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PON INTEGRATOR TEST PLAN

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DEVICE AND TEST PLAN INFORMATION	
Device Under Test (DUT)	XGS Company ONU123
Test Specification/Suite	PON Integrator Test Plan
UNH-IOL Test Result ID	N/A

CONTACT INFORMATION		
GPON Consortium	+1-603-862-2911	pon@iol.unh.edu
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SUMMARY OF RESULTS

The definition of result types can be found in the Result Key.

Detailed test results including observed behaviors can be found in the Detailed Test Results.

TEST NUMBER & LABEL	RESULTS
1.1 – ONU Provisioning According to Serial Number	**PASS**
1.2 – ONU Provisioning According to the Registration-ID	**PASS**
1.3 – Remote Reboot & Troubleshooting	**PASS**
1.4 – ONU Dying Gasp & Power Cycle	**PASS**
1.5 – OLT PON Restart and Reboot	**PASS**
1.6 – Emergency Stop	**PASS**
1.7 – Overnight Stability Test	**PASS**
2.1 – ONU Bring-up for New ONU	**PASS**
2.2 – ONU Bring-up method for Old ONU	**PASS**
2.3 – ONU Bring-up method with encrypted OMCC	**N/S**
3.1.1 – Untagged U-interface	**PASS**
3.1.2 – Priority-tagged U-interface	**FAIL**
3.1.3 – Q-tagged U-interface	**FAIL**
3.1.4 – User Isolation	**PASS**
3.2.1 – Untagged U-interface, Double Tagged V-interface	**PASS**
3.2.2 – Tagged U-interface, Double Tagged V-interface	**PASS**
3.3.1 – Double Tagged U-interface/V-interface	**N/S**
3.3.2 – Hairpin Turn for VBES at OLT	**N/T**
3.4 – RFC 2544 Throughput & Latency Test	**INFO**
4.1 – Strict Priority Upstream Scheduling	**FAIL**

4.2 – Strict Priority Downstream Scheduling	**PASS**
4.3 – Alarms Synchronization	**PASS**
5.1 – Software Download, Valid Image	**N/T**
5.2 – Switch Active Software Instance	**N/T**
5.3 – Switch Committed Software Instance	**N/T**
6.1 – Optical Range Tests	**PASS**
6.2 – Differential Reach	**PASS**

TESTING NOTES

The following table contains any notes on the testing process or on general DUT behavior.

NOTES
Testing performed on 10GE port unless otherwise specified.

REVISION HISTORY

The following table contains a revision history for this report.

REVISION	DATE	AUTHOR	EXPLANATION
1.0	05/27/2023	Jake Tester	Initial version

DEVICE UNDER TEST AND INITIALIZATION INFORMATION

The following table contains the state of the DUT during testing.

COMPONENT	DESCRIPTION
Manufacturer and Name	XGS Company ONU123
UNH-IOL Device Identification Number	31011
Speed and Media Type	XGS-PON
Hardware Version	N/A
Firmware Version	FV.123
Software Version	1.2.3
Serial Number	DEF98765
Product Category	ONU
Additional Information	1 10GE port, 1 1GE port

TEST TOOL AND ENVIRONMENT INFORMATION

The following table contains the test tool and test suite versions used during testing.

TOOL	VERSION
Wireshark Version	10.0.0
Spirent Test Center	4.75.1256.0000

ENVIRONMENT	CONDITION
Relative Humidity	53%
Temperature	72 degrees

TARGET DEVICE / INTEROP PARTNER INFORMATION

DEVICE	DESCRIPTION
Chassis	XGS-PON Chassis
Line-Card	XPC-456
Line-Card Software Version	1.2.103.104
Line-Card Serial Number	456789123
Line-Card IOL ID	54321

TEST SETUP

All tests were completed using one of three test setups.

