



CTC GPON IOP Test Plan

China Telecom Corporation Limited

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1 General

This test plan is focus on the GPON interoperability including basic function, OMCI and different kind of service.

1.1 Device Overview

1.1.1 OLT

Device Model		
PON chipset		
Appearance (Attach Picture)		
Dimension (Length/Height/Width mm)		
Weight		
Power supply		
Power consumption		
Slot number		
Control board (support redundant or not)		
Capability of backplane switching		
PON port number (single linecard/whole device)		
NNI Ports	10GE	
	GE (Optical/Electrical)	
	FE	
	STM-1	
	E1	

1.1.2 Optical Network Termination (ONT) Unit

Model				
PON Chipset				
Appearance (Attach Picture)				
Dimension (Length/Height/Width mm)				
Weight				
Power supply				
Power consumption				
UNI Ports	FE			
	POTS			
	E1			
	GE			
	Others			

1.1.3 System Characteristics:

No.	Characteristics	Descriptions
1	Attenuation range	
2	Maximum transmitting range (Distance)	
3	Maximum split ratio	
4	OLT Transceiver bit rate	
5	OLT Transceiver wavelength	
6	ONU Transceiver bit rate	
7	ONU Transceiver wavelength	
8	FEC (Support or not)	
9	Encryption (Support or not)	

1.2 Test Date&Time, Location and Participants

Test Date & Time		
Location		Broadband lab, 2/F, Shanghai Academy of China Telecom Corporation Limited
Participants	CTC	
	Vender (_____)	

1.3 Test Environment and Device configuration

1.3.1 Test Instruments

Instrument Name	Model	Quantity
Network Performance analyzer	Smartbits6000	1
Optical Power Meter	Vendor's obligation (EXFO or other PON power meter)	1
Variable optical attenuator	Vendor's obligation	1

1.3.2 Test Equipment Version

Description		Model Type	Hardware version	Firmware version	Remarks
Network Management					
OLT	Main control Board				
	PON Board				
	PON Chipset				
	Upstream connection board				
	Switch Chipset				
	Optical transceiver				
	Others				
ONU					
Splitter					Indicates Manufacturer and type.

1.3.3 Network Topology of Test Equipment

Please reference test network topology in figure 1. In this test, you need to verify the interoperability between Vender A's OLT and Vender B's ONU.

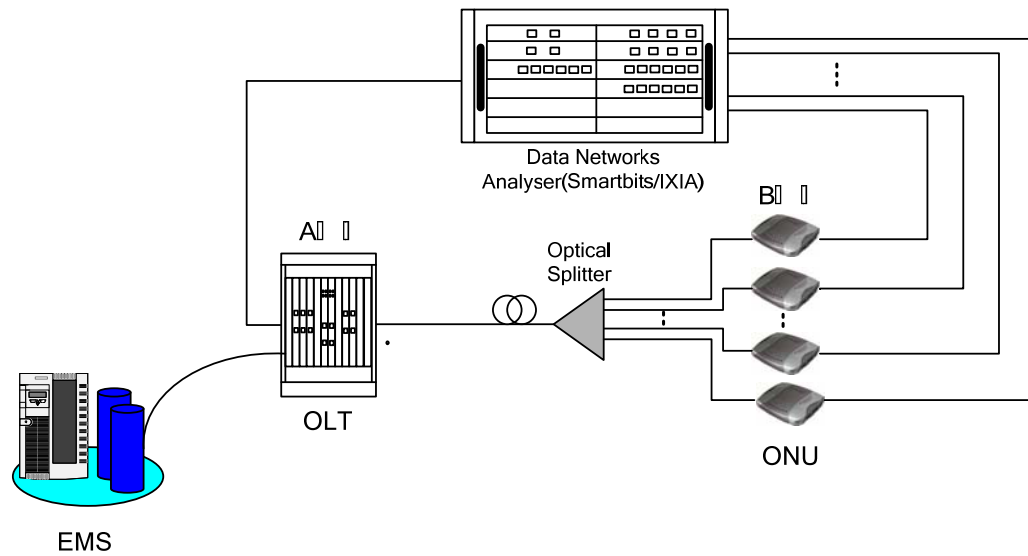


Figure 1 Test network topology

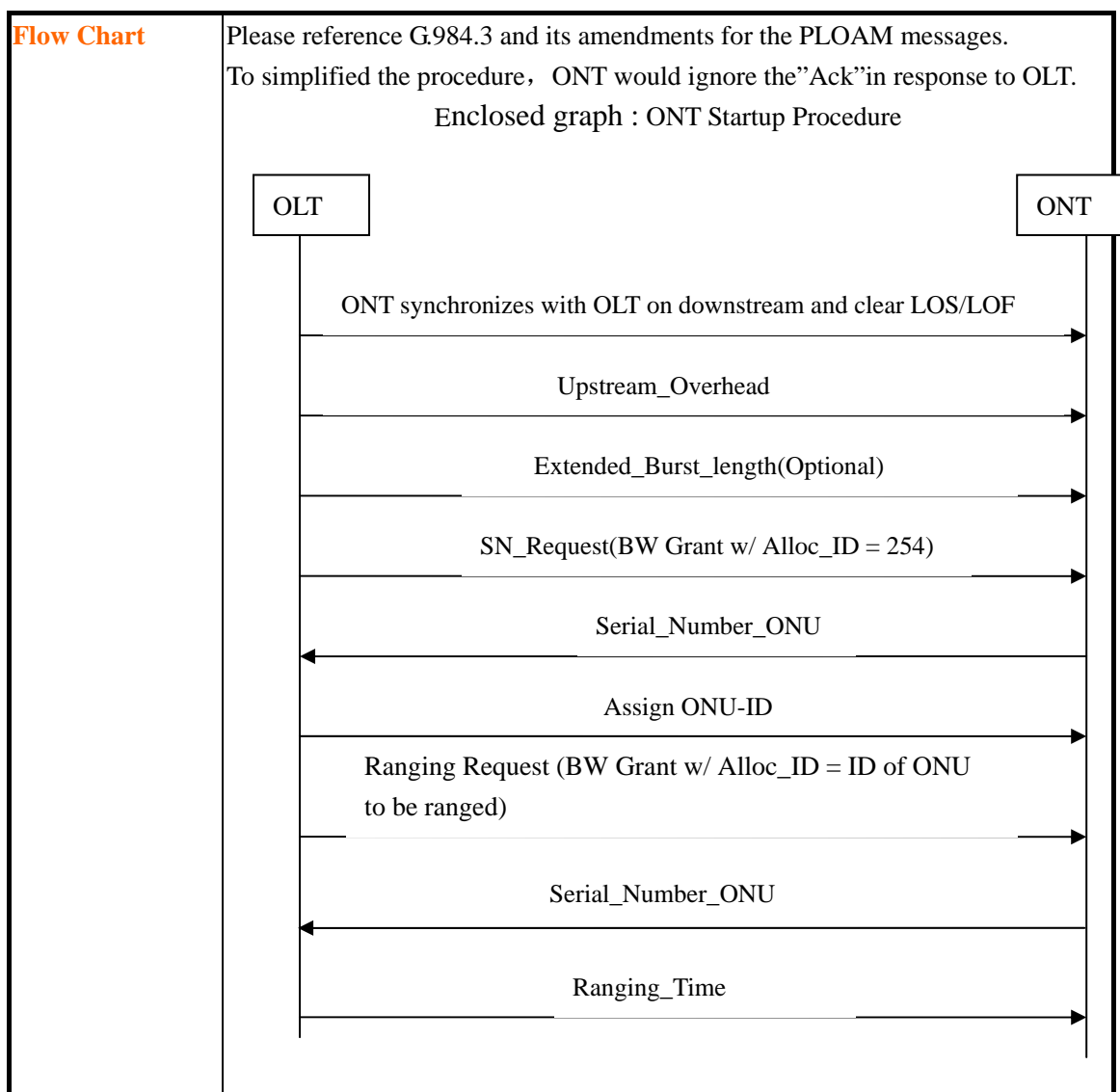
Note: If no special request, 10km fiber is used between OLT and splitter.

