

IEEE Standard for Conformance Test Procedures for Service Interoperability in Ethernet Passive Optical Networks, IEEE Std 1904.1TM Package C

Version 001.001

IEEE Communications Society

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Standards Development Board

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IEEE Communications Society**

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Abstract: This standard specifies a suite of conformance tests for system-level requirements of Ethernet Passive Optical Network (EPON) equipment, defined in IEEE 1904.1 Package C.

Keywords: 1G-EPON, 10G-EPON, conformance, Conformance03, EPON, Ethernet Passive Optical Network, IEEE 1904.1™, Package C, SIEPON

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Introduction

This introduction is not part of IEEE Std 1904.1/Conformance03-2014, IEEE Standard for Conformance Test Procedures for Service Interoperability in Ethernet Passive Optical Networks, IEEE Std 1904.1™ Package C – Version 001.001.

This standard builds upon the IEEE 1904.1 Service Interoperability in Ethernet Passive Optical Networks (SIEPON) and specifies a suite of conformance tests for system-level requirements of Ethernet Passive Optical Network (EPON) equipment, defined in IEEE 1904.1 Package C. This standard supplements IEEE Std 1904.1 by providing test cases to verify key requirements for proper service establishment across the Optical Line Terminal (OLT) and Optical Network Units (ONUs) from different manufacturers. Interoperability between the OLT and ONUs is verified indirectly, by assessing conformance of individual devices to IEEE 1904.1 Package C requirements.

Contents

1. Overview	1
1.1 Scope	1
1.2 Purpose	1
1.3 Mandatory and optional requirements	2
1.4 Test suite version and conformance test identifier.....	2
1.4.1 Major and minor conformance test suite versions.....	2
1.4.2 Conformance test identifier.....	2
1.4.3 Updating conformance test identifier and test suite version.....	2
1.5 Overview of clauses.....	3
2. Normative references.....	4
3. Definitions, acronyms, and abbreviations	5
3.1 Definitions	5
3.2 Acronyms and abbreviations	5
3.3 Package C organizationally unique identifier (OUI) value.....	7
4. Test equipment and test configuration.....	8
4.1 Functional requirements for test equipment	8
4.1.1 Introduction.....	8
4.1.2 Packet Analyzer	8
4.1.3 PON Protocol Analyzer.....	8
4.1.4 Packet Generator.....	9
4.1.4.1 Size of Ethernet frame	9
4.1.5 ODN.....	9
4.1.6 OLT Emulator.....	9
4.1.7 ONU Emulator	10
4.2 Test equipment configurations.....	10
4.2.1 Introduction.....	10
4.2.2 ONU under test without Packet Generator/Analyzer	10
4.2.3 OLT under test without Packet Generator/Analyzer	11
4.2.4 ONU under test with Packet Generator/Analyzer	11
4.2.5 OLT under test with Packet Generator/Analyzer	12
4.3 Frame flow configurations.....	13
5. Conformance map	21
5.1 Introduction	21
5.2 Mapping between IEEE 1904.1 Package C PICS for ONU and test cases	21
5.3 Mapping between IEEE 1904.1 Package C PICS for OLT and test cases.....	24
6. Message and TLV primitives	27
6.1 Common messages	27
6.1.1 Get_Request(TLV1,..., TLVn) primitive	27
6.1.2 Get_Response(TLV1,..., TLVn) primitive.....	27
6.1.3 Set_Request(TLV1,..., TLVn) primitive	28
6.1.4 Set_Response(TLV1,..., TLVn) primitive.....	28
6.1.5 TLV_Object_ID(object, instance) primitive.....	29
6.1.6 TLV_Attribute(attribute_id) primitive	29