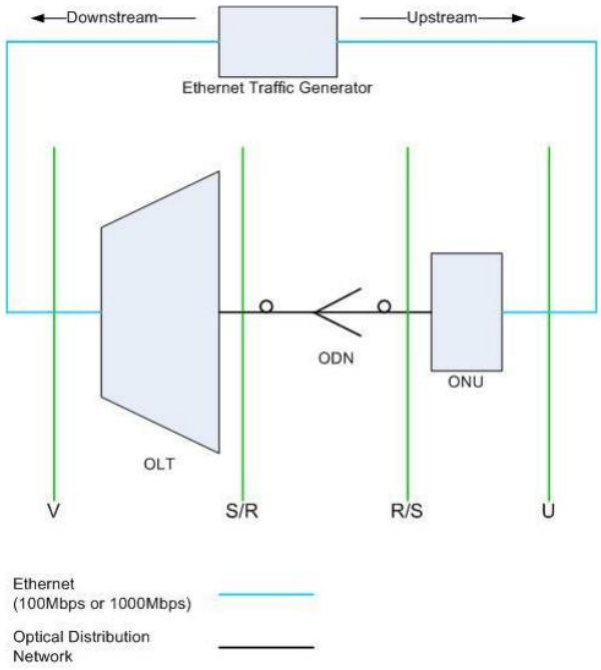

Figure 1 – Setup for tests requiring a single ONU

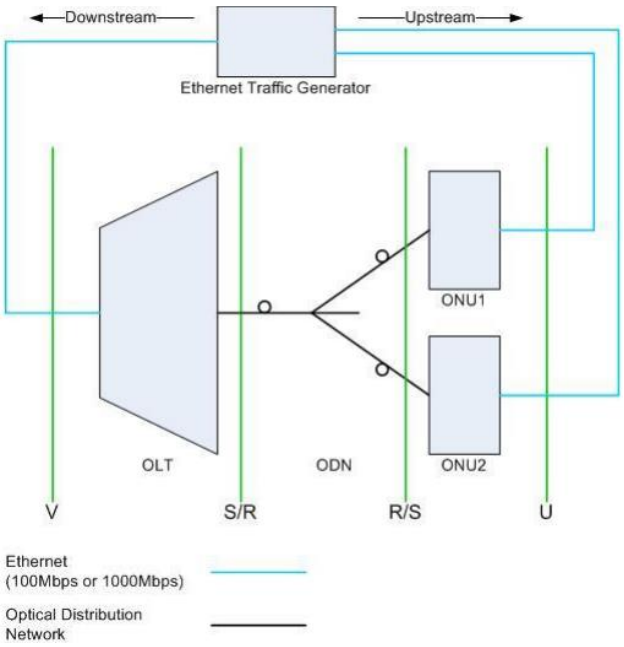

Figure 2 – Setup for tests requiring multiple ONUs

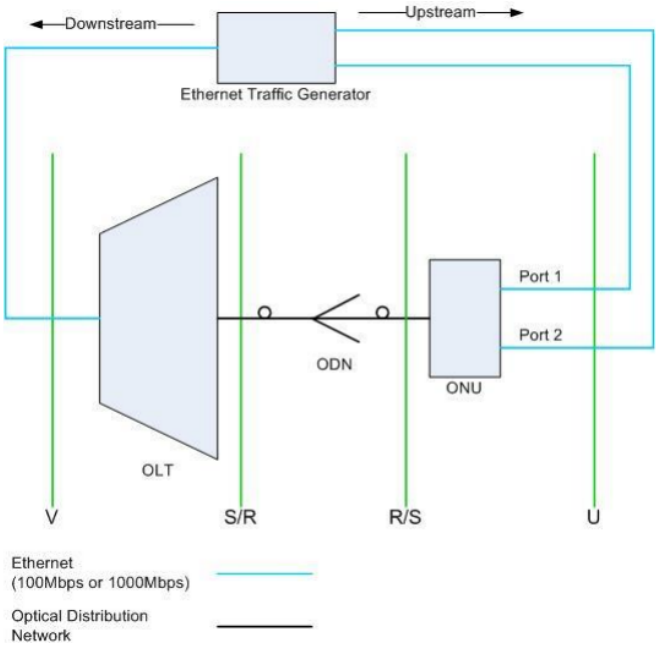

Figure 3 – Setup for tests requiring ONUs supporting multiple U-interfaces

DETAILED TEST RESULTS

1 – ONU PROVISIONING AND MANAGEMENT TESTS

1.1 – ONU Provisioning According to Serial Number

SECTION NAME	RESULT
1.1 – ONU PROVISIONING ACCORDING TO SERIAL NUMBER	**PASS**
PURPOSE	
To verify that the ONU can reach the state O5 using the serial number method, and that the OMCC is established and activated.	
METRICS	
The OLT and ONU are synchronized (O5 state) following serial number method (at step 3)	**PASS**
The ONU reboots at step 4	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
None.	

1.2 – ONU Provisioning According to the Registration-ID

SECTION NAME	RESULT
1.2 – ONU PROVISIONING ACCORDING TO THE REGISTRATION-ID	**PASS**
PURPOSE	
To verify that the ONU can reach the state O5 using the registration-ID mechanism, and that the OMCC is established and activated.	
METRICS	
The OLT and ONU are synchronized (O5 state) following serial number method (at step 3)	**PASS**
The ONU reboots at step 4	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
None.	