Default is 1:64 splitter, 1:32 can be used if OLT cannot support 1:64.

2 ONU Basic functionality

2.1 ONU Auto-Registration

Test Purpose	Verify ONU auto-registration function.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1、 Please reference figure 1. Connect vendor A's OLT and vendor B's ONU (Don't configure ONU first). 2、 Disconnect ONU fiber. 3、 After connect the fiber, put ONU to ODN. 4、 Check if ONU can be discovered from OLT EMS/CLI, and check registered ONU's SN. Then record the time between fiber-connect to SN-register success. 5、 Configure correlated parameters for PON port, then check ONU registration process. Check following message format : Upstream Overhead, Extended_Burst_Length , Serial_Number_Request, Assign_ONU_ID, Ranging_Request, Ranging_response, Ranging_Time, Configure_Port_ID. 6、 Disconnect ONU fiber. 7、 Connect fiber. Connect 4 vendor's B ONUs to ODN. Follow steps 4~5 again. 8、 Analyze the reason if ONU register fail.
Expected Results	<ol style="list-style-type: none"> 1. ONU should register to OLT successfully. 2. The format of SN should compliant with G.984. 3. The handshaking process and message format between ONU and OLT should compliant with G.984. 4. After EMS/CLI configure ONU's SN , ONU should automatically register to OLT successfully.
Test Statement	1、 Disable encryption and FEC function in this test.
Test Results	
Remarks	



2.2 ONU Pre-Configured SN (Serial Number) Test

Test Purpose	Verify the registration function of legal and illegal ONUs. OLT need to pre-configure the legal SN first.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup test environment as figure 1. 2. Disconnect the fiber at ONU side. 3. Configure the ONU's SN from EMS/CLI. 4. Connect the fiber and put ONU to ODN. 5. Check ONU registration process and record ONU's PLOAM state and how much time it takes to rgister success. 6. Analyze the reason if registration fail. 7. Disconnect the fiber at ONU PON port.

	8. Configure SN for ONU from EMS/CLI, and check the registration process. Record ONU's PLOAM state machine.
Expected Results	<ol style="list-style-type: none"> 1. In step 5, If ONU register success and meet the requirement of G.984, then ONU will enter Operation state (O5). 2. In step 8, if ONU registration fail, ONU state should be back and forth between O2 and O3.
Test Statement	1. Disable encryption and FEC function in this test.
Test Results	
Remarks	
Flow Chart	Please reference 2.1 for detail.

2.3 SN+Password Authentication

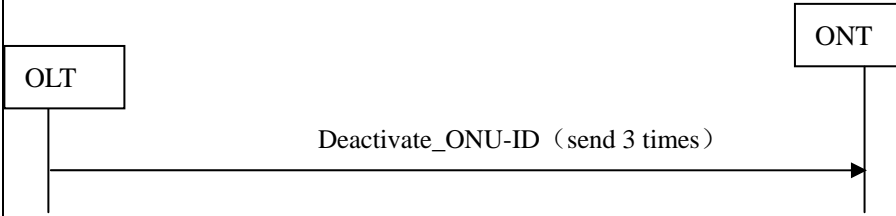
Test Purpose	Verify SN+password Authentication
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup test environment as figure 1. 2. Disconnect the fiber at ONU PON port. 3. Configure SN and password for ONU from EMS/CLI. Then configure ONU's authentication mode to "SN+Password". 4. Connect the fiber and put ONU to ODN. 5. Check ONU registration process, and record its PLOAM state and how much time it takes for registration success. 6. Analyze the reason if ONU register fail. 7. Disconnect the fiber at ONU PON port. 8. Change ONU's password from EMS/CLI, then connect the fiber and put ONU to ODN. Check if ONU can register success or not and record its registration process and its PLOAM state.

Expected Results	<ol style="list-style-type: none"> In step 5,ONU should register successfully and meet the requirement of G.984.Then ONU enter Operation State (O5). In step 8,ONU would fail to register.
Test Statement	1. Disable encryption and FEC function in this test.
Test Results	
Remarks	
Flow Chart	<p>Please reference G.984.3 and its amendments for the PLOAM messages.</p> <pre> sequenceDiagram participant OLT participant ONT Note over OLT, ONT: ONT synchronizes with OLT on downstream and clear LOS/LOF OLT->>ONT: Upstream_Overhead OLT->>ONT: Extended_Burst_length(Optional) OLT->>ONT: SN_Request(BW Grant w/ Alloc_ID = 254) ONT->>OLT: Serial_Number_ONU OLT->>ONT: Assign ONU-ID OLT->>ONT: Ranging Request (BW Grant w/ Alloc_ID = ID of ONU to be ranged) ONT->>OLT: Serial_Number_ONU OLT->>ONT: Ranging_Time OLT->>ONT: Request_password(Optional) ONT->>OLT: Password (Optional) </pre>

2.4 Password Authentication

Test Purpose	Verify password authentication function
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup test environment as figure 1. 2. Disconnect the fiber at ONU PON port. 3. Configure the password for ONU from EMS/CLI. Then configure ONU's authentication mode to "Password". 4. Connect the fiber and put ONU to ODN. 5. Check ONU registration process,and record its PLOAM state and how much time it takes for registrtaion success. 6. Analyze the reason if ONU register fail. 7. Disconnect the fiber at ONU PON port. 8. Change ONU's password from EMS/CLI,then connect the fiber and put ONU to ODN. Check if ONU can register success or not and record its registration process and its PLOAM state.
Expected Results	<ol style="list-style-type: none"> 1. In step 5,ONU should register successfully and meet the requirement of G.984.Then ONU enter Operation State (O5). 2. In step 8,ONU would fail to register.
Test Statement	1. Disable encryption and FEC function in this test.
Test Results	
Remarks	
ALU Recommendation	This method will use user ID(password) to indentify the ONU which can provide better flexibility of GPON service to customer. To avoid conflict with current standard ,the Password of PLOAM messages defined in G.984.3 is not applied here.We suggest keep original messages (SN and PW) and define an extension PLAOM message to achieve this goal.

2.5 ONU De-Register

Test Purpose	Verify ONU registration function after OLTde-register ONU.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup test environment as figure 1. ° 2. Configure ONU's authentication mode to SN.ONU should register normally. 3. Disable ONU at OLT side 4. Check if ONU enter Emergency State (O7) . 5. Manually reset ONU,ONU re set and restart. 6. Check if ONU ONU enter Emergency State (O7) after registration 7. Enable ONU at OLT side. 8. Check if ONUcan re-enter to Operation State (O5)
Expected Results	<ol style="list-style-type: none"> 1. Step 4 : ONU enter Emergency State (O7). 2. Step 6 : ONU enter Emergency State (O7). 3. Step 8 : ONU enter Operation State (O5). 4. The transition state of ONUshould compliant with G.984.
Test Statement	
Test Results	
Remarks	
Flow Chart	<p>Please reference G.984.3 and its amendments for the PLOAM messages.</p>  <pre> graph LR OLT[OLT] -- "Deactivate_ONU-ID (send 3 times)" --> ONT[ONT] </pre>

2.6 Downstream FEC Function

Test Purpose	Verify FEC function in downstream PATH
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup test environment as figure 1. 2. Configure ONU's authentication mode to SN. Reset ONU,ONU should register normally. 3. Send 10M Ethernet traffics from OLT to ONU by "Network Performance analyzer". The traffic should flow normally. 4. Increase the attenuation level gradually until error occur or packet dorp and record the attenuation value. 5. Enable FEC function in OLT and ONU. Increase the attenuation level gradually until error occur or packet dorp and record the attenuation value. (Observe " Ident" field if you have GPON protocol analyzer) 6. Record the difference of attenuation in Step4 and Step5. 7. Analyze the reason if FEC cannot be set or work normally.
Expected Results	<ol style="list-style-type: none"> 1、 FEC function should increase optical buget about 3dB. 2、 There is a FEC enable indication in the "Ident" field(Most significant bit).
Test Statement	
Test Results	
Remarks	
Flow Chart	OLT set PCBd-IDENT FEC Ind to '1' in downstream.

