FiberHome Element Management System Northbound Interface (TL1)

1 TL1 Northbound Interface Overview

1.1 TL1 Interface Introduction

The TL1 northbound interface is used for connecting the Element Management System (EMS) and the Operation Support System (OSS) / Network Management System (NMS). The TL1 northbound interface enables the OSS or NMS to implement the provisioning and maintenance of the EPON/GEPON FTTX broadband, IPTV and VoIP services.

1.2 Network Diagram

The position of the TL1 northbound interface in the network is as shown in Figure 1-1.

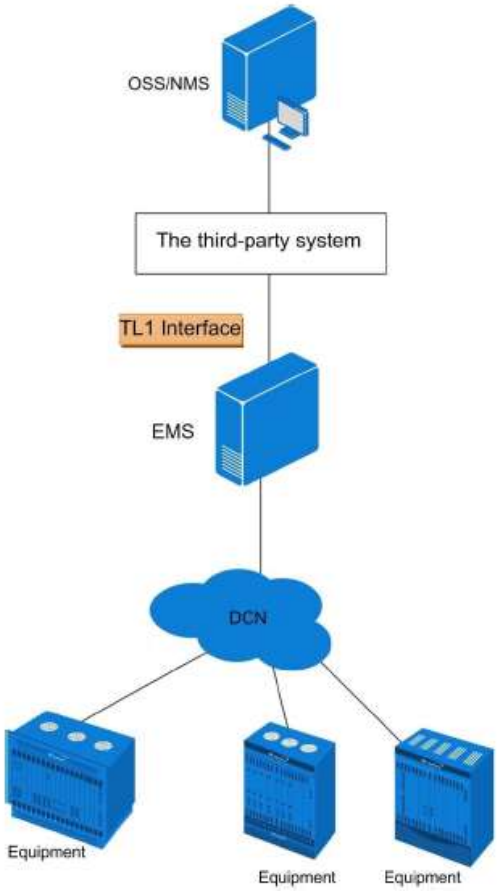

Figure 1-1 Network Diagram

In the network diagram, each node functions as follows:

- OSS / NMS: Indicates the Operation Support System / Network Management System. It sends TL1 commands to the EMS to perform service provisioning and failure query operations.
- Third-party system: It is deployed between the OSS / NMS and the EMS, parsing the OSS / NMS system command into the standard TL1 format and sending it to the EMS; meanwhile, it parses the result returned from the EMS and presents it to OSS / NMS.
- TL1 northbound interface: It processes the TL commands already parsed by the third-party system, and performs operations on the EMS and returns the result.
- EMS: Indicates the FiberHome Element Management System, providing the TL1 interface to be used by the upper-level system.
- Equipment: Indicates other sets of equipment in the network, managed by the EMS.

1.3 Protocols Used

The FiberHome EMS can establish the TCP connection with the upper-level system to achieve connection and communication. It offers default port for the upper-level system to use:
3337 (service provisioning / integrated testing / resource query).

After the login to OSS / NMS using the configured username and password, the operations relevant to the TL1 northbound interface can be performed. The protocols used by the TL1 northbound interface is as shown in Figure 1-2.

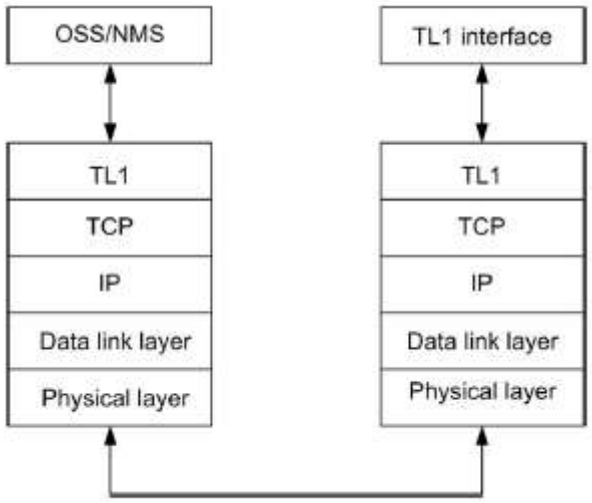

Figure 1-2 Protocols Used

- OSS / NMS: Operation Support System / Network Management System.
- TCP/IP: Transmission Control Protocol / Internet Protocol.

