

# CiTRANS 810A&810B

## 1 Product Description

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The device is introduced from the following aspects.

### 1.1 Product Application

CiTRANS R810A/B is a new generation of miniaturized edge router for multi-service access based on IP/MPLS.

#### Brief introduction of device

CiTRANS R810A/B router is located at the edge access layer of mobile backhaul network and multi-service MAN, and can access base stations and major customer services.

CiTRANS R810A/B has the following features:

- u Support any combination of service carrying schemes with GE/FE and other multi-type service interfaces.
- u Fully support MPLS (including MPLS-TP, etc.), and realize full-service scenario coverage of 2G/3G/LTE/major customer dedicated line.

CiTRANS R810A/B includes CiTRANSR810A-8A (AC model), CiTRANSR810A-8D (DC model), CiTRANSR810B-1A (AC model), and CiTRANSR810B-1D (DC model), and the external views of devices are shown in Figure 1-1, Figure 1-2 and Figure 1-3.



Figure 1-1 External view of CiTRANSR810A-8A device



Figure 1-2 External view of CiTRANSR810A-8D Device



Figure 1-3 External view of CiTRANSR810B-1A/1D Device

## Network Application

CiTRANS R810A/B is located at the access layer of multi-service MAN and mobile backhaul network, and cooperates with CiTRANSR800/R8000 series products for networking to develop an IP network solution with complete structure and clear hierarchy from access network, aggregation network to core network, meeting the needs of operators for full-service access.

The typical networking of CiTRANS R810A/B is shown in Figure 1-4.

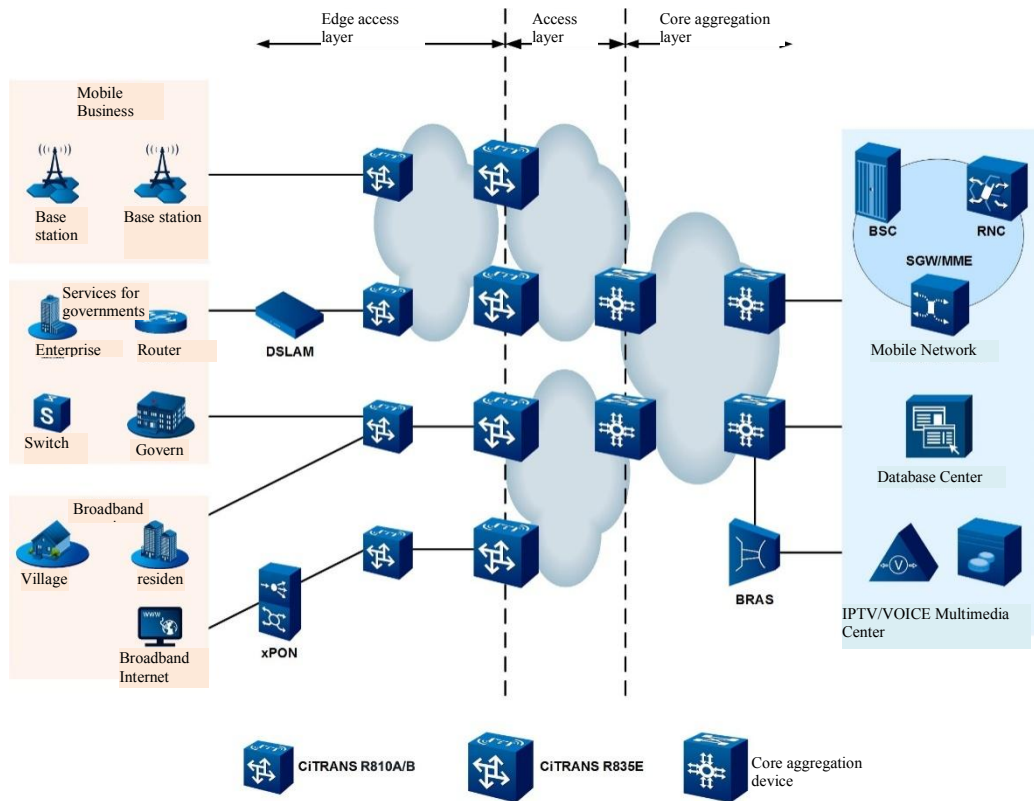


Figure 1-4 Typical networking

## 1.2 Product functions and features

CiTRANS R810A/B is a carrier class transport device, which supports a variety of service types, and has rich product functions and features to ensure the quality and efficiency of service transmission.