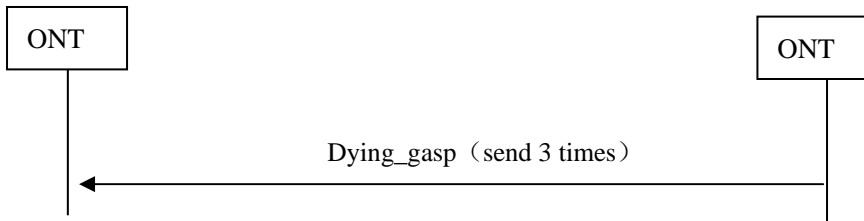
2.7 Downstream Encryption & Decryption

Test Purpose	Verify Encryption & Decryption Function in downstream path.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup test environment as figure 1. 2. Configure ONU's authentication mode to SN. Reset ONU,ONU should register normally. 3. Disable encrypton function in downstream path. 4. Send 10M traffic from OLT to ONU(downstream) and10M traffic from ONU to OLT(upstream) by "Network Performance analyzer". Check there is no error occur or packet drop in both direction. 5. Enable encryption function from OLT,then observe the key exchange process and check the format of following messages: Encryption Key 、 Key switching Time 、 Request Key 、 Encrypted_Port-ID. Check there is no error occur or packet drop in both direction. 6. Analyze the reason if the encryption function fail.

Expected Results	1、 After enable encryption function from OLT,ONU should decryp the traffics according to encryption key and no packet should be dropped.The format of PLOAM should meet the requirement of G.984.
Test Statement	
Test Results	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px 10px;">OLT</div> <div style="border: 1px solid black; padding: 2px 10px;">ONT</div> </div>
Remarks	Request Key
Flow Chart	Encryption Key (3times, fragement 1)
	Encryption Key (3times, fragement 2)
	Encryption Key (3times, fragement end)
	Encrypted Port-ID
	Acknowledge
	Key switching time (send 3 times)
	<p>Please reference the flow chart above for the key exchange, encryption Port-ID and key swithing time.</p> <p>The PLOAM messages should be compliant with G.984.3 and its amendments.</p>

2.8 Dying Gasp Function

Test Purpose	Verify Dying gasp function
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup test environment as figure 1. 2. Configure ONU's authentication mode to SN. Reset ONU,then ONU should register normally. 3. Power off ONU and observe is there any Daying gasp alarm on EMS/CLI. 4. Power on ONU. Check wether dying gasp alarm disappear or not after ONU register successfully. 5. Analyze the reason from Dying_gasp(PLOAM) message if there is no dying gasp alarm on EMS/CLI.

Expected Results	<p>1、 In Step3 , there is a dying gasp alarm on EMS/CLI. Dying_gasp should meet the requirement of G.984.</p> <p>2、 In Step 4,alarm would be disappeared on EMS/CLI.</p>
Test Statement	
Test Results	
Remarks	
Flow Chart	<p>Please reference G.984.3 and its amendments for the PLOAM messages.</p>  <pre> graph LR ONT1[ONT] -- "Dying_gasp (send 3 times)" --> ONT2[ONT] </pre>

3 OMCI Interoperability Test

3.1 OMCI Channel(OMCC) Establish

Test Purpose	Verify the establish of OMCI channel(OMCC).
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<p>1. Setup test environment as figure 1.。</p> <p>2. Configure SN for ONU from EMS/CLI,then power on ONU.</p> <p>3. ONU automatically create OMCI channel. Check TCONT Alloc_ID of OMCI channel and establishing procedure.</p> <p>4、 Analyze the reason if OMCI channel cannot be established normally.</p>
Expected Results	1、 The procedure of establishing OMCI channel should meet the requirement of G.984 ,Alloc_ID shuould be same as ONU_ID。
Test Statement	

Test Results	
Remarks	
Flow Chart	<p>Please reference G.984.3 and its amendments for the PLOAM messages.</p> <pre> sequenceDiagram participant OLT participant ONT OLT->>ONT: Assign ONU-ID OLT->>ONT: Ranging Request (BW Grant w/ Alloc_ID = ID of ONU to be ranged) ONT->>OLT: Serial_Number_ONU OLT->>ONT: Ranging_Time OLT->>ONT: Configure Port-ID ONT->>OLT: ACK </pre>

3.2 OMCI Initialization and Synchronization

Test Purpose	Verify initialization and synchronization of OMCI.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup test environment as figure 1. ° 2. Configure ONU's authentication mode to SN. Reset ONU, then ONU should register normally. 3. Check the initial synchronization process of OMCI. Check ONU support MIB UPLOAD or not. 4. Observe the ONU's MIB message received from OLT by EMS/CLI and compare it with ONU local MIB. Check the MIB between OLT and ONU is synchronized or not. Record the MIB content on EMS/CLI. 5. Analyze the reason from OMCI message format and procedure if OLT cannot synchronize with ONU's MIB message.

Expected Results	<p>1、The initial synchronization process of OMCI should meet the requirement of G.984. This process involve MIB the operation of data sync attribute and other actions such as “MIB reset”, ”MIB upload” and “MIB upload next” defined in the managed entity of “ONT data”.</p> <p>2、MIB upload should upload the “Required” managed entities which defined in G.984.4 such as ANI-G、ONT data、ONT – G、ONT2-G、T-CONT。</p> <p>3、In Step 4, the MIB is synchronized between OLT and ONU.</p>
Test Statement	
Test Results	
Remarks	
Flow Chart	<pre> sequenceDiagram participant OLT participant ONT OLT->>ONT: ONT Data Get command ONT-->>OLT: ONT Data Get response Note over OLT: MIB Data sync checking, if not same, reset ONT MIB OLT->>ONT: ONT Data MIB reset command ONT-->>OLT: ONT Data MIB reset response OLT->>ONT: ONT Data MIB upload command ONT-->>OLT: ONT Data MIB upload response(number of commands N+1) OLT->>ONT: ONT Data MIB upload next command(sequence 0) ONT-->>OLT: ONT Data MIB upload next command response Note over OLT: ----- OLT->>ONT: ONT Data MIB upload next command(sequence N) ONT-->>OLT: ONT Data MIB upload next command response </pre>

3.3 Ethernet Port Management

Test Purpose	Verify the management of Ethernet port by remote query or configuration.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<p>1、Setup test environment as figure 1. ;</p> <p>2、Configure ONU's authentication mode to SN. Reset ONU ONU register normally. OMCI channel establish normally and finish initial synchronization process</p> <p>4、Query Ethernet port status of ONU from EMS/CLI. Check the GET/GET Response message is correct or not.</p> <p>5、Enable Ethernet port from EMS/CLI. Check the setting is applied to Ethernet port or not. Check the SET/SET Response message is correct or not.</p> <p>6、Disable Ethernet port from EMS/CLI. Check the setting is applied to Ethernet port or not. Check the SET/SET Response message is correct or not.</p> <p>7、Analyze the reason from OMCI message and procedure if the setting is not applied.</p>
Expected Results	<p>1、OLT can remotely query/set ONU Ethernet port .The setting should be applied immediately.</p> <p>2、Management of Ethernet port ONU involve the operation of the attribute “Administrative state “ which defined in managed entity “Physical path termination point Ethernet UNI”.</p>
Test Statement	
Test Results	
Remarks	