1.3 – Remote Reboot & Troubleshooting

SECTION NAME	RESULT
1.3 – REMOTE REBOOT & TROUBLESHOOTING	**PASS**
PURPOSE	
The purpose of this test is to ensure the OLT can instruct the ONU to perform a full reboot and the ONU responds to the instruction properly.	
METRICS	
The ONU must correctly respond to the reboot requests and perform a full reboot.	**PASS**
The OLT must correctly report the ONU operational status as “down” during the reboot.	**PASS**
The OLT must correctly report the ONU operational status as “up” following the completion of the reboot.	**PASS**
(optional) The ONU performed a full “cold boot” reloading its operating system.	**N/A**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
None.	

1.4 – ONU Dying Gasp & Power Cycle

SECTION NAME	RESULT
1.4 – ONU DYING GASP & POWER CYCLE	**PASS**

PURPOSE

This test verifies the behavior of the ONU after multiple reboot events caused by loss of power. Power is removed from and restored to the ONU, while the ONU is under a traffic load. The OLT should report the ONU power failure. This process is repeated multiple times as part of a stress test of the ONU device.

METRICS

At step 6, the ONU must pass the Ethernet frames at the expected rate, without dropping frames.	**PASS**

Iteration	Step 8 loss of power event	Step 11 ONU reported as active	Step 12 ethernet frames at expected rate
1	**PASS**	**PASS**	**PASS**
2	**PASS**	**PASS**	**PASS**
3	**PASS**	**PASS**	**PASS**
4	**PASS**	**PASS**	**PASS**
5	**PASS**	**PASS**	**PASS**
6	**PASS**	**PASS**	**PASS**
7	**PASS**	**PASS**	**PASS**
8	**PASS**	**PASS**	**PASS**
9	**PASS**	**PASS**	**PASS**
10	**PASS**	**PASS**	**PASS**

OBSERVED BEHAVIOR & ADDITIONAL COMMENTS

None.

1.5 – OLT PON Restart & Reboot

SECTION NAME	RESULT
1.5 – OLT PON RESTART & REBOOT	**PASS**
PURPOSE	
The purpose of this test is to verify the ONU can return to an operational state, following either: a PON restart (OLT admin status change to PON port), or a reboot of the OLT.	
METRICS	
At step 6, the ONU must pass the Ethernet frames at the expected rate, without dropping frames.	**PASS**
At step 11, the OLT must report the OLT must report the ONU as active / operationally up.	**PASS**
At step 12, the ONU must pass the Ethernet frames at the expected rate, without dropping frames.	**PASS**
At step 15, the OLT must report the OLT must report the ONU as active / operationally up.	**PASS**
At step 16, the ONU must pass the Ethernet frames at the expected rate, without dropping frames.	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
None.	

1.6 – Emergency Stop

SECTION NAME	RESULT
1.6 – EMERGENCY STOP	**PASS**
PURPOSE	
The purpose of this test is to verify the ONU properly responds to the “Emergency Stop” messages, where the ONU must enter the O7 State, and disable its upstream laser / transmission. Within this test, the ONU under test must be the only ONU connected to the PON, and with its laser shutdown the OLT should report the PON as operationally down or loss of all upstream signal.	
METRICS	
At step #5, the in-line power meter must report transmit power from the ONU.	**PASS**
At step #7, the in-line power meter must report no transmit power from the ONU.	**PASS**
At step #9, the in-line power meter must report transmit power from the ONU.	**PASS**
At step #11, the OLT must report the OLT must report the ONU as active / operationally up.	**PASS**
At step #12, the in-line power meter must report transmit power from the ONU.	**PASS**
At step #14, the in-line power meter must report no transmit power from the ONU.	**PASS**
At step #16, the OLT must report the OLT must report the ONU as active / operationally up.	**PASS**
At step #17, the in-line power meter must report transmit power from the ONU.	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
None.	

1.7 – Overnight Stability Test

SECTION NAME	RESULT
1.7 – OVERNIGHT STABILITY TEST	**PASS**

PURPOSE
The purpose of this test is to verify the ONU can maintain stability with the OLT for an extended period of time.

MEASUREMENTS

DS Transmitted Frames	DS Received Frames	DS Dropped Frames
888,157,895	888,157,895	0
US Transmitted Frames	**US Received Frames**	**US Dropped Frames**
888,157,895	888,157,890	5

METRICS	
At step #2, the ONU should range onto the PON, and no errors or alarms should be reported by the OLT.	**PASS**
At step #3, the OLT must report the ONU as activated and operational.	**PASS**
At step #6, the OLT must report the ONU as activated and operational.	**PASS**
The number of dropped frames must not exceed 20 frames in either direction.	**PASS**

OBSERVED BEHAVIOR & ADDITIONAL COMMENTS
None.