### 1.2.1 Ethernet characteristics

Introduce Ethernet features such as L2 and L3 supported by CiTRANS R810A/B.

#### 1.2.1.1 L2 Ethernet features

Ethernet interface can work in switching mode (L2) and support VLAN, QoS and VPLS services.

L2 Ethernet interface can support MPLSVPN service when used as UNI.

CiTRANS R810A/B supports the following L2 Ethernet features:

- u QinQ.
- u Port-based VLAN partition.
- u Outer VLAN based on user priority.
- u MAC entry restriction.
- u Unknown unicast/multicast/broadcast suppression.
- u Ethernet sub-interface.
- u Ethernet anti-ring based on VPLS model.
- u MAC polling for VPLS service.

### 1.2.1.2 L3 Ethernet features

CiTRANS R810A/B supports the following L3 Ethernet features:

- u IPv4.
- u MPLS.
- u QoS.
- u VLAN sub-interface.
- u Ethernet sub-interface.

### 1.2.1.3 STP/RSTP/MSTP features

CiTRANS R810A/B supports the following STP/RSTP/MSTP features:

- u STP blocks redundancy links in switching network, pruning the network to eliminate loops.
- u RSTP is improved based on STP to realize fast convergence of network topology.
- u MSTP is the upgrade of STP and RSTP combined with VLAN technology, conducts spanning tree operation for multiple VLANs, and realizes load balance of data traffic among VLANs.
- u STP/RSTP/MSTP based on VPLS.

## 1.2.2 IPv4 features

CiTRANS R810A/B supports the following IPv4 features:

- u Basic TCP/IP protocol stack includes ICMP, IP, TCP, UDP, Socket (TCP/UDP/RawIP), and ARP.
- u ACL.
- u FTPServer/Client、TFTPClient.
- u DHCPRelay.
- u DHCPClient.
- u Ping and Traceroute operations.
- u All physical and logical interfaces can be configured with slave IP addresses.
- u Server-side Telnet, SSH protocol and client-side Telnet protocol.

## 1.2.3 GRE tunneling protocol

CiTRANS R810A/B supports the following GRE tunneling features:

- u GRE tunnel carries static VPWS service.
- u GRE tunnel carries static VPLS service.
- u GRE tunnel carries the protection switching of static L2VPN service.
- u Public network OSPF protocol runs on GRE tunnel interface.
- u Private network OSPF protocol runs on GRE tunnel interface.

## 1.2.4 Route protocol

Introduce features of unicast and multicast routing protocols supported by CiTRANS R810A/B.

### Unicast routing features

CiTRANS R810A/B supports the following unicast routing features:

- u IPv4 routing protocols: OSPF, IS-IS, and BGP4.

- u Static routes are manually configured by administrator.
- uu Large-capacity routing entries effectively support the operation of MAN. Password authentication and MD5 authentication improve the security of network.
- u Manually restart the protocol process from the command line. Introduce routing information of other routing protocols. Routing policy configuration.
  - 4 Determine the best route through complete routing policy functions.
  - 4 Apply routing policies while publishing and receiving routes, and filter routes by
- u IS-IS
  - 4 IS-IS adopts a two-level hierarchical structure in the routing domain.
  - 4 IS-ISLDP linkage.
- u OSPF
  - 4 OSPF-LDP linkage.
  - 4 Suppress the specified interface from sending and receiving OSPF messages.
  - 4 OSPF fast convergence is achieved through the following two methods:
    - Adjust the time interval of LSA.
    - Configure BFDforOSPF.
- u BGP
  - 4 When there are multiple routes to the same destination, support BGP to adopt strategy
  - 4 BGP route reflector: When the number of IBGP peers is large, the overhead for establishing a fully connected network is high.
  - 4 Send BGP updated messages without carrying private autonomous system number.

## Multicast routing features

CiTRANS R810A/B supports the following multicast routing features:

- u Multicast protocols include: IGMP (including IGMPV1, IGMPV2, and IGMPV3).
- u L2 multicast SSMMapping functions.
- u L2 multicast router ports can be statically specified by users or dynamically learned.
- u Specific source multicast of L2 multicast.