3.4 Loopback Function of Ethernet Port

Test Purpose	Verify loopback function of Ethernet port by remote configuration.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<p>1 、 Setup test environment as figure 1. ；</p> <p>2 、 Configure ONU's authentication mode to SN. Reset ONU ONU register normally. OMCI channel establish normally and finish initial synchronization process</p> <p>3 、 Send upstream and downstream traffic from OLT,ONU FE1 and ONU FE2 by network analyzer(Smartbit) and make sure that no error occur or packet drop.</p> <p>3 、 Enable the loopback function of ONU FE1 from EMS/CLI and check the message SET/SET response in process. Observe the influence of the traffic; wether the traffic being block at ONU FE1 and whether the traffic being influenced at ONU FE2.</p> <p>4 、 Disable the ONT loopback function and observe the influence of traffic.</p> <p>5 、 Analyze the reason if fail to configure.</p>
Expected Results	<p>1 、 OLT should be able to remotely configure the loopback function of Ethernet port.</p> <p>2、 The loopback function of ONU Ethernet port involve the operation of the attribute " Ethernet loopback configuration" which defined in the managed entity " Physical path termination point Ethernet UNI"</p> <p>3、 FE1 loopback should not affect the traffic of FE2.</p>
Test Statement	
Test Results	
Remarks	

3.5 Auto-Negotiation Function of Ethernet Port

Test Purpose	Verify Auto-Negotiation function of Ethernet port by remote query or configuration.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1、 Setup test environment as figure 1. 2、 Configure ONU's authentication mode to SN. Reset ONU. ONU register normally. OMCI channel establish normally and finish initial synchronization process. 4 、 Query the Auto-Negotiation ability and status from EMS/CLI and check the OMCI message in the process. 5 、 Enable the Auto-Negotiation function from EMS/CLI and check the OMCI message in process.Check wether the configuration is applied or not by network analyzer(Smartbit). 6 、 Disable the Auto-Negotiation function from EMS/CLI and check the OMCI message in process.Check wether the configuration is applied or not by network analyzer(Smartbit). 7 、 Analyze the reason if fail to configure.
Expected Results	<ol style="list-style-type: none"> 1 、 EMS/CLI can remotely query/configure Auto-Negotiation ability and status. 2、 The Auto-Negotiation function of ONU Ethernet port involve the operation of the attribute " Auto detection configuration" and "Configuration Ind" which defined in the managed entity " Physical path termination point Ethernet UNI".
Test Statement	
Test Results	
Remarks	

3.6 Flow Control(Pause) Function of Ethernet Port

Test Purpose	Verify flow control(Pause) function of Ethernet port by remote query or configuration.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1、 Setup test environment as figure 1. ; 2、 Configure ONU's authentication mode to SN. Reset ONU. ONU register normally. OMCI channel establish normally and finish initial synchronization process. 3、 Query the flow control status of Ethernet port from EMS/CLI and check the OMCI messages in the process. 4、 Enable the flow control function of Ethernet port from EMS/CLI and check the OMCI messages in the process.Check wether the configuration is applied or not by network analyzer(Smartbit). 5、 Disable the flow control function of Ethernet port from EMS/CLI and check the OMCI messages in the process.Check wether the configuration is applied or not by network analyzer(Smartbit). 6、 Analyze the reason if fail to configure.
Expected Results	<ol style="list-style-type: none"> 1、 EMS/CLI can remotely query/configure the flow control function of ONU Ethernet port. 2、 The flow control(PAUSE) function of ONU Ethernet port involve the operation of the attribute “Pause time” which defined in the managed entity “Physical path termination point Ethernet UNI”.
Test Statement	
Test Results	
Remarks	

3.7 VLAN Function of Ethernet Port

Test Purpose	Verify VLAN function of Ethernet port by remote query or configuration.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup the test environment as figure 1. 2. Query the VLAN mode of Ethernet port from OLT and check the OMCI messages in the process. 3. OLT configure the VLAN mode of ONU Ethernet port to TRUNK mode through EMS/CLI and check the OMCI messages in the process. Check whether the configuration is applied or not. 4. OLT configure the VLAN mode of ONU Ethernet port to ACCESS mode through EMS/CLI and check the OMCI messages in the process. Check whether the configuration is applied or not. 5. OLT configure the VLAN mode of ONU Ethernet port to Hybrid mode through EMS/CLI and check the OMCI messages in the process. Check whether the configuration is applied or not. 6. OLT configure the VLAN mode of ONU Ethernet port to Translation mode through EMS/CLI and check the OMCI messages in the process. Check whether the configuration is applied or not. 7. Analyze the reason if OLT fail to configure the VLAN mode of ONU port.
Expected Results	<ol style="list-style-type: none"> 1、OLT can remotely query/configure the VLAN mode of ONU Ethernet port. 2、The configuration of VLAN mode involve following managed entities: "Vlan tagging filter data", "vlan tagging operation configuration data" or "extended vlan tagging operation configuration data".
Test Statement	<p>Test and record what kind of VLAN mode that ONU can support</p> <p>Ignore Setp 6 if ONU cannot support VLAN translation mode.</p>
Test Results	This item can be tested together with 4.2.
Remarks	

3.8 Rate Limit Function of Ethernet Port

Test Purpose	Verify rate limit function of Ethernet port by OLT remote query or configuration.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup the test environment as figure 1. 2. Query the rate limit function of Ethernet port from OLT and check the OMCI messages in the process. 3. OLT configure the upstream rate limit function of ONU Ethernet port through EMS/CLI and check the OMCI messages in the process. Check whether the configuration is applied or not. 4. OLT configure the downstream rate limit function of ONU Ethernet port through EMS/CLI and check the OMCI messages in the process. Check whether the configuration is applied or not. 5. Analyze the reason if fail to configure.
Expected Results	<ol style="list-style-type: none"> 1、OLT can remotely query/configure upstream/downstream rate limit function. 2、The rate limit function of ONU Ethernet port involve the operation of the attribute “Outbound TD pointer” and “Inbound TD pointer” which defined in the managed entity “MAC bridge port configuration data”. Furthermore the “TP pointer” of “MAC bridge port configuration data” should point to “Physical path termination point Ethernet UNI” accordingly.
Test Statement	This item can be tested together with 4.3.2.
Test Results	
Remarks	

3.9 ONU Classification and Priority Mapping

Test Purpose	Verify that OLT can remotely query/configure ONU classification and priority mapping.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1、 Setup the test environment as figure 1. 2、 OLT Query the classification and mapping rules through EMS/CLI and check the OMCI messages in the process. 3、 OLT configure the classification and mapping rules to “Physical Port” through EMS/CLI and check the OMCI messages in the process.Check wether the configuration is applied or not. 4、 OLT configure the classification and mapping rules to “VLAN” through EMS/CLI and check the OMCI messages in the process.Check wether the configuration is applied or not. 5 、 OLT configure the classification and mapping rules to “Ethernet Priority(TOS)” through EMS/CLI and check the OMCI messages in the process.Check wether the configuration is applied or not. 6、 OLT configure the classification and mapping rules to “VLAN + user Priority” through EMS/CLI and check the OMCI messages in the process.Check wether the configuration is applied or not. 7、 Analyze the reason if fail to configure.
Expected Results	<ol style="list-style-type: none"> 1 、 OLT can remotely query/configure ONU classification and priority mapping. 2、 ONU classification and priority mapping involve the managed entities defined in the figure 8.2.2-3~8.2.2-9 in G.984.4.
Test Statement	This item can be tested together with 4.3.1.
Test Results	
Remarks	

3.10 Remote Management Function of ONU VoIP Port (Only for VoIP-Capable ONU)

Test Purpose	Verify the interoperability of remote query/set function for ONU VoIP port.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<p>1、Setup test environment as figure 1. ;</p> <p>2、Configure ONU's authentication mode to SN. Reset ONU. ONU register normally. OMCI channel establish normally and finish initial synchronization process.</p> <p>3、OLT Query the status of ONU VoIP POTS port through EMS/CLI and check the OMCI messages in the process.</p> <p>4、OLT enable ONU VoIP POTS port through EMS/CLI and check the OMCI messages in the process.Check wether the configuration is applied or not.</p> <p>5、OLT disable ONU VoIP POTS port through EMS/CLI and check the OMCI messages in the process.Check wether the configuration is applied or not.</p> <p>6、Analyze the reason from OMCI messages and process if fail to configure.</p>
Expected Results	<p>1、OLT can remotely query/configure ONU's VoIP POTS port,and setting should be applied.</p> <p>2、The management of ONU POTS port involve the operation of the attribute "Administrative state" which defined in the manage entity "Physical path termination point POTS UNI".</p>
Test Statement	
Test Results	
Remarks	