2 – ONU BRING UP TESTS

2.1 – ONU Bring-up for New ONU

SECTION NAME	RESULT
2.1 – ONU BRING-UP FOR NEW ONU	**PASS**
PURPOSE	
To verify that the OLT and ONU correctly complete the ONU Bring-up method as described in ITU-T G.988. A new ONU is defined as an ONU that has never completed the OLT's MIB synchronization process.	
METRICS	
Once ONU activation is completed, the ONU's serial number and status MUST be reported as active by the OLT's management interface	**PASS**
After step 4, the OMCC has been established and the ONU MIB upload has been completed, the ONU MIB MUST be available from the OLT management interface	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
None.	

2.2 – ONU Bring-up method for Old ONU

SECTION NAME	RESULT
2.2 – ONU BRING-UP METHOD FOR OLD ONU	**PASS**
PURPOSE	
To verify the OLT and ONU can perform the methods necessary to bring up an ONU that was previously connected to the OLT.	
METRICS	
Once ONU activation is completed, the ONU's serial number and status MUST be reported as active by the OLT's management interface	**PASS**
After step 4, the OMCC has been established and the ONU MIB upload has been completed, the ONU MIB MUST be available from the OLT management interface	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
None.	

2.3 – ONU Bring-up method with encrypted OMCC

SECTION NAME	RESULT
2.3 – ONU BRING-UP METHOD WITH ENCRYPTED OMCC	**N/S**
PURPOSE	
To verify that the OLT and ONU correctly complete the ONU Bring-up method as described in ITU-T G.988, when the OLT has been configured to use encrypted OMCC channels. A new ONU is defined as an ONU that has never completed the OLT's MIB synchronization process.	
METRICS	
Once ONU activation is completed, the ONU's serial number and status MUST be reported as active by the OLT's management interface	
After step 4, the OMCC has been established and the ONU MIB upload has been completed, the ONU MIB MUST be available from the OLT management interface	
If the optional GPON Analyzer is being used, it MUST report the OLT and ONU are using an AES encrypted OMCC channel	
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
The OLT does not support AES.	

3 – BASIC HIGH SPEED ACCESS TESTS

3.1 – N:1 Architecture

3.1.1 – Untagged U-interface

SECTION NAME	RESULT
3.1.1 – UNTAGGED U-INTERFACE TEST CASE	**PASS**
PURPOSE	
To verify the ONU/OLT combination correctly supports/implements the N:1 VLAN architecture when the U-interface of the ONU is configured as an untagged interface.	
METRICS	
Upstream frames from Frame-set A-us must be received from the V-interface as S-tagged frames, with SVID=VID1 and TPID=0x88a8	**PASS**
Upstream frames from Frame-sets B-us, C-us, and D-us must be silently discarded (e.g. not received from the V-interface)	**PASS**
Downstream frames from Frame-set A-ds must be received from the U-interface as untagged frames	**PASS**
Downstream frames from Frame-sets B-ds and C-ds must be silently discarded (e.g. not received from the U-interface)	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
None.	

3.1.2 – Priority-tagged U-interface

SECTION NAME	RESULT
3.1.2 – PRIORITY-TAGGED U-INTERFACE	**FAIL**
PURPOSE	
To verify the ONU/OLT combination correctly supports/implements the N:1 VLAN architecture when the U-interface of the ONU is configured as a priority-tagged interface.	
METRICS	
Upstream frames from Frame-set A-us must be received from the V-interface as S-tagged frames, with SVID=VID1 and TPID=0x88a8	**PASS**
Upstream frames from Frame-sets B-us, C-us, and D-us must be silently discarded (e.g. not received from the V-interface)	**FAIL**
Downstream frames from Frame-set A-ds must be received from the U-interface as priority-tagged frames	**PASS**
Downstream frames from Frame-sets B-ds and C-ds must be silently discarded (e.g. not received from the U-interface)	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
The OLT/ONT combination allowed frames from stream C-us to pass.	

3.1.3 – Q-tagged U-interface

SECTION NAME	RESULT
3.1.3 – Q-TAGGED U-INTERFACE	**FAIL**
PURPOSE	
To verify the ONU/OLT combination correctly supports/implements the N:1 VLAN architecture when the U-interface of the ONU is configured as a Q-tagged interface.	
METRICS	
Upstream frames from Frame-set A-us must be received from the V-interface as S-tagged frames, with SVID=VID2 and TPID=0x88a8	**PASS**
Upstream frames from Frame-sets B-us, C-us, D-us, and E-us must be silently discarded (e.g. not received from the V-interface)	**FAIL**
Downstream frames from Frame-set A-ds must be received from the U-interface as Q-tagged frames, with QVID=VID1 and TPID=0x8100	**PASS**
Downstream frames from Frame-sets B-ds and C-ds must be silently discarded (e.g. not received from the U-interface)	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
The OLT/ONT combination allowed frames from stream D-us to pass.	