1.4 Management Function

The TL1 northbound interface supports the following functions:

- Service provisioning: Supports the provisioning of the broadband, voice and multicast services in the FTTB / FTTH scenario.
- Integrated testing: Supports querying the running status of the equipment, and the status of the PON, XDSL and POTS ports as well as troubleshooting.
- Alarm management: Supports subscribing to, querying and filtering alarms so as to monitor the running status of the EMS.
- Resource query: Supports querying the equipment physical resource and service configurations as well as the resource change notification report.

1.5 Security Mechanism

The TL1 northbound interface adopts the security mechanism of the FiberHome EMS. To implement this security mechanism, it is required to configure an account for the TL1 northbound interface on the EMS and then log in using this account. The FiberHome EMS accepts a maximum of 32 concurrent TCP connections.

The security mechanism adopted by the TL1 northbound interface includes the following functions:

- Login authentication: When connecting to the TL1 northbound interface, the TCP client needs to send the LOGIN command to login. Only after the successful login can the subsequent commands of the TCP connection be accepted by the system. The LOGIN username and password are exclusively allocated by the FiberHome EMS to the TL1 northbound interface.
- Automatic disconnection: If the TCP connection has no communication within 10 minutes, the system will initiatively disconnect it.

1.6 Performance Specifications

Table 1-1 describes the performance specifications of the TL1 northbound interface.

Table 1-1 Performance Specifications of the TL1 Northbound Interface

Performance Item Specification

Performance Item	Specification
Maximum quantity of concurrent TCP connections	32
Service provisioning interface	◆ Each connection supports more than two service provisioning / deletion work orders per minute. ◆ Each connection supports more than four service suspension / recovery / modification work orders per minute.
Integrated testing interface	◆ The result is returned within one minute for the internal line test, external line test, SELT, DELT and incoming / outgoing call emulation tests. ◆ The result for a query command is returned within five seconds.
Integrated alarm interface	◆ The alarm delay is less than 10 seconds in normal running status and is less than 30 seconds in case of alarm storm. ◆ The maximum delay for synchronizing 1000 alarm data entries is 10 minutes. ◆ The alarm throughput is more than 20 entries per second.
Integrated query interface	◆ The query time is less than 5 seconds when the number of queried records is smaller than 500, and less than 10 seconds when the number of queried records is greater than 500. ◆ Full export of configuration data is up to 10000 ports per minute.

2 Definition of Returned Error Codes

The error codes returned by the TL1 northbound interface are as shown in
Table 2-1.

EN (error- code)	Error Type	ENDESC (error-description)
IRNE	INPUT	resource does not exist
IANE	INPUT	the alarm does not exist
IMP	INPUT	missing parameter
IIPF	INPUT	invalid parameter format
IIPE	INPUT	input parameter error
DDNS	DEVICE	device may not support this operation
DDOF	DEVICE	device operation failed
DDB	DEVICE	device is busy
SENS	SYSTEM	EMS may not support this operation
SEOF	SYSTEM	EMS operation failed
EEEH	EXCEPTION	EMS exception happens
TUB	TEST	user is busy
TUT	TEST	user is testing
TTMB	TEST	test module is busy

3 Session Control

The session control is used for managing the SOCKETconnection between the access adaptation module and the FiberHome EMS, providing a secure layer to prevent against access by unauthorized users. It is recommended to modify the user ID and password periodically during running and maintaining of the EMS.

- Logging into the FiberHome EMS (LOGIN)
- Logging Out of the FiberHome EMS (LOGOUT)
- Handshake Command (SHAKEHAND)

3.1 Logging into the FiberHome EMS (LOGIN)

Function Description

- To use the integrated query interface, establish the TCP connection with the FiberHome EMS through the port 3337.

When successfully establishing the TCP connection, log into the FiberHome EMS through the command. After login, send commands of the TL1 northbound interface to perform operations over the equipment.

Command Format

LOGIN:::CTAG::UN=user-name,PWD=password;

Input Parameter

Parameter Name	Data Type	Value Range	Description	Default Value
UN	OCTET STRING	Size (20)	User Name	-
PWD	OCTET STRING	Size (16)	Password	-

Output Parameter

None

Example

For example, after establishing the TCP connection with the server, enter the username **EMSUSER** and password **EMSPWD** to log into the FiberHome EMS.

- Command

```
LOGIN:::CATG::UN=EMSUSER,PWD=EMSPWD;
```

- Response message

```
FH_10.78.20.120 2011-02-21 13:41:37
M CATG COMPLD
EN=0 ENDESC=No error
;
```

Related Command

None

3.2 Logging Out of the FiberHome EMS (LOGOUT)

Function Description

Log out of the FiberHome EMS and disconnect the TCP connection with the TL1 northbound interface.