3.11 Remote Management of ONU TDM Port(For TDM capable ONU)

Test Purpose	Verify that OLT can remotely query/configure ONU E1 port.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<p>1 、 Setup test environment as figure 1. ;</p> <p>2 、 Configure ONU's authentication mode to SN. Reset ONU. ONU register normally. OMCI channel establish normally and finish initial synchronization process.</p> <p>3 、 OLT Query the status of ONU E1 port through EMS/CLI and check the OMCI messages in the process.</p> <p>3 、 OLT enable ONU E1 port through EMS/CLI and check the OMCI messages in the process.Check wether the configuration is applied or not.</p> <p>4 、 OLT disable ONU E1 port through EMS/CLI and check the OMCI messages in the process.Check wether the configuration is applied or not.</p> <p>5 、 Analyze the reason from OMCI messages and procedure if fail to configure.</p>
Expected Results	<p>1 、 OLT can remotely query/configure ONU E1 port,and the setting should apply to ONU.</p> <p>2 、 Management of ONU TDM prt involve the operation of the attribute "Administrative state" which defined in the managed entity "Physical path termination point CES UNI".</p>
Test Statement	
Test Results	
Remarks	

3.12 Statistics Fucntion of ONU Ethernet Port Performance

Test Purpose	Verifythe statistics functionof ONU Ethernet port performance.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<p>1 、 Setup test environment as figure 1. ；</p> <p>2 、 Configure ONU's authentication mode to SN. Reset ONU. ONU register normally. OMCI channel establish normally and finish initial synchronization process.</p> <p>3 、 Send downstream traffic from OLT and upstream traffic from ONU FE1 by network analyzer,then observe the traffic.</p> <p>4 、 OLT clear the statistic of ONU FE1 through EMS/CLI.</p> <p>5 、 Send 10000 unicast Ethernet packets in both upstream and downstream.Observe the statistics counter from EMS/CLI and OMCI messages.</p> <p>6 、 Send 100 CRC error packets in both upstream and downstream.Observe the statistics counter from EMS/CLI and OMCI messages.</p> <p>7 、 Send 100 over-length packets in both upstream and downstream.Observe the statistics counter from EMS/CLI and OMCI messages.</p> <p>8 、 Send 100 under-length packets in both upstream and downstream.Observe the statistics counter from EMS/CLI and OMCI messages.</p> <p>9 、 Send 100 alignemnet error packets in both upstream and downstream.Observe the statistics counter from EMS/CLI and OMCI messages.</p> <p>10 、 Analyze the reason if OLT cannot get the statistics of ONU ethernet port.</p> <p>11 、 Verify other statistics function if possible.</p>
Expected Results	<p>1 、 OLT can query the statistics of ONU ethernet port through OMCI message.</p> <p>2 、 ONU can query the statistics of “Ethernet performance monitoring history data” , ”Ethernet performance monitoring history data2” , ”Ethernet performance monitoring history data3” through the action “Get current data” defined in OMCI.</p>
Test Statement	
Test Results	
Remarks	

3.13 Alarm Notification for ONU Ethernet Port Status

Test Purpose	Verify alarm notification function for ONU Ethernet port status.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1、 Setup test environment as figure 1.; 2、 Configure ONU's authentication mode to SN. Reset ONU. ONU register normally. OMCI channel establish normally and finish initial synchronization process. 3、 Disconnect the cable at ONU Ethernet port,and check whether LAN-LOS alarm occur through EMS/CLI. Check OMCI messages in the process. 4、 Connect the Ethernet cable to ONU Ethernet port and check LAN-LOS alarm disappear through EMS/CLI.Check OMCI messages in the process. 8、 Analyze the reason from OMCI message format or procedure if no alarm notification from ONU. 9、 Verify other types of alarm types if possible.
Expected Results	<ol style="list-style-type: none"> 1、 In step 3 , EMS/CLI can see LAN-LOS alarm notified from ONU. 2、 In step 4, EMS/CLI can see that LAN-LOS alarm is disappear. 3、 The alarm notification of ONU Ethernet port involove the “ALARM” of the managed entity “Physical path termination point Ethernet UNI”.
Test Statement	
Test Results	
Remarks	

3.14 ONU Remote Reset

Test Purpose	Verify OLT can reset ONU remotely.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup test environment as figure 1. ; 2. Configure ONU's authentication mode to SN. Reset ONU. ONU register normally. OMCI channel establish normally and finish initial synchronization process. 3. OLT remotely reset ONU through OMCI message. Check ONU can be reset or not. 4. After ONU reset,check ONU's PLAOM state machine. 5. Analyze the reason from OMCI message and procedure if ONU cannot reset normally.
Expected Results	<ol style="list-style-type: none"> 1、ONU can reset immediately,and register normally(stay in Operataion State O5) 2、ONU remote reset function invovle the action of “Reboot” which defined in managed entity ”ONT-G”.
Test Statement	
Test Results	
Remarks	

3.15 ONU Firmware Upgrade

Test Purpose	Verify ONU firmware upgrade function.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1、 Setup test environment as figure 1. ; 2、 Configure ONU's authentication mode to SN. Reset ONU. ONU register normally. OMCI channel establish normally and finish initial synchronization process. 3、 Query the firmware version as VerA from EMS/CLI, check OMCI messages in the process. 4、 Upgrade firmware to VerB from EMS/CLI and check OMCI messages in the process. Record how much time it takes. 5、 Reset the ONU after firmware upgrade,then query the firmware version through EMS/CLI.Check wether the firmwar version is VerB or not. 6、 Analyze the reason from OMCI message and procedure if ONU fail to upgrade.
Expected Results	<ol style="list-style-type: none"> 1 、 EMS/CLI can query ONU's firmware version. 2 、 EMS/CLI can upgrade ONU's firmware. 3 、 ONU firmware upgrade involve the operation of the action “Start download”, ”Download section”, ”End download”, ”Activate image” and “Commit image” which defined in the managed entity “Software image”. Please reference the state machine of “Software image” defined in ITU-984.4 for the detail precedure.
Test Statement	
Test Results	
Remarks	

4 Service Interoperability Test

4.1 Bandwidth Allocation Interoperability Test

4.1.1 ONU TCONT Operation

Test Purpose	Verify remote query/set ONU T-CONT type or number.												
Test Instruments													
Test Environment	Please reference figure 1 for test configuration.												
Test Procedure	<p>1、 Setup the test environment as figure 1.Put 1 vendor B's ONU 1 to ODN.Go next step when the ONU register successfully.</p> <p>2、 Create 5 TCONTs(Type1~Type5) and 5 GEMPorts for Vendor B's ONU1 through EMS/CLI.Confiure TCONT as follow:Type 1 fixed bandwidth=10M ,Type 2 assured bandwidth=10M ,Type 3 assured bandwidth =5M and maximum bandwidth=10M,Type 4 maximum bandwidth = 10M,Type 5 fixed bandwidth=5M, assured bandwidth=6M and maximum bandwidth=20M.</p> <p>Furthermore configure 5 VLAN at OLT NNI side, the mapping table is displayed as follow.</p> <table border="1"> <thead> <tr> <th>TCONT</th><th>VLAN</th></tr> </thead> <tbody> <tr> <td>Type1</td><td>101</td></tr> <tr> <td>Type2</td><td>102</td></tr> <tr> <td>Type3</td><td>103</td></tr> <tr> <td>Type4</td><td>104</td></tr> <tr> <td>Type5</td><td>105</td></tr> </tbody> </table> <p>3、 Send 5 15M traffic streams(Packet size is random) to ONU1 by network analyzer, and VLAN ID are 101~105 accordingly.</p> <p>4、 Check the BWmap field allocated by OLT in the downstream frame.Observe the traffic at OLT NNI side and verify that ONU can normally transmit/receive traffic. Or observe the alarm in network management message.</p> <p>5、 OLT remotely query how many TCONT number that ONU1 can support.</p> <p>6、 OLT create N TCONTs and N Gemports for ONU1and each Gemport map to each TCONT. All the TCONTs are type 4 and maximum bandwith=10M.Check OMCI message in configuration process.</p> <p>7、 OLT remotely create N+1 th's TCONT and N+1 th's Gemport.The TCONT is type 4 and maximum bandwidth = 10M.Check the OMCI messages in the configuration process.</p> <p>8、 Analyze the reason if OLT fail to configure ONU's TCONT and Gemport.</p>	TCONT	VLAN	Type1	101	Type2	102	Type3	103	Type4	104	Type5	105
TCONT	VLAN												
Type1	101												
Type2	102												
Type3	103												
Type4	104												
Type5	105												