3.1.4 – User Isolation

SECTION NAME	RESULT
3.1.4 – USER ISOLATION	**PASS**
PURPOSE	
To verify the ONU/OLT combination correctly implement the user isolation functions required by the N:1 architecture, and that this functionality is configurable.	
METRICS	
After procedure step 6, frames from frame-sets A-us or B-us must not be received from the U-interface	**PASS**
After procedure step 8, frames from frame-sets A-us and B-us must be received from the appropriate U-interface	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
This section was not tested because it requires 2 ONTs.	

3.2 – 1:1 Architecture

3.2.1 – Untagged U-interface, Double Tagged V-interface

SECTION NAME	RESULT
3.2.1 – UNTAGGED U-INTERFACE, DOUBLE TAGGED V-INTERFACE	**PASS**
PURPOSE	
To verify the ONU/OLT combination correctly supports/implements the 1:1 VLAN architecture listed as configuration 5 in Table 6-1, when the U-interface of the ONU is configured as an untagged interface.	
METRICS	
Upstream frames from Frame-set A-us must be received from the V-interface as double tagged frames, with SVID=VID2, STPID=0x88a8, CVID=VID1, and C-TPID=0x8100	**PASS**
Upstream frames from Frame-sets B-us, C-us, and D-us must be silently discarded (e.g. not received from the V-interface)	**PASS**
Downstream frames from Frame-set A-ds must be received from the U-interface as untagged frames	**PASS**
Downstream frames from Frame-sets B-ds, C-ds, D-ds, E-ds, and F-ds must be silently discarded (e.g. not received from the U-interface)	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
None.	

3.2.2 – Tagged U-interface, Double Tagged V-interface

3.2.2 – TAGGED U-INTERFACE, DOUBLE TAGGED V-INTERFACE	
PURPOSE	
To verify the ONU/OLT combination correctly supports/implements the 1:1 VLAN architecture listed as configuration 7 in Table 6-1, when the U-interface of the ONU is configured as a tagged interface.	
PASS/FAIL CRITERIA	RESULTS
Upstream frames from Frame-set A-us must be received from the V-interface as double tagged frames, with SVID=VID3, STPID=0x88a8, CVID=VID2, and C-TPID=0x8100	**PASS**
Upstream frames from Frame-sets B-us, C-us, D-us, and E-us must be silently discarded (e.g. not received from the V-interface)	**PASS**
Downstream frames from Frame-set A-ds must be received from the U-interface as Q-tagged frames, with QVID=VID1 and TPID=0x8100	**PASS**
Downstream frames from Frame-sets B-ds, C-ds, D-ds, E-ds, and F-ds must be silently discarded (e.g. not received from the U-interface)	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
None.	

3.3 – VLANS FOR BUISNESS ETHERNET SERVICES (VBES)

3.3.1 – Double Tagged U-interface/V-interface

3.3.1 – DOUBLE TAGGED U-INTERFACE/V-INTERFACE	
PURPOSE	
To verify the ONU/OLT combination correctly supports/implements the VBES VLAN architecture listed as configuration 12 in Table 6-1, when the U-interface of the ONU is configured as a double-tagged interface.	
PASS/FAIL CRITERIA	RESULTS
Upstream frames from Frame-set A-us through D-us must be received from the V-interface as double tagged frames, with SVID=VID2, S-TPID=0x88a8, and C-VID = VID3 through VID6, respectively, and C-TPID=0x8100	**N/S**
Upstream frames from Frame-sets E-us through H-us must be silently discarded (e.g. not received from the V-interface)	**N/S**
Downstream frames from Frame-set A-ds through D-ds must be received from the U-interface as double-tagged frames, with SVID=VID1, S-TPID=0x88a8, and C-VID = VID3 through VID6, respectively, and C-TPID=0x8100	**N/S**
Downstream frames from Frame-sets E-ds, F-ds, and G-ds must be silently discarded (e.g. not received from the U-interface)	**N/S**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
This section is unsupported because the OLT does not support handling double tagged frames received at the U interface.	

