

GPON Test Services: ONU benchmarking & Certification

Description



GPON test services aim to validate the functionality and performance of a GPON vendor solution. By benchmarking and certification, it will ensure that services can be delivered over GPON, and that no underlying issues exist with the GPON access layer, which under different conditions would cause a degradation in service performance. If the GPON layer is not tested thoroughly, but is just treated as a black-box, any underlying issues with the Vendor's deployed GPON solution will be missed.

Aspects Covered

- ITU-T standards compliance (G.984.3, G.984.4, G.988).
- ONU conformance testing (BBF ATP-247).
- OLT-ONU interoperability testing (BBF WT-255)...
- Services provisioning model analysis.
- Performance of the High Speed Internet service.
- Performance of the VoIP service.
- Performance of the IPTV service.
- Stress testing.

Equipment (other than the elements that make up operator's network)

- GPONDoctor 8000 analyser and OLT emulator (includes Wireshark™ and Xcap software).
- Traffic generator/analyser

Test set-up

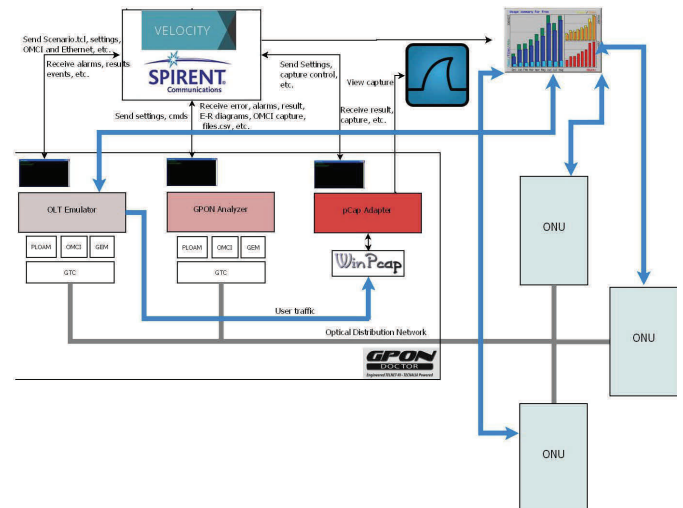
Three different scenarios are proposed depending on the test type. All of them include GPON Doctor 8000 as the basic analysis tool.

- ONU conformance test set-up;
- Standards compliance, interoperability and services provisioning model tests set-up;
- Performance test set-up;

Methodology & Test plan

- Detailed definition and customization of the test plan in conjunction with and based on customer's technical priorities.
- Execution of the test plan.
- Preparation of the test report.
- Presentation of the results.
- Knowledge transfer

Test Services covered



ONU conformance test cases:

Classification and Tagging

- Single untagged U-interface
- Single U-interface with symmetric VLAN tag translation
- Deriving p-bits as a function of received P-bits (single user port)
- Addition of an S-Tag in the Upstream Direction in a VBES Architecture
- Validation of an S-Tag in the Upstream Direction in a VBES Architecture
- Translation of an S-Tag in the Upstream Direction in a VBES Architecture
- Removal of an S-Tag in the Downstream Direction in a VBES Architecture
- Translation of an S-Tag in the Downstream Direction in a VBES Architecture

Certification and Benchmarking Services

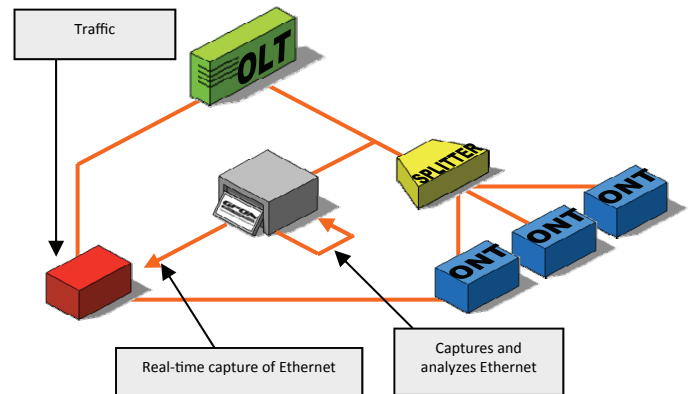
- Deriving p-bits as a function of received VID (single user port)
- Deriving p-bits as a function of received Ethertype (single user port)
- Deriving p-bits as a function of received user port
- VID Support for Untagged Frames. N:1 VLAN or 1:1 VLAN Single-Tagged at the V Interface
- VID Support for Untagged Frames. 1:1 VLAN Double-Tagged at the V Interface
- VID Support for Priority Tagged Frames with Priority Preservation. N:1 VLAN or 1:1 VLAN Single-Tagged at the V Interface
- VID Support for Priority Tagged Frames without Priority Preservation. N:1 VLAN or 1:1 VLAN Single-Tagged at the V Interface
- VID Support for Priority Tagged Frames with Priority Preservation. 1:1 VLAN Double-Tagged at the V Interface
- VID Support for Priority Tagged Frames without Priority Preservation. 1:1 VLAN Double-Tagged at the V Interface
- ONU addition and removal of C-Tag for 1:1 VLANs
- ONU addition and removal of S-Tag for 1:1 VLANs
- ONU translation between Q-Tag and C-Tag for 1:1 VLANs
- ONU translation between Q-Tag and S-Tag for 1:1 VLANs