Command Format

```
LOGOUT:::CTAG::;
```

Input Parameter

None

Output Parameter

None

Example
For example, the current user logs out of the FiberHome EMS.

- Command

```
LOGOUT:::CTAG::;
```

- Response message

```
FH_10.78.20.120 2011-02-21 13:41:37
M CATG COMPLD
EN=0 ENDESC=No error
;
```

Related Command
None

3.3 Handshake Command (SHAKEHAND)

Function Description
If the TCP connection has no communication within 10 minutes, the system will initiatively disconnect the TCP connection. However, sending the handshake command can keep it connected with no operations performed.

Command Format
```
SHAKEHAND:::CTAG::;
```

Input Parameter
None

Output Parameter
None

Example
For example, send the handshake command to the system.

- Command

```
SHAKEHAND:::CTAG::;
```

- Response message

```
FH_10.78.20.120 2011-02-21 13:41:37
M CATG COMPLD
EN=0 ENDESC=No error
;
```

4 Querying the Equipment Information

4.1 Querying the NE Information (LST-DEVINFO)

Function Description
This command is used to query the device model, software version, memory, CPU
and temperature of the NE (OLTand ONU).

Command Format

```
LST-DEVINFO::ONUIP=onu-name|OLTID=olt-name[,PONID=ponport-location,
ONUIDTYPE=id-type,ONUID=onu-index]:CTAG::;
```

Input Parameter

Parameter	Data Type	Value Range	Description	Remark
ONUIP	OCTET STRING	Size (128)	IP address, name or ID of the ONU that has a management IP address	-
OLTID	OCTET STRING	Size (128)	OLT IP address, name or ID	-
PONID	OCTET STRING	Size (128) Cabinet rack - shelf - slot - PON port number	PON port location information. Locate a port through the information **rack - shelf - slot - PON port number**. If any part of the information is unavailable, enter **NA** instead.	If the parameter entered does not include the ONUID, the PONID is optional.
ONUID-TYPE	OCTET STRING	Size (128)	ONU identifier type (ONU_NAME, MAC, LOID, ONU_NUMBER)	Optional
ONUID	OCTET STRING	Size (128)	ONU identifier, used for uniquely identifying the ONU connected to the PON port. The value is ONU_NAME, MAC, LOID or ONU_NUMBER.	Optional

Output Parameter

Parameter	Data Type	Value Range	Description
DEVNAME	OCTET STRING	Size (128)	Device name
DEVIP	OCTET STRING	Size (128)	Device IP address
DT	OCTET STRING	Size (255)	Device model
DEVER	OCTET STRING	Size (255)	Software version
MEM	INTEGER	0 to 100	Memory usage Unit: %
CPU	INTEGER	0 to 100	CPU usage Unit: %
TEMPERA-TURE	INTEGER	-50 to 100	Temperature Unit: °C
TOPOLOC	OCTET STRING	Size (255)	Optional. It indicates the topology location of the device, which uses / to separate layer information and describes the information from the root node to the node where the device is located, such as **Root/shanghai/MA5600T** or **Root/shanghai/MA5600T/ODN-15-2**.

Example

Query the information of the NE whose IP address is 10.250.18.100.

- Command issued

```
LST-DEVINFO::OLTID=10.250.18.100:CTAG::;
```

- Response message

```
FH_10.250.18.133 2010-11-01 10:09:57
M CTAG COMPLD
total_blocks=1
block_number=1
block_records=1
List of Device Info
------------------------------------------------------------
        DEVNAME DEVIP DT DEVER MEM CPU TEMPERATURE

1 10.250.18.100 AN5516_01 RP0121 68.98 5.57 30
```

4.2 Querying the Card Information (LST-BRDINFO)

Function Description

This command is used to query the type, status and version of the card.