3.3.2 – Hairpin Turn for VBES at OLT

SECTION NAME	RESULT
3.3.2 – HAIRPIN TURN FOR VBES AT OLT	**N/T**
PURPOSE	
To verify the ONU/OLT combination correctly supports/implements the VBES VLAN architecture when the OLT is required to “hairpin turn” upstream traffic received from one ONU, sending the traffic back down the same PON to a second ONU.	
METRICS	
Upstream frames from Frame-set A-us must be received from the U-interface of ONU 2 as untagged Ethernet Frames	**N/T**
Upstream frames from Frame-set B-us must be received from the U-interface of ONU 1 as untagged Ethernet Frames	**N/T**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
This section was not tested because it requires two ONTs.	

3.4 – RFC 2544 Throughput & Latency Test

SECTION NAME	RESULT
3.4 – RFC 2544 THROUGHPUT & LATENCY TEST	**INFO**

PURPOSE

The purpose of this test is to measure the maximum throughput performance of the ONU for various Ethernet frame sizes.

MEASUREMENTS

10G Port

Frame Size (B)	Direction	Average L1 Throughput (Mbps)	Average L2 Throughput (Mbps)	Max Latency (µs)	Average Latency (µs)
64	**US**	3,967.76	3,066	1,149.43	529.76
	DS	6,158.36	4,692.08	10.96	10.2
128	**US**	4,215.52	3,660.84	1,124.26	530.54
	DS	5,278.59	4,545.45	11.71	10.81
256	**US**	4,207.57	3,907.03	1,108.16	485.43
	DS	5,529.95	5,123.34	12.72	11.54
512	**US**	4,279.78	4,120.09	1,160.43	482.2
	DS	5,702.77	5,486.75	14.48	13.32
1024	**US**	4,802.05	4,710.41	1,045.58	492
	DS	5,784.2	5,672.97	17.78	16.45
1280	**US**	4,751.26	4,678.39	1,046.57	491.05
	DS	5,785.03	5,695.75	18.76	17.72
1500	**US**	4,702.93	4,641.21	1,046.79	489.95

	DS	5,836.67	5,759.67	20.66	19.24

METRICS
This section has no metrics and is intended to be informative.

OBSERVED BEHAVIOR & ADDITIONAL COMMENTS
None.

4 – QUALITY OF SERVICE FUNCTION TESTS

4.1 – Strict Priority Upstream Scheduling

SECTION NAME	RESULT
4.1 – STRICT PRIORITY UPSTREAM SCHEDULING	**FAIL**
PURPOSE	
To verify that the OLT and ONU can support four queues on the upstream direction, that each queue can be assigned to one specific traffic class and that they support strict priority scheduling among those four traffic classes. To verify that multiple traffic streams can be mapped into a specific traffic class.	
PASS/FAIL CRITERIA	
At step 6: All the sent upstream frames of traffic streams from A to H are received at the Ethernet traffic generator, error free	**PASS**
At step 7: All frames from traffic streams A, B & C are received error free	**FAIL**
At step 7: At least some of the frames from traffic streams D, E & F (i.e. Traffic Class 3) are received	**PASS**
At step 7: No frame from traffic streams G & H (i.e. Traffic Class 4) is received	**FAIL**
At step 8: All frames from traffic stream A are received error free	**FAIL**
At step 8: At least some of the frames from traffic streams B & C (i.e. Traffic Class 2) are received	**PASS**
At step 8: No frame from traffic streams D, E & F (i.e. Traffic Class 3) and G & H (i.e. Traffic Class 4) is received	**FAIL**
At step 9: At least some of the frames from traffic stream A are received	**PASS**
At step 9: No frame from traffic streams B & C (i.e. Traffic Class 2), D, E & F (i.e. Traffic Class 3) and G & H (i.e. Traffic Class 4) is received	**FAIL**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
This test was run with P-bits 0-7 on the outer VLAN tag of traffic streams H-A respectively because the OLT cannot prioritize traffic based on inner P-bit. No prioritization behavior was witnessed in the upstream direction.	