- u IGMP group member quickly leaving functions.

## 1.2.5 MPLS features

Introduce MPLS features supported by CiTRANS R810A/B.

### MPLS

CiTRANS R810A/B supports the following MPLS features:

- u MPLS basic functions and forwarding services distribute labels, establish LSP, and pass the parameters required during LSP establishment process through LDP and RSVP protocols.
- u Static, dynamic, combining dynamic and static multi-segment PW, dynamic PW protocol supports LDP protocol; support multi-segment PW redundancy protection.
- u LDP
  - 4 DU and DoD label publishing modes.
  - 4 Ordered allocation control mode.
  - 4 Liberal retention mode.
  - 4 LDP session supports basic discovery mechanism and extended discovery mechanism.
- u MPLSQoS
  - 4 IP message mapping from ToS domain to MPLS message EXP domain.
  - 4 LSP is statically configured based on flow classification, and label forwarding is conducted based on flow classification.
- u Used as label edge router LER and label switching router LSR.
  - 4 LER refers to the edge device between MPLS network and other networks, which has many functions such as service classification, label distribution, encapsulation or multi-layer labels stripping.
  - 4 LSR is the core router of MPLS network, which provides the functions of label switching and label distribution.
- u LDPLSP can be established between routers of different ISISLevel, and LDPLSP can communicate with devices of other competitors.
- u LDP and RSVP can communicate with devices of other competitors.

### MPLSTE

CiTRANS R810A/B supports the following MPLSTE features:

- u CR-LSP processing includes processing for different types of CR-LSP, and supports path calculation of CSPF algorithm.
- u CR-LSP hot backup creates backup CR-LSP immediately after creating primary CR-LSP. The service is directly switched to backup CR-LSP through MPLSTE when main CR-LSP fails.

## 1.2.6 VPN features

Introduce VPN features supported by CiTRANS R810A/B.

### 1.2.6.1 VPN tunnel

CiTRANS R810A/B supports the following VPN tunnels:

- u LDPLSP tunnel.
- u TE tunnel.
- u GRE tunnel.
- u Static tunnel.

### 1.2.6.2 L2VPN

L2 VPN features supported by CiTRANS R810A/B include VPWS and VPLS.

#### VPWS

CiTRANS R810A/B supports the following VPWS features:

- u CCC-type VPWS.
- u SVC-type VPWS.
- u Martini-type VPWS.
- u GE/LAG interface.
- u VCCV-PING.
- u Use static or dynamic BFD to detect PW connectivity.
- u Use OAM to detect PW connectivity.
- u L2 services pass-through IPv6/IPv4 signaling messages.



- u RAW and TAGGED mode encapsulation.
- u QinQ.

## VPLS

CiTRANS R810A/B supports the following VPLS features:

- u VPLS static configuration.
- u Martini-type VPLS.
- u GE/LAG interface.
- u VPLS service MAC address learning.
- u Split horizon of VPLS services.
- u Fast revocation of MAC address for VPLS.
- u VPLS anti-ring.
- u VPLS service Ethernet message speed limit.
- u VPLSMAC quantity limit.
- u VPLSMAC address list polling.

### 1.2.6.3 L3VPN

CiTRANS R810A/B supports the following L3VPN features:

- u CE devices are accessed to L3VPN through three-layer interfaces, such as Ethernet interface.
- u Static routing, BGP, RIP, OSPF, IS-IS routing protocols are used between CE and PE.
- u IPv4VPN.
- u IPv4VPN networking schemes include IntranetVPN and ExtranetVPN.
- u L3VPN based on MPLS/BGP.

## 1.2.7 Network reliability

Introduce network reliability features supported by CiTRANS R810A/B.

## Redundancy backup for key components

Support 1 +1 redundancy backup of main control switching panel and power plate.

## MPLSTunnel protection

CiTRANS R810A/B supports the following MPLSTunnel protection:

- u Static LSP 1:1 protection.
- u RSVP dynamic LSP 1:1 protection.
- u The static LSP detection mode is VPOAM or BFDforLSP, and the dynamic LSP detection mode is BFDforLSP,

and the switching time is  $\leq 50$ ms.