Command Format

```
LST-BRDINFO::ONUIP=onu-name|OLTID=olt-name[,PONID=ponport_location,
ONUIDTYPE=id-type,ONUID=onu_index][,BOARDID=board-name]:CTAG::;
```

Input Parameter

Parameter	Data Type	Value Range	Description	Remark
ONUIP	OCTET STRING	Size (128)	IP address, name or ID of the ONU that has a management IP address	-
OLTID	OCTET STRING	Size (128)	IP address, name or ID of the OLT	-
PONID	OCTET STRING	Size (128) Cabinet rack - shelf - slot - PON port number	PON port location information. Locate a port through **cabinet rack - shelf - slot - PON port**. Enter **NA** if the corresponding information is not specified.	If the parameter entered does not include the ONUID, the PONID is optional.
ONUID-TYPE	OCTET STRING	Size (128)	ONU identifier type (ONU_ NAME, MAC, LOID, ONU_ NUMBER or PASSWORD).	Optional
ONUID	OCTET STRING	Size (128)	ONU identifier, used for uniquely identifying the ONU connected to the PON port. The value is ONU_NAME, MAC, LOID, ONU_NUMBER or PASSWORD.	Optional
BOARDID	OCTET STRING	Size (128) Cabinet rack - shelf - slot	Card location information . Locating through **cabinet rack - shelf - slot number**. Enter **NA** if the corresponding information is not specified.	(Optional) If it is not set, all cards will be queried.

Output Parameter

Parame-ter	Data Type	Value Range	Description	Remark
BOARDID	OCTET STRING	Size (128) Cabinet rack - shelf - slot	Locate the card connected with the ONU through **cabinet rack - shelf - slot number**. Enter **NA** if the corresponding information is not specified.	-
BSTAT	OCTET STRING	Normal Fault Offline	Card status	-
BOARD-TYPE	OCTET STRING	Size (128)	Card type	-
BSER-VICE	OCTET STRING	Power ETH ADSL VDSL POTS E1 GPON EPON SCU Other	Card service type (such as ADSL2P and SHDSL)	-
PNUM	INTEGER	0 to 64	Number of ports	-
SWVER	OCTET STRING	Size (255)	Software version	-
HWVER	OCTET STRING	Size (255)	Hardware version	-
MEM	INTEGER	0 to 100	Memory usage Unit: %	-
CPU	INTEGER	0 to 100	CPU usage Unit: %	-

Example

Query the card information of the NE whose IP address is 10.250.18.100.

- Command issued

```
LST-BRDINFO::OLTID=10.250.18.100,BOARDID=NA-NA-3:CTAG::;
```

- Response message

```
FH_10.250.18.133 2010-10-27 10:59:09
M CTAG COMPLD
total_blocks=1
block_number=1
block_records=1
List of Board Info
------------------------------------------------------------
BOARDID BSTAT BOARDTYPE BSERVICE PNUM SWVER HWVER MEM CPU
NA-1-3 Normal EC4B EPON 4 RP0121 WKE2.119.318R2A 38.88 2.73
```

4.3 Querying the PON Port Information (LST-PONINFO)

Function Description

This command is used for querying the status and configuration information of an OLT PON port.

Command Format

LST-PONINFO::OLTID=olt-name,PONID=pon_name:CTAG::;

Input Parameter

Parameter	Data Type	Value Range	Description	Remark
OLTID	OCTET STRING	Size (128)	IP address, name or ID of the OLT	-
PONID	OCTET STRING	Size (128) Rack - shelf - slot - PON port number	PON port location information. Locate a port through the information **rack - shelf - slot - PON port number**. If any part of the information is unavailable, enter **NA** instead.	-

Output Parameter

Parameter	Data Type	Value Range	Description
AdminState	OCTET STRING	UP DOWN	Management status
OperState	OCTET STRING	UP DOWN	Operating status

Example

Query the status of PON port 1 in slot 3 of the NE whose IP address is 10.250.18.100.

- Command issued

```
LST-PONINFO::OLTID=10.250.18.100,PONID=NA-NA-3-1:CTAG::;
```

Response message

```
FH_10.250.18.133 2010-10-27 11:02:13
M CTAG COMPLD
total_blocks=1
block_number=1
block_records=1
List of olt pon port information
------------------------------------------------------------
AdminState OperState
UP UP
------------------------------------------------------------
```

4.4 Querying the OLT Information (LST-DEVICE)

Function Description

This command is used for querying the information of a specified set or all sets of OLT.