4.2 – Strict Priority Downstream Scheduling

SECTION NAME	RESULT
4.2 – STRICT PRIORITY DOWNSTREAM SCHEDULING	**PASS**
PURPOSE	
To verify that the OLT and ONU can support four queues on the downstream direction, that each queue can be assigned to one specific traffic class and that they support strict priority scheduling among those four traffic classes. To verify that multiple traffic streams can be mapped into a specific traffic class.	
PASS/FAIL CRITERIA	
At step 6: All the sent upstream frames of traffic streams from A to H are received at the Ethernet traffic generator, error free	**PASS**
At step 7: All frames from traffic streams A, B & C are received error free	**PASS**
At step 7: At least some of the frames from traffic streams D, E & F (i.e. Traffic Class 3) are received	**PASS**
At step 7: No frame from traffic streams G & H (i.e. Traffic Class 4) is received	**PASS**
At step 8: All frames from traffic stream A are received error free	**PASS**
At step 8: At least some of the frames from traffic streams B & C (i.e. Traffic Class 2) are received	**PASS**
At step 8: No frame from traffic streams D, E & F (i.e. Traffic Class 3) and G & H (i.e. Traffic Class 4) is received	**PASS**
At step 9: At least some of the frames from traffic stream A are received	**PASS**
At step 9: No frame from traffic streams B & C (i.e. Traffic Class 2), D, E & F (i.e. Traffic Class 3) and G & H (i.e. Traffic Class 4) is received	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
This test was run with P-bits 0-7 on the outer VLAN tag of traffic streams H-A respectively because the OLT cannot prioritize traffic based on inner P-bit.	

4.3 – Alarms Synchronization

SECTION NAME	RESULT
4.3 – ALARMS SYNCHRONIZATION	**PASS**
PURPOSE	
The purpose of this test is to verify the ONU will correctly report alarms to the OLT and if an alarm occurs while the ONU is disconnected from the PON, the alarm will be synchronized with the OLT upon reconnection. Note, this test case is mirrored from Broadband Forum TR-255.	
METRICS	
At step 6. the OLT must report an alarm condition for the ONU Ethernet port.	**PASS**
At step 8, the OLT must not report an alarm condition for the ONU Ethernet port.	**PASS**
At step 12, the OLT must report the OLT must report the ONU as active / operationally up.	**PASS**
At step 13, the OLT must report an alarm condition for the ONU Ethernet port.	**PASS**
At step 17, the OLT must report the OLT must report the ONU as active / operationally up.	**PASS**
At step 18, the OLT must not report an alarm condition for the ONU Ethernet port.	**PASS**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
None.	

5 – SOFTWARE DOWNLOAD TESTS

5.1 – Software Download, Valid Image

SECTION NAME	RESULT
5.1 – SOFTWARE DOWNLOAD, VALID IMAGE	**N/T**
PURPOSE	
The purpose of this test is to verify that the OLT can upgrade ONU software.	
PASS/FAIL CRITERIA	
OLT reports successful software download (at step 1)	**N/T**
OLT can send active software and the ONU activates software (at step 3)	**N/T**
OLT can send commit software and the ONU committed software (at step 5)	**N/T**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
This section was not tested at the request of the ONT vendor.	

5.2 – Switch Active Software Instance

SECTION NAME	RESULT
5.2 – SWITCH ACTIVE SOFTWARE INSTANCE	**N/T**
PURPOSE	
The purpose of this test is to verify an OLT can cause the ONT to switch its active software instance when two valid images are present.	
PASS/FAIL CRITERIA	
If supported by the OLT, at least one software instance must be listed as committed, active, and valid (step 2)	**N/T**
The ONU must be able to re-range with the OLT once the activate software image has completed, without human interaction. This process may require the ONU to autonomously reboot to attempt to boot the new software image (step 4)	**N/T**
If supported by the OLT, verify the second software image is listed as active and the first software image is listed as committed (first and second do not imply specific instance numbers) (step 5)	**N/T**
The ONU must reboot in the original software version automatically (step 7)	**N/T**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
This section was not tested at the request of the ONT vendor.	

5.3 – Switch Committed Software Instance

SECTION NAME	RESULT
5.3 – SWITCH COMMITTED SOFTWARE INSTANCE	**N/T**
PURPOSE	
The purpose of this test is to verify an OLT can cause the ONT to switch its committed software instance when two valid images are present.	
PASS/FAIL CRITERIA	
If supported by the OLT, at least one software instance must be listed as committed, active, and valid (step 2)	**N/T**
The ONU must be able to re-range with the OLT once the activate software image has completed, without human interaction. This process may require the ONU to autonomously reboot to attempt to boot the new software image (step 4)	**N/T**
If supported by the OLT, verify the second software image is listed as active and the first software image is listed as committed (first and second do not imply specific instance numbers) (step 5)	**N/T**
The ONU must reboot in the original software version automatically (step 8)	**N/T**
If supported by the OLT, verify the second software image is listed as active and committed	**N/T**
OBSERVED BEHAVIOR & ADDITIONAL COMMENTS	
This section was not tested at the request of the ONT vendor.	

6 – TC LAYER TESTS

6.1 – Optical Range Tests

SECTION NAME	RESULT
6.1 – OPTICAL RANGE TESTS	**PASS**

PURPOSE
The purpose of this test is to verify the minimum and maximum optical reach of the ONU device, within the optical link budget for the transceiver types.