Expected Results	<p>1、OLT can remotely query how many TCONT number that ONU can support and configure ONU's TCONT and Gempport normally.</p> <p>2、N must great than 3.</p> <p>3、Multiple TCONTs on an ONU can transmit and recive traffic at the same time and OLT can receive the traffic(Type1~Type5) at OLT NNI port.</p>
Test Statement	If ONU have no GE port, at least 10 ONUs with FE Port need to be used in this case.
Test Results	
Remarks	

4.1.2 Fixed Bandwidth Allocation(T-CONT type 1)

Test Purpose	Verify the fixed bandwidth allocation function of T-CONT type 1 and its granularity.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup the test environment as figure 1. Put 2 vendor A's ONU2 and ONU3 (Use ONU with GE UNI port) and 1 vendor B's ONU1 into ODN. Go next step when three ONUs register successfully. 2. Create 1 TCONT(Type 1) for vendor B's ONU1 through EMS/CLI. Then configure the fixed bandwidth to 50M and create a GEM port for the TCONT. 3. Create one TCONT(Type 4) for each vendor A's ONU2 and ONU3. Then configure the maximum bandwidth to 1000M, and create one GEM port for each TCONT. 4. Send 1000M upstream traffic(packet size is 512B) for each ONU1, ONU2 and ONU3. Check the BWmap field allocated by OLT in downstream frame and observe the traffic at OLT NNI side. 5. Stop sending traffic to ONU. Check the BWmap field allocated by OLT in downstream frame and observe the traffic at OLT NNI side. 6. Analyze the reason if OLT cannot remotely configure ONU's TCONT and Gempport.

Expected Results	<ol style="list-style-type: none"> 1. OLT can remotely configure ONU's TCONT and GeM port. 2. In step 4,OLT NNI port expect to receive 50M traffic from ONU1. 3. In step 4 and step 5,OLT NNI port expect to receive equivalent traffic from ONU2 and ONU3. 4. The format of BWmap field should meet the requirment of G.984 and ONU should transmit the corresponding traffic during the allocation time.
Test Statement	If ONU have no GE port, at least 10 ONUs with FE Port need to be used in this case.
Test Results	
Remarks	

4.1.3 Dynamic Bandwidth Allocation (T-CONT type 2)

Test Purpose	Verify dynamic bandwidth allocation of T-CONT type2
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup the test environment as figure 1. Put 2 vendor A's ONU2 and ONU3 (Use ONU with GE UNI port) and 1 vendor B's ONU1 into ODN. Go next step when three ONUs register succefully. 2. Create 1 TCONT(Type 2) for vendor B's ONU1 through EMS/CLI.Then configure the assured bandwidth to 50M and create a GEM port for the TCONT. 3. Create one TCONT(Type 4) for each vendor A's ONU2 and ONU3. Then configure the maximum bandwidth to 1000M, and create one GEM port for each TCONT. 4. Send1000M upstream traffic(packet size is 512B) for each ONU1,ONU2 and ONU3.Check the BWmap field allocated by OLT in downstream frame and observe the traffic at OLT NNI side. 5. Stop sending traffic to ONU. Check the BWmap field allocated by OLT in downstream frame and observe the traffic at OLT NNI side. 6. Analyze the reason if OLT cannot remotely configure ONU's TCONT and Gempport.

Expected Results	<p>1、OLT can remotely configure ONU's TCONT and GeM port.</p> <p>2、In step 4,OLT NNI port expect to receive 50M traffic from ONU1.</p> <p>3、OLT NNI port in step 5 expect to receive more traffic from ONU2 and ONU 3 than that in step 4.</p> <p>4、The format of BWmap field should meet the requirmenet of G.984 and ONU should transmit the corresponding traffic during the allocation time.</p>
Test Statement	If ONU have no GE port, at least 10 ONUs with FE Port need to be used in this case.
Test Results	
Remarks	

4.1.4 Dynamic Bandwidth Allocation (T-CONT type 3)

Test Purpose	Verify dynamic bandwidth allocation of T-CONT type3
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1、Setup the test environment as figure 1. Put 2 vendor A's ONU2 and ONU3 (Use ONU with GE UNI port) and 1 vendor B's ONU1 into ODN. Go next step when three ONUs register succcessfully. 2、Create one TCONT(Type 4) for each vender B's ONU1 and each vendor A's ONU2 and ONU3. Then configure the maximum bandwidth to 1000M, and create one GEM port for each TCONT. 3、Send 1000M upstream traffic(packet length is 512B) for each ONU1,ONU2 and ONU3.Observe the traffic at OLT NNI side. 4、Record the total bandwidth noted as B1 and top sending traffic from network analyzer. 5、Modify ONU1's TCONT type to type 3 through EMS/CLI.Configure the assured bandwith to 80M, maximum bandwidth to 100M. 6、Send 1000M upstream traffic(packet size is random) for each ONU1,ONU2 and ONU3.Check the BWmap field allocated by OLT in downstream frame and observe the traffic at OLT NNI side. 7、Stop sending traffic to ONU. Check the BWmap field allocated by OLT in downstream frame and observe the traffic at OLT NNI side. Record the total bandwidth noted as B2。 8、Analyze the reason if OLT fail to configure ONU's TCONT and GEMport.

Expected Results	1、OLT can remotely configure ONU's TCONT and GeM port. 2、B1=B2; 3、In step 7, OLT NNI port expect to receive 80M ~100M traffic from ONU1. 4、The format of BWmap field should meet the requirment of G.984 and ONU should transmit the corresponding traffic during the allocation time.
Test Statement	If ONU have no GE port, at least 10 ONUs with FE Port need to be used in this case.
Test Results	
Remarks	

4.1.5 Dynamic Bandwidth Allocation (T-CONT type 4)

Test Purpose	Verify dynamic bandwidth allocation of T-CONT type4
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	1、Setup the test environment as figure 1. Put 2 vendor A's ONU2 and ONU3 (Use ONU with GE UNI port) and 1 vendor B's ONU1 into ODN. Go next step when three ONUs register succefully. 2、Create one TCONT(Type 4) for vender B's ONU1 through EMS/CLI. Then configure the maximum bandwidth to 100M, and create one GEM port for the TCONT. 3、Create one TCONT(Type 4) for each vender A's ONU2 and ONU3 through EMS/CLI. Then configure the maximum bandwidth to 1000M, and create one GEM port for the TCONT. 4、Send 1000M upstream traffic (packet size is random) for ONU1 and ONU2. Check the BWmap field allocated by OLT in downstream frame and observe the traffic at OLT NNI side. 5、Analyze the reason if OLT fail to configure ONU's TCONT and GEMport.
Expected Results	1. OLT can remotely configure ONU's TCONT and GeM port. 2. The format of BWmap field should meet the requirment of G.984 and ONU should transmit the corresponding traffic during the allocation time.
Test Statement	If ONU have no GE port, at least 10 ONUs with FE Port need to be used in this