Command Format

```
LST-DEVICE::[OLTID=olt-name]:CTAG::;
```

Input Parameter

Parameter	Data Type	Value Range	Description
OLTID	OCTET STRING	Size (128)	IP address or name of the OLT

Output Parameter

Parameter	Data Type	Value Range	Description
DEVNAME	OCTET STRING	Size (128)	Device name
DEVIP	OCTET STRING	Size (128)	Device IP address
DT	OCTET STRING	Size (255)	Device model
DEVER	OCTET STRING	Size (255)	Software version
MEM	INTEGER	0 to 100	Memory usage Unit: %
CPU	INTEGER	0 to 100	CPU usage Unit: %
TEMPERATURE	INTEGER	-50 to 100	Temperature Unit: °C
TOPOLOC	OCTET STRING	Size (512)	The location information of the Topo node where the OLT resides, displayed after the interface query. If the topological location involves multiple layers, the information of each layer is separated by "/". For example, the physical topological tree /abassa/2323sd-faa/2122121sffgvafaaaa/10.144.78.163.
DSTAT	OCTET STRING	Connecting Disconnecting	NE communication status Connecting Disconnecting
ALIAS	OCTET STRING	Size (32)	Alias name

Example

For example, query the information of the OLT whose IP address is 10.250.18.100.

- Command issued

```
LST-DEVICE::OLTID=10.250.18.100:CTAG::;
```

- Response message

```
FH_10.250.18.133 2010-11-04 10:37:35
M CTAG COMPLD
total_blocks=1
block_number=1
block_records=1
---------------------------------------------------------
DEVNAME DEVIP DT DEVER
System 1 10.250.18.100 AN5516_01 RP0121
---------------------------------------------------------
```

4.5 Querying the Card Information (LST-BOARD)

Function Description

This command is used for querying the card information of a specified OLT

Command Format

- Query the card information of a specified OLT:

```
LST-BOARD::OLTID=olt-name[,BOARDID=BOARD_location]:CTAG::;
```

Parameter	Data Type	Value Range	Description	Remark
OLTID	OCTET STRING	Size (128)	OLT IP address or name	OLT or the ONU that has no management IP address. Required.

Output Parameter

Parameter	Data Type	Value Range	Description
OLTID	OCTET STRING	Size (128)	OLT IP address or name. When the device is queried in the entire network, the IP address will be returned.
PONID	OCTET STRING	Size (128) Cabinet rack - shelf - slot - port	Locate the card through cabinet rack - shelf - slot - port number. Enter NA if the corresponding information is not specified.
ONUID	OCTET STRING	Size (128)	When a single ONU is queried, the input parameter will be returned; when all ONUs are queried in the entire network, the ONUNO will be returned.
BOARDID	OCTET STRING	Size (128) Cabinet rack - shelf - slot	Locates the card through cabinet rack - shelf - slot. Enter NA if the corresponding information is not specified. To only specify the shelf number, enter it in format of NA-0-NA.
BOARDTYPE	OCTET STRING	Size (128)	Card type
BSERVICE	OCTET STRING	-	Card service type
PNUM	INTEGER	0 to 64	Number of ports
SWVER	OCTET STRING	Size (255)	Software Version
HWVER	OCTET STRING	Size (255)	Hardware version
BOARDSN	OCTET STRING	Size (32)	Card serial number. You can set the switch to display or not display this information.
TOPOLOC	OCTET STRING	Size (255)	Information of logical domain
ESN	OCTET STRING	Size (255)	Electronic serial number of card

Example

Example 1, query the information of a card on the OLT whose IP address is 10.250.18.100.

- Command issued

```
LST-BOARD::ONUIP=10.250.18.100:CTAG::;
```

- Response message

```
FH_10.250.18.133 2010-11-04 10:38:05
M CTAG COMPLD
total_blocks=1
block_number=1
block_records=10
---------------------------------------------------------
```

```
ONUIP OLTID PONID ONUID BOARDID BOARDTYPE BSERVICE
PNUM SWVER HWVER
-- 10.250.18.100 -- -- NA-1-1 EC4B EPON 4
RP0121 WKE2.119.318R1A
-- 10.250.18.100 -- -- NA-1-2 EC4B EPON 4
RP0121 WKE2.119.318R2A
-- 10.250.18.100 -- --NA-1-3 EC4B EPON 4
RP0121 WKE2.119.318R2A
-- 10.250.18.100 -- -- NA-1-9 HSWA SCU 3
RP0121 WKE2.115.334R1A
-- 10.250.18.100 -- -- NA-1-18 PUBA Other 2
RP0107 WKE2.167.177R1A
-- 10.250.18.100 -- -- NA-1-19 HU1A Other 5
RP0103 WKE2.170.846R3A
-- 10.250.18.100 -- --NA-1-20 HU1A Other 5
RP0103 WKE2.170.846R3A
-- 10.250.18.100 -- -- NA-1-21 FAN Other 2
-- --
-- 10.250.18.100 -- -- NA-1-22 FAN Other 2
-- --
-- 10.250.18.100 -- -- NA-1-23 FAN Other 2
-- --
------------------------------------------------------------
```

4.6 Querying the VLAN Information (LST-VLAN)

Function Description

This command is used for querying the VLAN information.