## PW redundancy protection

CiTRANS R810A/B supports the following PW redundancy protection:

- u PW redundancy protection.
- u The detection mode of PW redundancy protection protocol is OAM or BFD, and the switching time is  $\leq 50$ ms.

## FRR

Support IPFRR/VPNFRR/LDPFRR. The protocol detection mode is BFD, and the switching time is  $\leq 50$ ms.

## Ethernet LAG protection

Support UNI, NNILAG.

## Ethernet linear protection ELPS (G.8031)

CiTRANS R810A/B supports the following Ethernet linear protection features:

- u 1:1 protection.
- u 1+1 bidirectional protection.
- u The switching time is  $\leq 200$ ms.
- u Fault detection adopts link alarm mode, and CFM fault link detection is optional.

## 1.2.8 QoS features

Introduce QoS features supported by CiTRANS R810A/B.

### Traffic bandwidth control

CiTRANS R810A/B supports the following multilevel inbound/outbound traffic bandwidth control strategies:

- u Traffic bandwidth control based on LSP.
- u Traffic bandwidth control based on PW.
- u Traffic bandwidth control based on physical port.
- u Traffic bandwidth control based on logical port.

### Service priority mapping

CiTRANS R810A/B supports the following service priority mapping features:

- u DiffServ fully implements PHB defined in the standard on the network, so that the network operators can provide users with different service quality levels of service assurance.
- u During data forwarding, the user priority and PW-layer priority in the received messages are supported to be mapped to PHB, and mapped to PHB in the messages sent to PW/LSP-layer priority.
- u Conduct PHB settings for physical and logical ports. Be able to optionally use an existing mapping list of PHB and PW priorities, and also specify a specific PHB service level.

### Queue cache management

CiTRANS R810A/B supports the following two queue cache management strategies:

- u Tail-drop cache management strategy  
When the queue is full, the messages arriving later are directly dropped.
- u WRED Cache Management strategy
  - 4 When the number of packets in the output buffer reaches the Start threshold, no packets are dropped;
  4. When the number of packets in the output buffer is above the End threshold, all packets are dropped;
  - 4 When the number of packets in the output buffer is between the Start and End thresholds, the dropping rate is a function of the average queue length.

## Queue congestion scheduling

CiTRANSR 810A/B supports the following two queue scheduling modes:

- u SP Queue Scheduling Mode  
The messages in the queue are scheduled strictly according to the queue priority. Only when the higher priority queue is empty, will the messages in the lower priority queue be sent.
- u WFQ Queue Scheduling Mode  
Each queue is scheduled fairly based on the weight assigned by the queue. High priority queues are assigned higher weights, occupying a large bandwidth;  
Low priority is assigned lower weights, occupying a smaller bandwidth.

## HQoS

CiTRANSR 810A/B supports the following HQoS features:

- u Support secondary scheduling mechanism.
- u Configure WRED, Low Latency, SP/WFQ Weight, Bandwidth Burst length CBS, PBS, and Statistical and Enable parameters
- u Configure CIR, PIR, number of flow queues, scheduling algorithm between flow queues and other parameters of each user.
- u Perfect traffic statistics function, making users to see the bandwidth usage of various services, and to reasonably allocate bandwidth for each service by analyzing the traffic.
- u Support HQoS in VPWS and L3VPN scenarios.
- u Support HQoS scheduling based on port and VLAN.
- u Support HQoS template function, which can configure HQoS through templates.

## Flow classification

Support simple flow classification: carried out simple flow classification based on inner VLAN/outer VLAN, IPDSCP, 802.1 p Ethernet priority, to realize service priority mapping between the same network and different networks.

## Traffic policing

CiTRANSR 810A/B supports the following traffic monitoring features:

- u Multi-level CAR function, using two dyeing patterns: Color-Blind and Color-Aware.
- u The default processing rules of traffic speed limit are: red messages are dropped, yellow and green messages are passed.

- u Traffic control functions include:
  - u Statistics function of a traffic policy based on interface and sub-interface.
  - u The statistics of user-flow queue, including the number of forwarded messages, bytes and discarded messages with 8 priorities.
  - u The number of forwarded messages, bytes and discarded messages of the user group.
  - u The number of forwarded messages, bytes and discarded messages with 8 priorities in port queue.
  - u In L2VPN and L3VPN networks, when a device is used as a PE device, it counts the outgoing and incoming traffic of the access users and the output and input flow of tunnel.
  - u Traffic statistics of each PW in the tunnel.
  - u UNI restriction of broadcast packet based on VPLS.
  - u UNI restriction of multicast packet based on VPLS.
  - u UNI restriction of unknown unicast packet based on VPLS.