	case.
Test Results	
Remarks	

4.1.6 Dynamic Bandwidth Allocation (T-CONT type 5)

Test Purpose	Verify dynamic bandwidth allocation of T-CONT type5
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1、 Setup the test environment as figure 1. Put 2 vendor A's ONU2 and ONU3 (Use ONU with GE UNI port) and 1 vendor B's ONU1 into ODN. Go next step when three ONUs register successfully. 2、 Create one TCONT(Type 4) for each vendor B's ONU1 and each vendor A's ONU2 and ONU3. Then configure the maximum bandwidth to 1000M, and create one GEM port for each TCONT. 3、 Send 1000M upstream traffic(packet size is random) for each ONU1,ONU2 and ONU3.Check the BWmap field allocated by OLT in downstream frame and observe the traffic at OLT NNI side. 4、 Record the total bandwidth noted as B1 and top sending traffic from network analyzer. 5、 Modify ONU1's TCONT type to type 5 through EMS/CLI. Then configure the fixed bandwidth to 80M, assured bandwidth to 40M and maximum bandwidth to 100M. 6、 Send 1000M upstream traffic(packet size is random) for each ONU1,ONU2 and ONU3.Check the BWmap field allocated by OLT in downstream frame and observe the traffic at OLT NNI side. 7、 Stop sending traffic to ONU. Check the BWmap field allocated by OLT in downstream frame and observe the traffic at OLT NNI side. Record the total bandwidth noted as B2. 6、 Analyze the reason if OLT fail to configure ONU's TCONT and GEMport.
Expected Results	<ol style="list-style-type: none"> 1、 OLT can remotely configure ONU's TCONT and GeM port. 2、 In step 6,OLT NNI port expect to receive at least 80M traffic. 3、 In step 7,OLT NNI port expect to receive B1-40M bandwidth from ONU2 and ONU3. 4、 The format of BWmap field should meet the requirment of G.984 and ONU should transmit the corresponding traffic during the allocation time.

Test Statement	If ONU have no GE port, at least 10 ONUs with FE Port need to be used in this case.
Test Results	
Remarks	

4.2 VLAN Interoperability Test

Test Purpose	Verify port base VLAN function
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup the test environment as figure 1. 2. Configure VLAN to “Trunk mode” for ONU Ethernet port through EMS/CLI. After success ,sending bidirectional traffic by network analyzer. Observe the VLAN TAG at OLT NNI port and ONU UNI port and verify whether the VLAN mode correct or not. 3. Configure VLAN to “Access mode” for ONU Ethernet port through EMS/CLI. After success ,sending bidirectional traffic by network analyzer. Observe the VLAN TAG at OLT NNI port and ONU UNI port and verify whether the VLAN mode correct or not. 4. Configure VLAN to “Hybrid mode” for ONU Ethernet port through EMS/CLI. After success ,sending bidirectional traffic by network analyzer. Observe the VLAN TAG at OLT NNI port and ONU UNI port and verify whether the VLAN mode correct or not. 5. Configure VLAN to “Translation mode” for ONU Ethernet port through EMS/CLI. After success ,sending bidirectional traffic by network analyzer. Observe the VLAN TAG at OLT NNI port and ONU UNI port and verify whether the VLAN mode correct or not. 6. Analyze the reason if OLT fail to configure VLAN of ONU port.
Expected Results	1、OLT can remotely configure ONU port’s VLAN mode.
Test Statement	Test and record what kind of VLAN mode that ONU could support. Ignore step 5 if ONU could not support VLAN translation mode.
Test Results	This item can be tested together with 3.7.
Remarks	

4.3 QoS Interoperability Test

4.3.1 ONU Classification & Mapping function for Upstream Traffics

Test Purpose	Verify ONU classification and mapping function for upstream traffics.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup the test environment as figure 1. 2. Create TCONT1(Type4) and configure its maximum bandwidth to 50M. Create Gemport 1 and Gemport 2, and both map to TCONT1. Check the OMCI messages in the configuration process. 3. Configure the classification & mapping rule to “Physical port” through MS/CLI. Then configure Ethernet port 1’s priority to 0x05 which map to Gemport1 and Ethernet port 2’s priority to 0x03 which map to Gemport2. Check the OMCI messages in the configuration process. 4. Send 50M traffic from ONU Ethernet port 1 and port 2 by network analyzer. 5. Analyze the traffic ratio for each physical port at OLT NNI side by network analyzer. Verify the classification & mapping function. Also capture the packets and check whether the priority tag(802.1D) meet above case. 6. Configure the classification & mapping rule of Ethernet port 1 to “VLAN ID” through EMS/CLI. If the Ethernet traffic with VLAN ID=0x11, its priority value is 0x05 and map to Gemport1. If the Ethernet traffic with VLAN ID=0x12, its priority value is 0x07 and map to Gemport2. Check the OMCI messages in the configuration process. 7. Send two 50M Ethernet traffic streams to ONU’s Ethernet port 1 by network analyzer and their VLAN ID is 0x11 and 0x12 accordingly. 8. Analyze the traffic ratio for both Ethernet traffic streams by network analyzer and verify the classification & mapping function. Also capture the packets and check whether the priority tag(802.1D) meet above case. 9. Configure the classification & mapping rule of Ethernet port 1 to “Ethernet priority (TOS)”. If the Ethernet traffic with TOS=0x03, its priority value is 0x03 and map to Gemport1. If the Ethernet traffic with TOS=0x05, its priority value is 0x05 and map to Gemport2. Check the OMCI messages in the configuration process. 10. Send two 50M Ethernet traffic streams to ONU’s Ethernet port 1 by network analyzer and their TOS are 0x03 and 0x05 accordingly. Then follow step 8.

	<p>11. Configure the classification & mapping rule of Ethernet port 1 to “VLAN + user Priority”. If the Ethernet traffic with VLAN ID=0x11 and user priority=0x05, its priority value is 0x05 and map to Gempport1. If the Ethernet traffic with VLAN ID=0x12 and user priority=0x07, its priority value is 0x07 and map to Gempport2. Check the OMCI messages in the configuration process.</p> <p>12. Send two 50M Ethernet traffic streams to ONU’s Ethernet port 1 by network analyzer and their VLAN ID are 0x11 and 0x12 and their user priority value are 0x05 and 0x7. Then follow step 8.</p> <p>13. Analyze the reason if OLT fail to configure ONU’s classification & mapping rules.</p>
Expected Results	1、OLT can remotely configure the classification & mapping rules for ONU.
Test Statement	<p>1、Test and record what kind of classification & mapping rule that ONU</p> <p>2、Record the schedule algorithm of ONU: SP,WRR or SP+WRR</p>
Test Results	
Remarks	

4.3.2 ONU Port Limit

Test Purpose	Verify ONU port limit function for upstream/downstream traffics.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<p>1. Setup the test environment as figure 1.</p> <p>2. Create one TCONT(Type 2) for ONU through EMS/CLI.Then configure the assured bandwidth to 100M and create a GEM port for the TCONT.</p> <p>3. Confiure the upstream/downstream rate limit function of ONU port 1 through EMS/CLI. Check the OMCI message in the configuration process.</p> <p>4. Send 80M traffic both in upstream and downstram path.Check the traffic loading at OLT NNI side and ONU UNI side and verify the ONU Ethernet port limit furnction.</p> <p>5. Analyze the reason if fail to configure.</p>
Expected Results	<p>1) OLT can remotely configure rate limit function of ONU port.</p> <p>2) Rate limit function should be applied and only 50M/sec Ethernet traffic can pass through OLT port.</p>
Test Statement	This item can be tested together with 3.8.
Test Results	
Remarks	