Command Format

```
LST-VLAN::ONUIP=onu-name|OLTID=olt-name:CTAG::[VLAN=vlanid];
```

Input Parameter

Parameter	Data Type	Value Range	Description
ONUIP	OCTET STRING	Size (128)	IP address or name of the ONU that has a management IP address
OLTID	OCTET STRING	Size (128)	IP address or name of the OLT
VLAN	INTEGER	0 to 4094	VLANID

Output Parameter

Parameter	Data Type	Value Range	Description
ONUIP	OCTET STRING	Size (128)	The input parameter will be returned.
OLTID	OCTET STRING	Size (128)	The input parameter will be returned.
VLAN	INTEGER	0 to 4094	VLAN ID
DESC	OCTET STRING	Size (128)	VLAN alias
VLANMODE	OCTET STRING	COMMON STACKING QINQ	VLAN attribute
PORTLIST	OCTET STRING	Rack - shelf - slot - port number	Port list
MVLANFLAG	INTEGER	-	Indicates whether it is a multicast VLAN or non-multicast VLAN.
MVLANPRI	INTEGER	0 to 7	Priority of the IGMP message
SERVICE	OCTET STRING	HSI (Internet access) IPTV (unicast) VOIP (voice)	Service type of the VLAN

Example

Query the VLAN information of the OLT whose IP address is 10.78.200.200 (the ONU has no management IP address).

- Command issued

```
;LST-VLAN::OLTID=10.204.247.185:CTAG::;
```

- Response message
-

```
   FH_0.0.0.0 2020-06-18 19:14:14
M  CTAG COMPLD
   total_blocks=1
   block_number=1
   block_records=2


---------------------------------------------------------------------------
ONUIP    OLTID    VLAN    DESC    VLANMODE        PORTLIST        MVLANFLAG
MVLANPRI       SERVICE
--       10.204.247.185  753     Data    COMMON  NA-NA-9-3       --      --
HSI
--       10.204.247.185  1906    SIP     COMMON  NA-NA-9-3       --      --
VOIP
```

4.7 Querying the ONU Information (LST-ONU)

Function Description

This command is used for querying the information of a specified ONU or all ONUs connected to the OLT.

Command Format

```
LST-ONU::ONUIP=onu-name|(OLTID=olt-name[,PONID=ponport_location[,
ONUIDTYPE=onuidtype,ONUID=onu-index]]):CTAG::;
```

- Query all ONUs connected to the OLT:

```
LST-ONU::OLTID=olt-name:CTAG::;
```

- Query all ONUs connected to a specified PON port of the OLT:

```
LST-ONU::OLTID=olt-name,PONID=ponport_location:CTAG::;
```

- Query the information of the ONU that has a management IP address:

```
LST-ONU::ONUIP=onu-name:CTAG::;
```

- Query the information of the ONU that has no management IP address:

```
LST-ONU::OLTID=olt-name,PONID=ponport_location,ONUIDTYPE=onuid-type,
ONUID=onuindex:CTAG::;
```

Input Parameter

Parameter	Data Type	Value Range	Description	Remark
ONUIP	OCTET STRING	Size (128)	IP address or name of the ONU that has a management IP address	Required for an ONU that has a management IP address
OLTID	OCTET STRING	Size (128)	OLT IP address or name.	OLTor the ONU that has no management IP address. Required.

PONID	OCTET STRING	Size (128) Cabinet rack - shelf - slot - PON port number	PON port information location. Locate a port through cabinet rack - shelf - slot - PON port number. Enter NA if the corresponding information is not specified.	Optional for an ONU that has no management IP address
ONUIDTYPE	OCTET STRING	Size (128)	ONU_NAME, MAC, LOID, ONU_NUMBER or PASSWORD.	Optional for an ONU that has no management IP address
ONUID	OCTET STRING	Size (128)	ONU identifier, used for uniquely identifying the ONU connected to the PON port. The value is ONU_NAME, MAC, LOID, ONU_NUMBER or PASSWORD.	Optional for an ONU that has no management IP address

Output Parameter

Parameter	Data Type	Value Range	Description
OLTID	OCTET STRING	Size (128)	OLT IP address or name.
PONID	OCTET STRING	Size (128) Cabinet rack - shelf - slot - port	Locate the card through cabinet rack - shelf - slot - port number. Enter NA if the corresponding information is not specified.