Frame Mapping and QoS

- Single U-interface with multiple downstream GEM ports
- User Isolation on ONU Devices with Multiple U-interfaces
- Mapping Traffic from GEM Ports to U Interface in the Downstream Direction in a VBES Architecture
- Mapping traffic into GEM Ports based on P-bit values in the upstream direction (single user port)
- Mapping traffic into GEM Ports based on VID values in the upstream direction (single user port)
- Mapping traffic into GEM Ports based on VID & p-bit values in the upstream direction (single user port)
- Mapping traffic into GEM Ports based on P-bit values in the upstream direction (multiple user port)
- Mapping traffic into GEM Ports based on VID values in the upstream direction (multiple user port)
- Mapping traffic into GEM Ports based on VID & p-bit values in the upstream direction (multiple user port)
- Mapping multiple p-bit values to the same GEM port (single user port).
- Strict priority downstream scheduling among 4 queues on ONU
- Indicating drop precedence using p-bits upstream
- Indicating drop precedence using DEI bit upstream
- Indicating drop precedence using p-bits downstream
- Indicating drop precedence using DEI bit downstream
- Mapping Traffic from GEM Ports to Multiple U Interfaces in the Downstream Direction (VBES)
- Mapping Traffic from GEM Ports to U Interface in the Downstream Direction in a 1:1 VLAN Architecture
- Mapping Traffic from GEM Ports to Multiple U Interfaces in the Downstream Direction (1:1 VLAN Architecture)

IGMP Controlled Multicast

- ONU passing of downstream IGMP messages
- ONU silent discarding of IGMPv1 messages
- Marking Upstream IGMP Messages with Ethernet P-Bits
- IGMP controlled Multicast



- Multicast White List
- IGMP rate limit
- IGMP immediate leave
- Maximum number of multicast flows
- IGMP transparent Snooping
- Multicast VLAN membership based on user ports (Multiple User ports)
- IGMP transparent Snooping (Multiple User ports)

Non-IGMP Controlled Multicast and Broadcast

- Downstream Broadcast Handling, Single U-interface
- Downstream Broadcast Handling, Multiple U-interfaces

TR-156 Other

- 2000-Byte Frames Supported by the ONU

Initial Provisioning of ONU

- Local setting of a registration ID at the ONU (ONU retains the Registration ID indefinitely)

ONU Bring-Up

- New ONU Bring-up method on new ONU
- New ONU Bring-up method for old ONU
- Old ONU Bring-up method for ONU
- New ONU Bring-up method for new ONU with encrypted OMCC

MIB and Alarm Synchronization

- Alarm synchronization
- MIB synchronization : Correct Data Sync
- MIB synchronization : MIB Upload

Software Image Download

- Software Image Download, multiple window sizes, padded final window
- Software Image Download, shortened final window
- Failed Software Image Download, missing section
- Failed Software Image Download, incorrect section CRC
- Failed Software Image Download, incorrect software image CRC
- Activate uncommitted software image
- Commit software image

Circuit Packs

- Cardholder match or port mapping package for integrated ONU. Mandatory for an integrated ONU

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OLT-ONU interoperability test cases:

VLAN manipulation in a N:1 Architecture

- Untagged U-interface
- Priority-tagged U-interface
- Q-tagged U-interface
- User Isolation
- Configurable Value of the S-tag TPID Value

VLAN manipulation in a 1:1 Architecture

- Untagged U-interface, Single Tagged V-interface
- Untagged U-interface, Double Tagged V-interface
- Tagged U-interface, Single Tagged V-interface
- Tagged U-interface, Double Tagged V-interface
- Deactivate MAC learning for 1:1 VLANs

VLAN manipulation in VLANs for Business Ethernet Services

- Untagged U-interface, Single Tagged V-interface
- Priority-tagged U-interface, Singled Tagged V-interface
- Q-tagged U-interface, Double Tagged V-interface
- S-tagged U-interface, Singled Tagged V-interface
- Double Tagged U-interface, Double Tagged V-interface
- Hairpin Turn for VBES at OLT