6.1.7	TLV_Action(action_id) primitive.....	29
6.1.8	TLV_Attribute_Response(attribute_id, code) primitive.....	30
6.1.9	TLV_Action_Response(action_id, code) primitive.....	30
6.2	Group AU messages.....	30
6.2.1	MPCP_GATE_Discovery() primitive.....	30
6.2.2	MPCP_GATE() primitive.....	31
6.2.3	MPCP_REGISTER_REQ() primitive.....	32
6.2.4	MPCP_REGISTER(flag) primitive.....	32
6.2.5	MPCP_REGISTER_ACK() primitive.....	33
6.2.6	eOAM_AuReq() primitive.....	34
6.2.7	eOAM_AuRes(LOID, Pass) primitive.....	34
6.2.8	eOAM_AuSuc() primitive.....	35
6.2.9	eOAM_AuFail() primitive.....	35
6.3	Group DCD messages.....	35
6.3.1	TLV_Serial(sVendorId, sOnuModel, sOnuId, sVersionHw, sVersionSw, sOnuModelExt) primitive.....	35
6.3.2	TLV_ChipsetFirmware(sOnuChipsetFwVer) primitive.....	36
6.3.3	TLV_ChipsetId(sVendorId, sModel, sRevision, sVersion) primitive.....	36
6.3.4	TLV_OnuCapabilities(sType, sCountLOnu, sProtection, sCountPonPort, sCountSlot, sCountUnitType, sUnitType[1], sUniCount[1] ..., sUnitType[sCountUnitType], sUniCount[sCountUnitType]) primitive.....	37
6.3.5	TLV_Set_OnuMode(Count) primitive.....	37
6.3.6	InformationExt(type, Revision, Version1, ..., VersionN) primitive.....	38
6.3.7	Information() primitive.....	38
6.4	Group MA messages.....	39
6.4.1	TLV_MAC_Aging(period) primitive.....	39
6.5	Group PLD messages.....	39
6.5.1	TLV_LoopDetection(status) primitive.....	39
6.5.2	TLV_PortDisable(status) primitive.....	40
6.5.3	EventNotification(Event) primitive.....	40
6.6	Group PM messages.....	41
6.6.1	TLV_PMStatus(sMonitoringStatus, sMonitoringPeriod) primitive.....	41
6.6.2	TLV_PMDataZero1(Leaf) primitive.....	41
6.6.3	TLV_PMDataZero2(Leaf) primitive.....	42
6.6.4	TLV_PMDataZero3(Leaf) primitive.....	42
6.6.5	TLV_PMData1(Leaf) primitive.....	43
6.6.6	TLV_PMData2(Leaf) primitive.....	43
6.6.7	TLV_PMData3(Leaf) primitive.....	44
6.7	Group RF messages.....	44
6.7.1	MPCP_REPORT() primitive.....	44
6.8	Group RPC messages.....	45
6.8.1	TLV_Set_OnuTxPowerSupply(sAction, sOnuId, sPowerControlMode) primitive.....	45
6.9	Group SU messages.....	45
6.9.1	eOAM_FWR(filename) primitive.....	45
6.9.2	eOAM_FTA(BlockNumber) primitive.....	46
6.9.3	eOAM_FTE(ReturnCode, ReturnMessage) primitive.....	47
6.9.4	eOAM_FTD(BlockNumber, Data) primitive.....	47
6.9.5	eOAM_EDRt(Size) primitive.....	48
6.9.6	eOAM_EDRe(ReturnCode) primitive.....	48
6.9.7	eOAM_AIRt() primitive.....	49
6.9.8	eOAM_AIRe(ReturnCode) primitive.....	49