ONUNO	INTEGER	0 to 512	ONU authorization number
NAME	OCTET STRING	Size (128)	ONU name
DESC	OCTET STRING	Size (128)	ONU description information.
ONUTYPE	OCTET STRING	Size (128)	ONU type
IP	OCTET STRING	Size (128)	The management IP address of the ONU.
AUTHTYPE	OCTET STRING	MAC LOID LOIDONCEON PASSWORD and PASSWORDONCEON are added.	Authentication mode. When no authentication mode is specified, a dash (–) will be returned.
MAC	OCTET STRING	Size (128)	The registered MAC information of the ONU.
LOID	OCTET STRING	Size (64)	When the MAC authentication is adopted, a dash (–) will be returned.
PWD	OCTET STRING	Size (128)	LOID password. If no password is specified, a dash (–) will be returned.
SWVER	OCTET STRING	Size (128)	Software Version
FTTXMODE	OCTET STRING	FTTB FTTH FTTC FTTO	FTTx networking mode
VendorID	OCTET STRING	Size (4)	Vendor ID
EquipmentID	OCTET STRING	Size (20)	ONU ID
TOPOLOC	OCTET STRING	Size (255)	Iformation of logical domain

Example

Example 1, query the information of the ONU (having no management IP address) with ONUID being whdx04. The ONU is connected to the shelf 0 - slot 4 - PON port 1 of the OLT whose IP address is 10.250.18.102.

- Command issued

```
;LST-ONU::OLTID=10.204.247.143:CTAG::;


   FH_0.0.0.0 2020-06-18 19:15:12
M  CTAG COMPLD
   total_blocks=1
   block_number=1
   block_records=2
```

- Response message

```
---------------------------------------------------------------------------
----
      OLTID   PONID   ONUNO   NAME    DESC    ONUTYPE IP     AUTHTYPE       MAC
      LOID    PWD     SWVER
      10.204.247.143  1-1-2-1 2      BCR_140_L009_N01B_002   --     AN5506-
      04-FA    --     MAC    FHTT9426d1e8    --     --     --
      10.204.247.143  1-1-2-1 3      PON[1]-AN5506-04-FA[3]  --     AN5506-
      04-FA    --     MAC    FHTT9426d5c0    --     --     RP2615
---------------------------------------------------------------------------
----
```

4.8 Querying the ONU Status (LST-ONUSTATE)

Function Description

This command is used for querying the status or authentication information of a single ONU or all ONUs on the OLT PON port.

Command Format

```
LST-ONUSTATE::OLTID=olt-name,PONID=ponport_location[,ONUIDTYPE=id-type,
ONUID=onu-index]:CTAG::;
```

Input Parameter

Parameter	Data Type	Value Range	Description	Remark
OLTID	OCTET STRING	Size (128)	IP address, name or ID of the OLT	-
PONID	OCTET STRING	Size (128) Rack - shelf - slot - PON port number	PON port location information. Locate a port through the information **rack - shelf - slot - PON port number**. If any part of the information is unavailable, enter **NA** instead.	-
ONUIDTYPE	OCTET STRING	Size (128)	ONU identifier type: ONU_NAME, MAC, LOID, ONU_NUMBER	Optional. If it is not specified, the status of all ONUs on the OLT PON port will be queried.
ONUID	OCTET STRING	Size (128)	ONU identifier, used for uniquely identifying the ONU connected to the PON port. The value is ONU_NAME, MAC, LOID or ONU_NUMBER.	Optional. If it is not specified, the status of all ONUs on the OLT PON port will be queried.

Output Parameter

Parameter	Data Type	Value Range	Description
ONUID	OCTET STRING	Size (128)	ONU identifier, used for uniquely identifying the ONU connected to the PON port. The value is ONU_ Number.
AdminState	OCTET STRING	UP DOWN	Management status
OperState	OCTET STRING	UP Power-Off LOS	Operating status
AUTH	OCTET STRING	MAC LOID	Authentication mode
AUTHINFO	OCTET STRING	Size (64)	Authentication information. If AUTH is set to MAC, AUTHINFO is MAC address. If AUTH is set to LOID, AUTHINFO is LOID.
ONUIP	OCTET STRING	-	ONU management IP
LASTOFF-TIME	OCTET STRING	-	ONU offline time
ACTIVES-TATE	OCTET STRING	Active Deactive	ONU activation status. Whether the field will be returned depends on the switch.
LASTDOWN-CAUSE	OCTET STRING	-	Offline cause. This parameter and LASTOFFTIME are alternative, depending on the switch.
LASTONTIME	OCTET STRING	Size (128)	The last online time of the ONU. The time format (Beijing time) is **YYYY-MM-DD HH-MM-SS**.