QoS: Frame classification (derivation and manipulation of P-bits)

- Setting of P-bit value based on received VID
- Setting of p-bit value based on received p-bit
- Setting of p-bit value based on received EtherType
- Setting of p-bit value based on UNI port
- Setting of p-bit value based on received DSCP value

QoS: Frame Mapping

- Strict priority upstream scheduling among 4 queues on ONU and OLT based on pbit values (1:1 VLAN, single user port)
- Strict priority upstream scheduling among 4 queues on ONU and OLT based on VID values (1:1 VLAN, single user port)
- Strict priority upstream scheduling among 4 queues on ONU and OLT based on VID & pbit values (1:1 VLAN, single user port)
- Strict priority upstream scheduling among 4 queues on ONU and OLT based on VID, pbit & U-interface values (1:1 VLAN, multiple user port)
- Strict priority downstream scheduling among 4 queues on ONU and OLT based on pbit values (1:1 VLAN, single user port)
- Strict priority downstream scheduling among 4 queues on ONU and OLT based on VID values (1:1 VLAN, single user port)
- Strict priority downstream scheduling among 4 queues on ONU and OLT based on VID & pbit values (1:1 VLAN, single user port)
- Strict priority downstream scheduling among 4 queues on ONU and OLT based on SVID, CVID & pbit values (1:1 VLAN, single user port)
- Strict priority downstream scheduling among 4 queues on ONU and OLT based on VID, pbit values & MAC DA (VBES, single user port)
- Strict priority downstream scheduling among 4 queues on

ONU and OLT based on SVID, CVID & pbit values (1:1 VLAN, multiple user port)

- Strict priority downstream scheduling among 4 queues on ONU and OLT based on VID, pbit values & MAC DA (VBES, multiple user port)

QoS: Drop Precedence

- Indicating drop precedence using p-bit upstream
- Indicating drop precedence using DEI bit upstream
- Indicating drop precedence using p-bits downstream
- Indicating drop precedence using DEI bits downstream

IGMP controlled multicast

- Downstream Transport of IGMP messages
- Upstream Transport of IGMP messages
- Configurable discard of upstream IGMP messages
- White and black listing of multicast channels
- Blocking of user generated multicast traffic
- Rate-limiting of user generated IGMP messages
- IGMPv3 transparent snooping functions
- IGMP immediate leave
- Discard of user generated proxy query solicitations
- Marking of upstream IGMP messages with Ethernet P-bits
- Configurable maximum number of simultaneous multicast groups
- Silent discard of upstream IGMPv1 messages

Non- IGMP controlled multicast and broadcast

- Silent discard of frames with unknown MAC addresses
- Flooding of frames with unknown MAC addresses
- Silent discard of downstream broadcast frames
- Flooding of downstream broadcast frames

Security

- Test for Providing service to users with duplicate MAC addresses
- Test for denying service to users with duplicate MAC addresses
- Test for mechanism to prevent Broadband Network Gateway MAC address spoofing
- Test for mechanism to handle ARP broadcasts
- Test for mechanism to prevent IP address spoofing
- Test for mechanism to prevent MAC flooding attacks

Filtering

- MAC source address allowing filter
- MAC source address denying filter
- MAC destination address allowing filter
- MAC destination address denying filter
- Group MAC destination address filter
- EtherType allowing filter (IPoE)
- EtherType allowing filter (PPPoE)
- EtherType denying filter (IPoE)
- EtherType denying filter (PPPoE)

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Port identification and characterization

- Basic PPPoE Intermediate Function
- PPPoE Intermediate Function Option 82 Overwriting
- PPPoE Intermediate Function with Multiple Clients
- PPPoE Intermediate Function with Unicast PADI message
- Basic DHCP Relay Agent Functions
- DHCP Relay Agent Functions Option 82 Overwriting
- DHCP Relay Agent Functions with Multiple Clients
- DHCP Relay Agent Functions with Unicast DHCP Discover Message

Initial provisioning of ONU

- ONU provisioning according to serial number
- ONU Provisioning according to the registration-ID

ONU bring-up

- ONU Bring-up for New ONU
- ONU Bring-up method for Old ONU
- ONU Bring-up method with encrypted OMCC
- MIB synchronization

Alarms

- Alarms synchronization

Software download

- Software Download, Valid Image
- Software Download, Corrupt Image
- Switch Active Software Instance
- Switch Committed Software Instance



GPONDOCTOR
FTTH analysis & monitoring tools

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