerful processing capabilities,

and provide rich functional features to ensure the transmission quality and efficiency of various services of users. The features of CiTRANS 650 U5 are described below.

1.3.1   Powerful processing capacity

CiTRANS 650 U5 has large-capacity packet switching processing capability and multi-granularity service access capability,

and can fully meet the service processing capability requirements of the access layer or aggregation layer from Metro Transport Network (MTN).

Switching Capacity

The switching capabilities supported by this product are shown in Table 1-1.

TABLE 1-1   Switching Capacity

Device Type	CiTRANS650U5
Packet switching capacity	800G
SE-XC crossover capability	800G

Chassis Type

CiTRANS 650 U5 chassis types are shown in Table 1-2.

Table 1-2   Chassis Types Supported by CiTRANS 650 U5

Interface type	Chassis name	Chassis access capacity (channel)
GE/FE	MAC8	8
	GTAC8	8
10GE	XAC1	1
	XAC2	2
	XAC4	4
	XAC8	8
25GE	TFAC4	4
	TFAC2	2
50GMTN	LFAC1	1
	LFAC2	2
100GMTN	HFAC1	1
E1	E1V1	32
STM-1	S1V5	8

1.3.2   Multiple interface types

CiTRANS 650 U5 provide various types of interfaces to achieve the access of a variety of types of services,

management and maintenance of network elements, input and output of clock and time

information.

Service interface

Interface type	Interface description
FE	100BASE-LX、100BASE-EX、100BASE-ZX
GE	1000BASE-SX、1000BASE-LX、1000BASE-EX、1000BASE-ZX1、1000BASE-BX-10-U/D、1000BASE-BX-40-U/D、1000BASE-BX-80-U/D

10GE	10GBASE-LR、10GBASE-ER、10GBASE-ZR、10GBASE-SR、10GE-BX-10-U/D、10GE-BX-40-U/D

Interface type	Interface description
25GE	25GBASE-LR
50GE	50GBASE-LR、50GBASE-ER、50GBASE-ZR
100GE	100GBASE-LR4、100GBASE-ER4
STM-1	S1.1、L1.1、L1.2
E1	75/120Ω

Management / auxiliary interface

Interface type	Interface Name	Description
Management interface	F	Network management interface, usually connected with network
	COM	Debugging communication interface is used for communication expansion between subframes in network elements, which is usually
	ETH1/ETH2	Ethernet interface can be configured as F/COM/SIG functional
Auxiliary interface	MON	The monitoring interface of external events (such as temperature, alarm, etc.) is usually docked with the device to be monitored by the
	ALM	The alarm output interface is usually interfaced with the alarm

Clock / time interface

Interface type	Interface Name	Description
External clock interface	CKIO	Used for clock synchronization (i.e. frequency and phase synchronization), access or
External time interface	TOD（RJ45）	Used for 1PPS+ToD time synchronization, access or output time signals.
	1PPS（SMA）	Used for high-precision time synchronization and

1.3.3 Rich business types

CiTRANS 650 U5 supports L2VPN and L3VPN services to achieve integrated access and reduce service transmission costs, as shown in Table 1-3.

Table 1-3 Supported business types

Business	Service type		Description
L2VPN service	E-Line	EPL (port-based)	Point-to-point Ethernet emulation service, i.e. VPWS service
		EVPL (VLAN-based)	end scheduled tasks on a local or remote
	E-LAN	EP-LAN (port-based)	Multipoint-to-multipoint Ethernet emulation service, i.e.
		EVP-LAN (VLAN-based)	VPLS service.

Table 1-3 Supported Types of Services (Continued)

Business	Service type		Description
	E-Tree	EP-Tree (port-based)	Ethernet-Tree service. end scheduled tasks on a local or remote system.
		EVP-Tree (VLAN-based)	
	E-CES	Unstructured	Circuit emulation service realizes service pass-through of TDM circuit switching
L3VPN service	MPLSL3VPN		Support static L3VPN service.

1.3.4 Perfect QoS mechanism.

CiTRANS 650 U5 provides hierarchical end-to-end QoS management, and can provide differentiated and refined transmission services based on flow for each user group, each user, and each user service at different levels.

u   Support DiffServ mode based on traffic classification, completely realize PHB defined in the standard, enable network operators to provide users with service guarantee at different quality service levels, and realize an integrated network carrying data, voice and video services.

u   Provide end-to-end QoS for services. The device supports HQoS mechanism,

and can control the total bandwidth of single service type, single service access point,

multiple service access points, single service, or multiple services, respectively.

The perfect QoS mechanism can fully ensure the requirements of different services for delay, jitter and bandwidth

and ensure the development of key services through reasonable allocation and monitoring of

network resources.

1.3.5 Efficient carrying technology

CiTRANS 650 U5 uses tunnels to carry all kinds of services, make full use of network resources

to realize the efficient transmission of all kinds of services. The supported tunnel carrying

technologies are shown in Table 1-4.

Table 1-4   Tunnel Carrying Technology

Carrying technology	Description
MPLS-tunnel	MPLSLSP is used to carry all kinds of services.
SR-TP	Segment routing based on traffic engineering transports subsets. Support creating, deleting, and inquiring SR-TP tunnel
SR-BE	Segment routing based on best-effort forwarding. Support TI-LFAFRR protection
MTNChannel	Support the flexible creation of MTNChannel with N*5 G/10M granularity

1.3.6　　　Perfect protection

CiTRANS 650 U5 supports carrier class device-level protection and network-level protection to fully ensure the reliability of service transmission.

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Device-level protection feature

The device-level protection features of CiTRANS 650 U5 are shown in the table below.