4.4 Multicast Test

4.4.1 SCB function

Test Purpose	Verify SCB function.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1、 Setup the test environment as figure 1. 2、 EMS confiure OLT multicast VALN=4001 and enable the IGMP proxy function. 3、 Confiure multicast VLAN: VID=4001 for vendor B's ONU1 and ONU2 through EMS/CLI. Configure Etherne port of ONU1 and ONU2 to TAG mode and check the OMCI message in the process. 4、 Send one multicast stream(Multicast address = 0x01-00-5e-01-01-01 ,destination ip=224.1.1.1 ,VLAN ID=4001, traffic loading=50Mb/s) from OLT by network analyzer. OLT deliver the stream to ONU by multicast GEMPORT. Furthermore, send unicast traffic from OLT and to other ONUs except ONU1 and ONU2 by network analyzer and make sure the total bandwidth of unicast traffic plus 50M must smaller than GPON downstream throughput(could be 2400M). 5、 Send IGMP REPORT(Multicast address=224.1.1.1) packet through ONU1 and ONU2 Ethernet ports.Observe whether FE port of ONU1 and ONU2 can receive the multicast stream or not.At the same check wether packet drop occur on other ONUs.Finally,check the multicast Gemport value. 6、 Analyze the reason if SCB fuction fail.
Expected Results	<ol style="list-style-type: none"> 1. System should support SCB function 2. In step 5,ONU1 and ONU2 both receive the multicast traffic accordingly and no packet drop for downstram unicast traffic. 3. This case shoule follow the ME relation diagram in figure 8.2.2-10 G.984.4 and the multicast address and multicast VLAN are configured by the managed entity "Multicast GEM interworking termination point","MAC Bridge Port Config Data","Vlan tagging filter data" and "MAC Bridge Port filter data table".
Test Statement	ONU IGMP snooping is default enable.
Test Results	
Remarks	

4.4.2 ONU IGMP Snooping Function

Test Purpose	Verify ONU IGMP snooping function.
Test Instruments	
Test Environment	Please reference figure 1 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1、 Setup the test environment as figure 1. 2、 Configure OLT's multicast VLAN to 4001, Enable OLT's IGMP Proxy function. 3、 Configure the multicast VLAN(VID1=4001) for 2 ONU Ethernet ports through EMS/CLI. Configure the port to TAG mode. Add VLAN tag for IGMP REPORT/LEAVE at ONU UNI port. Check OMCI messages in configuration process. 4、 Send 1 multicast streams as follow from OLT NNI port by network analyzer. Mac addresss =0x01-00-5e-01-01-01(destination IP address is 224.1.1.1). VLAN ID=4001 Traffice loading = 50 Mb/s 5、 Send IGMP REPORT packet(multicast address=224.1.1.1,VID1=4001) from ONU1 FE1 by network analyzer.Observe the multicast stream received by network analyzer and keep sending multicast traffic to ONU FE1. 6、 Send IGMP REPORT packet(multicast address 224.1.1.1,VID1=4001) to ONU1 FE2 by network analyzer.Observe the multicast stream received by network analyzer. 7、 Send IGMP leave at ONU FE2 actively (or wait some time) ,this make the port leave the multicast group(VLAN=4001).Check leave function of IGMP snooping. 8、 Analyze the reason if IGMP snooping fail.
Expected Results	<ol style="list-style-type: none"> 1. ONU support IGMP snooping function 2. This function should follow the ME relation diagram of figure 8.2.2-10 in G.984.4 and the multicast address and multicast VLAN are configured by the managed entity "Multicast GEM interworking termination point","MAC Bridge Port Config Data","Vlan tagging filter data" and "MAC Bridge Port filter data table".
Test Statement	ONU IGMP snooping is default enable.
Test Results	
Remarks	

4.5 TDM Traffic IOP Test (Optional)

Test Purpose	Verify TDM traffic IOP.
Test Instruments	
Test Environment	<p>Figure 2</p>
Test Procedure	<ol style="list-style-type: none"> 1、 Setup test environment as figure 2. 2、 Enable ONU's E1 port from EMS/CLI. 3、 Confiugre one E1 service from EMS/CLI. Check OMCI message and figure out how much bandwidth that E1 use. 4、 Send test signal from SDH analyser,and check system's error code.
Expected Results	<ol style="list-style-type: none"> 1、 TDM traffic can pass through each other without problem. 2、 In Native TDM mode, the relation diagram of ME should follow the figure 8.2.9-2 in G.984.4. In CESop mode, he relation diagram of ME should follow the figure 8.2.9-1 in G.984.4.
Test Statement	
Test Results	
Remarks	

4.6 Performance of Ethernet Service

4.6.1 Throughput Test

Test Item	Throughput test.
Test Purpose	Verify the throughput of vendor's OLT and ONU.
Test Configuration	<p>Figure 3</p>
Test Procedure	<ol style="list-style-type: none"> 1、 Setup the test environment as figure 3.(Vendor A's OLT & 10 Vendor B's ONU) 2、 Assign each ONU port's traffic to one TCONT and configure TCONT type to TCONT1. 3、 Test the throughput of devices by Smartbit and record the result. 4、 Modify TCONT type to TCONT4,go to Setp 3.
Expected Results	
Test Statement	<ol style="list-style-type: none"> 1. Test upstream and downstream path seperatly. 1、 Test with 7 typical packet length:64 bytes,128 bytes,256 bytes,512 bytes,1024 bytes,1280 bytes,1514 bytes. 2、 Test time period is 10 seconds. 3、 When testing RFC2544,disable the age out fuction of mac table(Disable in both OLT and ONU)
Test Results	
Remarks	If each ONU has only one FE port, 25 ONUs should be included in this case.

4.6.2 Packet Drop Rate when Overloading

Test Item	Packet drop rate when overloading.
Test Purpose	Test packet drop rate when overloading.
Test Configuration	Please reference figure 3 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup the test environment as figure 3.(Vendor A's OLT & 10 Vendor B's ONU) 2. Test the packet drop rate when overloading by Smartbit and record the result.
Expected Results	
Test Statement	<ol style="list-style-type: none"> 4、 Upstream traffic loading is 1.4Gbps,downstream traffic loading is 2.6G. 5、 Test with 7 typical packet length:64 bytes,128 bytes,256 bytes,512 bytes,1024 bytes,1280 bytes,1514 bytes. 6、 Test time period is 10 seconds. 7、 When testing RFC2544,disable the age out fuction of mac table(Disable in both OLT and ONU)
Test Results	
Remarks	If each ONU has only one FE port, 25 ONUs should be included in this case.

4.6.3 Forwarding Delay Test

Test Item	Forwarding delay test.
Test Purpose	Measure the forwarding delay between vendor's OLT and ONUs.
Test Configuration	Please reference figure 3 for test configuration.
Test Procedure	<ol style="list-style-type: none"> 1. Setup the test environment as figure 3.(Vendor A's OLT & 10 Vendor B's ONU) 2. Map each ONU port's Ethernet traffic to one TCONT,and all the TCONT type is type I(TCONT1). 3. Test the forwarding deay of devices by Smartbit and record the result. 4. Modify the TCONT-type to TCONT2 for all T-CONTs, then go to Step3 again. 5. Modify the TCONT-type to TCONT4 for all T-CONTs,do Step3 again.
Expected Results	Downstream : less than 500us Upstream : less than 1.5ms

Test Statement	<p>1、 Test with 7 typical packet length:64 bytes,128 bytes,256 bytes,512 bytes,1024 bytes,1280 bytes,1514 bytes.</p> <p>2、 Test time period is 10 seconds.</p> <p>3、 The traffic loading is about 90% of throughput.</p> <p>4、 Both ONU and OLT have 2 kind of layer2 swithing method: store and forward and cut-through.</p> <p>For the store and forward devices , forwarding delay is the time zone between last-bit receiving time and first-bit transmission time.</p> <p>Fot the cut-through device, forwarding delay is the time zone between first-bit receving time and first-bit transmission time.</p> <p>a) The test result should adapt average value of forwarding delay and record the maximum and minimum value for reference.</p>
Test Results	
Remarks	If each ONU has only one FE port, 25 ONUs should be included in this case.