MEASUREMENTS		
Fiber Connection: 3m		
Initial US BIP Errors	**Final US BIP Errors**	**US BIP Error Increase**
0	0	0
US Transmitted Frames	**US Received Frames**	**US Dropped Frames**
46,875,000	46,875,000	0
Initial DS BIP Errors	**Final DS BIP Errors**	**DS BIP Error Increase**
0	0	0
DS Transmitted Frames	**DS Received Frames**	**DS Dropped Frames**
46,875,000	46,875,000	0
Fiber Connection: 20km		
Initial US BIP Errors	**Final US BIP Errors**	**US BIP Error Increase**
0	0	0
US Transmitted Frames	**US Received Frames**	**US Dropped Frames**
46,875,000	46,875,000	0
Initial DS BIP Errors	**Final DS BIP Errors**	**DS BIP Error Increase**

0	0	0
DS Transmitted Frames	**DS Received Frames**	**DS Dropped Frames**
46,875,000	46,875,000	0

METRICS	
At step 3, the OLT must report the ONU as a “new” or “detected” ONU, with a serial number that matches the serial number expected for the ONU.	**PASS**
At step 4, the OLT must report the ONU as activated and operational.	**PASS**
At step 6, the OLT must report the ONU as activated and operational.	**PASS**
The maximum number of dropped frames must not exceed 20 frames in either direction.	**PASS**
The number of reported BIP errors must not increase by more than 100 during the test.	**PASS**

OBSERVED BEHAVIOR & ADDITIONAL COMMENTS
None.

6.2 – Differential Reach

SECTION NAME	RESULT
6.2 – DIFFERENTIAL REACH	**PASS**

PURPOSE
The purpose of this test is to verify the ONU can operate without significant impact to other ONUs when the differential distance between two ONUs is close to the maximum supported distance for the PON.

MEASUREMENTS		
ONU 1		
Initial US BIP Errors	**Final US BIP Errors**	**US BIP Error Increase**
0	0	0
US Transmitted Frames	**US Received Frames**	**US Dropped Frames**
37,006,579	37,006,579	0
Initial DS BIP Errors	**Final DS BIP Errors**	**DS BIP Error Increase**
0	0	0
DS Transmitted Frames	**DS Received Frames**	**DS Dropped Frames**
36,996,843	39,996,843	0
ONU 2		
Initial US BIP Errors	**Final US BIP Errors**	**US BIP Error Increase**
0	0	0
US Transmitted Frames	**US Received Frames**	**US Dropped Frames**
37,006,579	37,006,579	0
Initial DS BIP Errors	**Final DS BIP Errors**	**DS BIP Error Increase**

0	0	0
DS Transmitted Frames	**DS Received Frames**	**DS Dropped Frames**
36,996,843	36,996,843	0

METRICS	
At step 2, the OLT must report both ONUs as activated and operational.	**PASS**
The maximum number of dropped frames must not exceed 20 frames for any traffic stream.	**PASS**
The number of reported BIP errors must not increase by more than 100 during the test.	**PASS**

OBSERVED BEHAVIOR & ADDITIONAL COMMENTS
None.

APPENDICES

APPENDIX 1: RESULT KEY

The following table contains possible results and their meanings.

RESULT	MEANING	INTERPRETATION
PASS	Pass	The Device Under Test (DUT) was observed to exhibit conformant behavior.
PWC	Pass With Comments	The Device Under Test (DUT) was observed to exhibit conformant behavior, however changes were made to the normal test procedure or the behavior observed requires additional comments.
FAIL	Fail	The Device Under Test (DUT) was observed to exhibit non-conformant behavior.
RTC	Refer to Comments	From the observations, a valid pass or fail was not determined. An additional explanation of the situation is included.
INFO	Informative	Test is designed for informational purposes only. The results may help ensure the interoperability of the DUT, but are not standards requirements.
WARN	Warning	The DUT was observed to exhibit behavior that is not recommended.
N/A	Not Applicable	This test does not apply to the device type or is not applicable to the testing program selected.
N/S	Not Supported	The Device Under Test (DUT) was not observed to support the necessary functionality required to perform these tests or the requirement is optional and not supported by this device.
N/T	Not Tested	This test was not performed and therefore this is not a complete test report. Please see the comments for additional reasons.
UA	Unavailable	The test was not performed due to limitation of the test tool(s) or interoperable systems, or the test methodology is still under development.

APPENDIX 2: DIGITAL SIGNATURE INFORMATION

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