## 1.2.9 Security feature

Security features supported by CiTRANSR 810A/B are introduced.

### Security verification

CiTRANSR 810A/B supports the following security authentication features:

- u TACACSAAA Local Service (Authentication/Billing/Authorization).
- u Routing protocols (OSPF, IS-IS, BGP) support message plaintext authentication and MD5 ciphertext authentication.
- u LDP and RSVP support MD5 ciphertext authentication.
- u SNMPV3 supports encryption and authentication.

### MAC Address Limit

CiTRANSR 810A/B supports the quantitative limitation of VSI-based MAC address entries.

MAC address entries are classified into three types:

- u Dynamic Entry
  - The MAC address learned on an interface is stored in the main control panel hardware.
  - The Entry will age. After the system is reset, the entry will be lost.

- u Static Entry  
Configured by users and stored on the main control panel. The Entry do not age. After configuration and saving, the system is reset, the entry will not be lost.
- u Blackhole Entry  
Used for filtering out frames with a specific destination MAC address, configured by users, and stored on the main control panel. The entry do not age. After configuration and saving, the system is reset, the entry will not be lost.

## Delete MAC address

CiTRANSR 810A/B supports the following functions of deleting MAC address entries:

- u Delete MAC address based on VSI.
- u Delete MAC address based on VLAN.
- u Delete MAC address based on LAG interface.
- u Delete MAC address based on the whole machine.

## Unknown traffic limit

The unknown traffic restriction function provided by CiTRANSR 810A/B can perform the following functions in VPLS and layer 2 networking:

- U manages user traffic.
- U allocates bandwidth for users.
- U limits the speed of unknown unicast, unknown multicast and broadcast traffic.

## Filtering Blacklist and Whitelist of MAC addresses

CiTRANSR 810A/B supports black and white list filtering based on the source MAC on the Ethernet port. Users can configure the source MAC address filtering function on the Ethernet port to limit which messages with source MAC addresses can be forwarded normally and which messages with source MAC addresses need to be discarded.

## Local anti-attack features

CiTRANSR 810A/B supports the following local anti-attack features:

- U Management and Business Plane Protection.
- U Attack traceability feature.

- u When the device itself is attacked maliciously, it can extract and store suspicious messages, and display them in format (including device command line and offline tool display), which provides a simple and easy-to-use auxiliary means for security attacks to locate the source of attacks.

## SSHv2

CiTRANSR 810A/B supports the following SSHv2 features:

- u Client-side and server-side of STelnet.
- u Client-side and server-side of SFTP.
- u SSH1 (SSH1.5) protocol and SSH2 (SSH2.0) protocol.

## ACL

CiTRANSR 810A/B supports the following ACL features:

- u Provide traffic control function.
- u Provide a basic level of security for network access.
- u Control the forwarding of traffic on router interface.
- u Control the area where clients access the network.
- u Screen hosts to permit or deny access to network services.
- u Standard ACL function of quintuple (source/destination IP address, IP protocol field, source/destination port).
- u Provide ACL access control policy means based on MAC address (including source and destination addresses).
- u ACL can take effect globally on the device or on the port.

## Network management security protection

CiTRANSR 810A/B supports the following network management security protection features:

- u Access control.
- u User level and Permission management.
- u Data security.
- u Log management.

## 1.2.10 Maintainability

Maintainable features supported by CiTRANSR 810A/B are introduced.

### Plug-and-play.

Plug and Play Can effectively reduce the on-site soft-tuning time of device, and protect employees from the harsh outdoor working environment, greatly improving the progress and quality of project.

### DCN

CiTRANSR 810A/B supports a variety of DCN network construction methods, supports the separation of management communication network and signaling communication network, realizing in-band DCN and out-band DCN networking mode.