Table 1-5　Device-level protection feature

Objects of protection	Protection Mode
SRC5F	1:1 protection of main control and cross control unit
XUV1	1+1 protection of XUV1 panel
PWR	1+1 protection of power plate

Network-level protection features

The network-level protection features of CiTRANS 650 U5 are shown in Table 1-6.

Table 1-6　Network-level protection features

Objects of protection	Protection Mode
MTNChannel	Unidirectional / bidirectional 1+1 path protection
SR-TP tunnel	SR-TP1:1 protection SR-TP1:1 protection + rerouting
SR-BE tunnel	TI-LFAFRR protection
MPLSTunnel	LSP 1:1 protection
PW	PW redundancy
Ethernet link (UNI side)	LAG group protection in
Cross-device link in dual-return landing scenario	MC-LAG protection of cross-device link
L3VPN service network side protection	VPNFRR+LSP1:1
SDH link	MSP 1+1 protection
Single-node and multi-node fault protection of L3VPN service	ECMP protection in IPECMP, VPNECMP and SR-TPECMP scenarios

1.3.7   Precise synchronization

CiTRANS 650 U5 supports a variety of clock and time synchronization features, and provides accurate clock and time synchronization for services with synchronization requirements to ensure lossless transmission of services.

Physical layer clock synchronization

Physical layer clock synchronization mechanism is a technology that extracts clock information from the signals of physical channels of transmission links to complete frequency synchronization. Ethernet synchronization is a kind of Ethernet physical layer clock synchronization technology, which directly extracts the clock from the serial code traffic on the Ethernet line and use the clock to send data to realize clock synchronization.

CiTRANS 650 U5 supports the recovery of clock information from the following transmission links:

U Support synchronous Ethernet function and 64-channel Ethernet synchronization interface to recover clock.

U Support two-way external clock source inputs and outputs, can optionally adopt 75Ω and 120Ω clock interfaces, and can provide tertiary lock source coded with 2048kHz and 2048kbit/s (HDB3) .

CiTRANS 650 U5 supports three clock modes: tracking, holding and free oscillation to process and transmit SSM.

Time synchronization

◆   Traditional Ethernet interface synchronization

4 Support processing of the message defined by PTP1588v2 through Ethernet ports such as FE, GE, 10GE, 25GE, 50GE, 100GE;

4 Support OC and BC clock models.

◆   MTN interface synchronization

4 Support MTN port to process the message defined by PTP protocol. The message format,

processing, clock model, OAM, synchronization precision, etc. of PTP protocol are the same as those of traditional Ethernet interface;

4 Support carrying PTP messages through MTNSection layer overhead;

4 Support carrying PTP messages through MTNClient.

◆   Time interface synchronization

4 Support one-way 1PPS time output interface, and the physical interface type is SMA;

4 Support two-way ToD time output/input interface, and the physical interface type is

RJ45.

1.3.8　　　Hierarchical operation and maintenance

CiTRANS 650 U5 supports rich OAM to improve network operation and maintenance capability, quickly locate faults and reduce operation and maintenance costs. MTN network adopts layered OAM architecture, which can be divided into sliced transport layer / access link layer OAM, sliced channel layer OAM, sliced packet layer OAM and customer service layer OAM.

OAM functions supported by CiTRANS 650 U5 are shown in Table 1-7.

Table 1-7　OAM function

Network	OAM type	OAM technology	STDS.
Sliced transport layer / access Link access	Physical link, MTN interface, UNI sub-interface	IEEE802.3ahOAM	IEEE802.3ahRFC5880 RFC7130
Sliced channel layer	MTNSection layer MTNPath layer	MTNSection layer OAM	OIF-FLEXE-2.0OIF-
Sliced packet layer	MPLS-TPSection	VSOAM	ITU-TG.8113.1
	MPLS-TP Tunnel、SR-TP Tunnel	VPOAM Ping、Trace	ITU-TG.8113.1
	PW	VCOAM	ITU-TG.8113.1
Customer service layer	L2VPN	IEEE802.1agOAM ITU-TY.1731OAM	IEEE802.1ag ITU-TY.1731
	L3VPN	Ping、Traceroute	RFC792 RFC4861
Customer service layer In-BandOAM	L3VPN	In-Band OAM/In-situOAM(iOAM)	IETF draft-brockners-inband-oam-requirements-

1.3.9　　　Green energy-saving design

CiTRANS 650 U5 adopts green energy-saving design, which is featured with great reduction of device energy consumption, high efficiency, environmental protection and low operation cost.

At the same time, the green hardware design is adopted, and the high-density and large-capacity design effectively reduces the average port energy consumption.

Intelligent fan

Support heat dissipation features of smart fan:

◆ The fan unit controls the speed of fan according to fan running gear information sent by network management to ensure the normal heat dissipation of device;

◆ The fan unit automatically adjusts the fan speed according to the temperature fed back by each chassis of the device.

Product Design

Have energy saving and emission reduction and easy installation features:

◆ With excellent hardware and structural design, it can effectively reduce power consumption, and it is low in carbon emission and energy efficient by improving chip technology;

◆ Choose high-efficiency secondary power supply module;

◆ 10 G optical module is fully SFP;

◆ With miniaturization and high integration, it reduces the single bit power consumption. Support pluggable photoelectric modules, and has strong applicability;

◆ Flexible installation mode, and supporting the installation of 19-inch and ETSI 21-inch cabinet.

PACKAGING DESIGN

Green environmental-protective packaging design:

◆ Provide necessary packaging, and the volume of device and accessories after packaging does not exceed 3 times of volume before packaging;

◆ Product packaging is easy to disassemble, and all packaging materials are easy to decompose;

◆ Plugs and connectors are easy to find and can be operated by common and simple tools;

◆ The stickers such as labels of device are easy to remove;

◆ Some identification information, such as silk screen printing, is directly engraved on the panel or subframe.