Example

Query the status of the ONU with ONUID being FHTT9426d5c0. The ONU is connected to PON port 2 in slot 1 of the OLT whose IP address is 10.204.247.143.

- Command issued

```
;LST-ONUSTATE::OLTID=10.204.247.143,PONID=NA-NA-2-1,ONUIDTYPE=MAC,
ONUID=FHTT9426d5c0:CTAG::;
```

- Response message

```
   FH_0.0.0.0 2020-06-18 19:28:53
M  CTAG COMPLD
   total_blocks=1
   block_number=1
   block_records=1

 list of ONU state
 ------------------------------------------------------------------------------
----
 ONUID    AdminState        OperState         AUTH     AUTHINFO          ONUIP
LASTOFFTIME
 3      UP      UP      MAC     FHTT9426d5c0    --      --
```

4.9 Querying a VEIP Data Service (LST-VEIPSERVICE)

Function Description

This command is used for querying a VEIP data service.

Command Format

```
LST-VEIPSERVICE::ONUIP=onu-ip|OLTID=olt-name,PONID=ponport_location,
ONUIDTYPE=onuid-type,ONUID=onu-index,ONUPORT=onu-port:CTAG::
[ServiceId=service-id];
```

Input Parameter

Parameter	Data Type	Value Range	Description	Remark
OLTID	OCTET STRING	Size (128)	IP address, name or ID of the OLT	Required
PONID	OCTET STRING	Size (128) Rack-shelf-slot-PON port number	PON port location information. Locate a port through the information **rack-shelf-slot-PON port number**. If any part of the information is unavailable, enter **NA** instead.	Required
ONUIDTYPE	OCTET STRING	Size (128)	ONU identifier type (ONU_NAME, MAC, LOID or ONU_NUMBER)	Required
ONUID	OCTET STRING	Size (128)	ONU identifier, used for uniquely identifying an ONU connected to a PON port. The value can be ONU_ NAME, MAC, LOID or ONU_ NUMBER.	Required
ONUPORT	OCTET STRING	Size (128) Rack-shelf-slot-port number	Locate a card port through the information **rack-shelf-slot-port number**. If any part of the information is unavailable, enter **NA** instead.	Required
ServiceId	INTEGER	1 to 16	Sequence number of the service under the port	Optional

Output Parameter

Parameter	Data Type	Value Range	Description	Remark
ServiceId	INTEGER	1 to 16	Sequence number of the service under the port	Optional
CVLANID	INTEGER	1 to 4085	Inner VLAN	Optional
CCOS	INTEGER	0 to 7	CVLAN priority or COS	Optional
TVLANID	INTEGER	1 to 4085	VLAN translation	Optional
TCOS	INTEGER	0 to 7	Translated VLAN priority or COS	Optional
UpAssuredRateLimit	OCTET STRING	Size (20)	Uplink bandwidth profile name	Optional
DownAssuredRateLimit	OCTET STRING	Size (20)	Downlink bandwidth profile name	Optional
ServiceModelProfile	OCTET STRING	Size (20)	Service model profile name	Required
ServiceType	OCTET STRING	NONE DATA IPTV MANAGEMENT VOIP	Service type	Optional
GEMPORT	INTEGER	0 to 4095	-	Optional

Example

Query the VEIP data service at port 1 of the ONU with the MAC address FHTT941fce40 connected to PON port 2 in slot 1 of the OLT equipment whose IP address is 10.204.247.211.

- Command issued

```
;LST-VEIPSERVICE::OLTID=10.204.247.211,PONID=NA-NA-1-
2,ONUIDTYPE=MAC,ONUID=FHTT941fce40,ONUPORT=NA-NA-NA-1:CTAG::ServiceId=1;
```

- Response message

```
   FH_0.0.0.0 2020-06-18 20:03:11
M  CTAG COMPLD
   total_blocks=1
   block_number=1
   block_records=1

List of Onu veip cfg Info
------------------------------------------------------------------------------
----
ServiceId      CVLANID CCOS    TVLANID TCOS    UpAssuredRateLimit
DownAssuredRateLimit    ServiceModelProfile     ServiceType     GEMPORT
1      1900    --      --      --      GPON_25_10      GPON_25_10      Service
DATA    --
```