### Link-level Ethernet OAM

CiTRANSR810A/B supports the following Link-level Ethernet OAM features:

- u IEEE 802.1 AG Protocol (ConnectivityFaultManagement, abbreviated as CFM). CFM defines the OAM function of continuity check based on Ethernet bearer network, including CC/LB/LT, which is suitable for end-to-end scenarios of large-scale networking and is a Link-level OAM.

CiTRANSR 810A/B supports the following CFM features:

4 Link performance monitoring.

4 Remote Loopback.

- u Y. 1731 Protocol. Y.1731 is an OAM protocol proposed by ITU-T (the global standard organization). It not only contains the contents specified by IEEE802.1ag, but also adds more OAM message combinations, including fault management, LM/DM/LB/LT measurement function, single-ended packet loss rate statistics, bidirectional delay, and performance statistics of messages with a certain priority.

CiTRANSR 810A/B supports the following Y.1731 features:

4 Continuity check.

4 Single-ended packet loss statistics.

4 Bidirectional delay statistics.

4 Loopback test.

4 Link tracing.



## MPLSTPOAM

CiTRANSR 810A/B supports the following MPLSTPOAM features:

- u CC detection.
- u LB.
- u RDI.
- u LM detection, including single-ended packet loss statistics and double-end packet loss statistics.
- u DM detection, including unidirectional jitter, bidirectional delay and jitter.

## RFC2544

CiTRANSR 810A/B supports the following RFC 2544 features:

- u Throughput Test.
- u Packet Loss Rate Test.
- u Delay Test.

## BFD

CiTRANSR 810A/B supports the following BFD features:

- u BFD single-hop detection and multi-hop detection.
- u BFD triggering a fast rerouting.
- u BFD for static routing.
- u BFDforIS-IS. u BFDforOSPF. u BFDforBGP. u BFDforLSP. u BFDforPW.

## Last words

After the device is powered down, the user can only see the device disconnected on the network management, but it is impossible to distinguish whether the device is powered down or something is wrong with the optical fiber.

The last words function of device can distinguish these two kinds of faults. After the device is powered down, the device capacitor can provide about 20ms to send the stored last words message to the network management. Users can know that the device is powered down according to the alarm prompted by the network management, and respond quickly and deal with the fault.

## Remote online upgrade

CiTRANSR 810A/B supports the following remote online upgrade features:

- u Whole packet upgrade.
- u Through the remote computer, the hardware FPGA and BMU software of each chassis are upgraded online.

## One-click factory reset

Through the RST key of the device panel, users can reset the hardware and empty the device configuration, so as to quickly empty the configuration, and realize device reset.

## TWAMP

CiTRANSR 810A/B supports the following TWAMP features:

- u Client-server communication mode.

4 Client: The client can initiate the establishment, start and stop of TWAMP session, and is responsible for the generation and maintenance

of performance statistics.

4 Server: The server responds to requests for the establishment, start and stop of TWAMP session initiated on the client.

- u TWAMPFull mode.
- u TWAMP dynamic learning mode.

### 1.2.11 Carrier class network management

CiTRANSR 810A/B adopts the Subnet Management System of e-FimOTNM2000 Transmission Network (hereinafter referred to as "OTNM2000 Network Management System") to realize network management. This network management system is a subnet of telecom management network (TMN) and is designed according to the Open System Interconnection (OSI) standard of ISO.

OTNM2000 Network Management System is developed by FiberHome Telecommunication, which can be used to manage on one platform multiple transmission and access and other devices

developed by FiberHome Telecommunication in a unified way, making it convenient for users to operate, and reducing the maintenance cost of users.

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CiTRANSR 810A/B supports login to network management via PPPoE.

### 1.2.11.1 Support centralized configuration management

CiTRANSR 810A/B can be uniformly configured and managed by OTNM2000 Network Management System in the central office. It is characterized by large control scope, high management efficiency and low maintenance cost.

OTNM2000 Network Management System realizes the operation and management of devices through the SNMP protocol. It has three versions, namely, SNMPv1, SNMPv2 and SNMPv3.

Configuration management is responsible for configuring the information of network and network element device.

- u Network information configured includes the establishment, modification and deletion of physical links and service channels of the network, and the reconfiguration and route recovery of physical links and channels when the network fails. The network topology connection relationship supports the display of a hierarchical topology view, as shown below.

- 4 Display of network topology of physical connection;

- 4 Display of LSP network topology;

- 4 Display of PW network topology;

- 4 Display of the network topology of the service layer.

- u Network element information configured: Manage the devices that make up the communication network (such as establish, delete and modify operations), including the network element initialization and the configuration of various functions (such as adding and deleting network elements, subframes and chassis, etc.).

- u Support network element configuration back calculation function, that is, support the uploading of device configuration data to the element end of the network management, consistency verification, and synchronization, as well as the service search and synchronization from network element to subnet.

### 1.2.11.2 Support performance and alarm management

CiTRANSR 810A/B allows performance and alarm management via OTNM2000 Network Management System, to realize the collection, prompt, view, filter, confirmation, clear and statistics of the performance and alarm in real time, and make the correlation analysis of alarm and the fault diagnosis.

- u The performance management supported by the device is as follows:
  - u Report and evaluate the transmission performance parameters of communication device and network.
  - u Collect the quality data and statistical data about the actual operation of the device in the communication network for the purpose of monitoring the status and performance of the network and device, and providing the maintenance personnel with the theoretical basis for evaluating, analyzing, predicting and planning the network.
  - u Traffic monitoring and SNMP traffic acquisition.

- u The alarm management supported by the device is as follows:
  - u Monitor the abnormal operation of device and network channel in real time, complete the monitoring, reporting and storage of alarm signals.
  - u Conduct the diagnosis, location and treatment of faults.

### 1.2.11.3 DCN network construction

CiTRANSR 810A/B supports a variety of DCN network construction methods, supports the separation of management communication network and signaling communication network, realizing in-band DCN and out-band DCN networking mode.

### 1.2.12 Clock characteristic

CiTRANSR 810A/B supports the physical layer clock synchronization mechanism, uses 1 clock input/output interface to realize the physical layer clock synchronization, and support IEEE1588v2 time synchronization protocol.

#### 1.2.12.1 Physical layer clock synchronization

CiTRANSR 810A/B supports the following physical layer clock synchronization features:

- u Support SSM processing function.
- u Support three clock operation modes: automatic mode, hold mode and free oscillation mode.
- u Support clock information extracted from the following transmission links.
  - u Clock information extracted from FE interface.
  - u Clock information extracted Ethernet Interface by GE synchronization.
- u Support external clock source input and output, can choose 75  $\Omega$  clock interface or 120  $\Omega$  clock interface, and provide
  - a three-stage clock source with 2048kHz or 2048kbit/s (HDB3) encoding.
- u Support the choosing of synchronization sources based on SSM values and priorities.
  - 4 When QL enabling is turned on, the device processes SSM information, preferentially select the synchronization of clock source according to the order of QL (quality level) value.

When the QL value is the same, then the synchronization of clock source is selected according to priority.

- 4 When QL enabling is disabled, the device does not process SSM information, and then the synchronization of clock source is selected according to the priority configuration.

## 1.2.12.2 PTP time synchronization

CiTRANSR 810A/B supports the following PTP time synchronization features:

- u Support periodic synchronous correction of clocks in all nodes of the network.
- u Support both in-band (IEEE1588 protocol interface) and out-band (1PPS & TOD interface) clock signal synchronization. managed.

### 4 In-band (IEEE1588 protocol interface) synchronization

- i Support OC and BC2 device modes. Master and Slave mode can be set for the port.
- i Support BMC algorithm.
  - Support Clockclass information transmitted through IEEE1588v2 messages.
- i Support path delay asymmetry compensation (compensated step size is no greater than 10ns).
- i Support configurable message sending interval.
- i Support PTP parameter setting.

### 4 Out-band (1PPS & TOD interface) mode

- i Support TOD information transport.
- i Support 1PPS second pulse, and adopt rising edge as the punctual edge. The rising time is less than 50ns, and the pulse width is about 180ms.

- u Support the following three types of PTP clock nodes:

- u BC
- u OC
- u TC



Tips:

The device only supports E2E mode TC.

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- u Support the following two PTP clock port states:
  - u MASTER (main port): This port provides a clock source for downstream nodes.
  - u SLAVE (standby port): This port is synchronous with the node state of upstream port MASTER.
- u Support the main-standby clock mode.

u The optimal clock can be specified statically by manual configuration, or dynamically elected by the clock algorithm BMC according to the clock accuracy and level on each node and UTC.