6.9.9 eOAM_CIRt() primitive	50
6.9.10 eOAM_CIRe(ReturnCode) primitive.....	50
6.9.11 ActivationSuccess() primitive.....	51
6.10 Group USM messages	51
6.10.1 TLV_OnuTRxStatus(sTemperature, sVoltage, sCurrent, sPowerOut, sPowerIn) primitive.....	51
6.10.2 Event(Object, Instance, EventID) primitive.....	52
6.10.3 EventThreshold_Request(Event1,..., Eventn) primitive.....	52
6.10.4 EventThreshold_Response(Event1, SetThreshold1, ClearThreshold1,..., Eventn, SetThresholdn, ClearThresholdn) primitive.....	53
6.10.5 TLV_Event(Event, State, Info) primitive.....	53
6.10.6 Notification(TLV_Event1,..., TLV_Eventn) primitive	54
6.11 Group UVM/TVM messages	54
6.11.1 TLV_Clear_Rules() primitive.....	54
6.11.2 TLV_Mode_Transparent() primitive.....	55
6.11.3 TLV_Mode_Tagging(defaultVID) primitive.....	55
6.11.4 TLV_Mode_Translation(defaultVID, sourceVid1, targetVid1, ..., sourceVidN, targetVidN) primitive.....	55
6.11.5 TLV_Mode_Aggregation(defaultVID, trunkCount, trunk1Count, trunk1Vid, source11Vid,..., source1NVid,..., trunkMCount, trunkMVid, sourceM1Vid,..., sourceMNVid) primitive.....	56
6.11.6 TLV_Mode_Filtering(defaultVID, permitVid1,..., permitVidN) primitive.....	56
7. ONU tests	57
7.1 Introduction	57
7.2 Common ONU requirements	57
7.3 Group AU: ONU authentication	57
7.3.1 CU-AU1a-01, Test case for ONU authentication process, MAC-address-based authentication	57
7.3.1.1 Test description	57
7.3.1.2 Required equipment and test configuration.....	57
7.3.1.3 Test procedure and expected results.....	57
7.3.2 CU-AU1b-01, Test case for ONU authentication process, Logical-ID-based authentication ...	58
7.3.2.1 Test description	58
7.3.2.2 Required equipment and test configuration.....	58
7.3.2.3 Test procedure and expected results.....	59
7.4 Group DCD: Device and capability discovery	60
7.4.1 CU-DCD3-01, Test case for eOAM and capability discovery process, successful discovery ...	60
7.4.1.1 Test description	60
7.4.1.2 Required equipment and test configuration.....	60
7.4.1.3 Test procedure and expected results.....	60
7.4.2 CU-DCD3-02, Test case for eOAM discovery process, failed discovery	62
7.4.2.1 Test description	62
7.4.2.2 Required equipment and test configuration.....	62
7.4.2.3 Test procedure and expected results.....	62
7.4.3 CU-DCD3-03, Test case for eOAM discovery process, failed discovery	63
7.4.3.1 Test description	63
7.4.3.2 Required equipment and test configuration.....	63
7.4.3.3 Test procedure and expected results.....	63
7.4.4 CU-DCD5b-01, Test case for sL-ONU support.....	64
7.4.4.1 Test description	64
7.4.4.2 Required equipment and test configuration.....	64
7.4.4.3 Test procedure and expected results.....	64

7.4.5 CU-DCD5a-01, Test case for mL-ONU capability discovery, successful discovery.....	65
7.4.5.1 Test description	65
7.4.5.2 Required equipment and test configuration.....	65
7.4.5.3 Test procedure and expected results.....	65
7.4.6 CU-DCD4-01, Test case for OAM and eOAM keep-alive process	66
7.4.6.1 Test description	66
7.4.6.2 Required equipment and test configuration.....	66
7.4.6.3 Test procedure and expected results.....	66
7.5 Group MA: MAC aging.....	67
7.5.1 CU-MA1-01, Test case for MAC aging function, MAC aging function operation with default MAC aging period (300 seconds)	67
7.5.1.1 Test description	67
7.5.1.2 Required equipment and test configuration.....	68
7.5.1.3 Test procedure and expected results.....	68
7.5.2 CU-MA1-02, Test case for MAC aging function, MAC aging function operation with non- default MAC aging period (60 seconds).....	69
7.5.2.1 Test description	69
7.5.2.2 Required equipment and test configuration.....	70
7.5.2.3 Test procedure and expected results.....	70
7.5.3 CU-MA1-03, Test case for MAC aging function, disabled MAC aging function	71
7.5.3.1 Test description	72
7.5.3.2 Required equipment and test configuration.....	72
7.5.3.3 Test procedure and expected results.....	72
7.6 Group PM: Performance monitoring.....	74
7.6.1 CU-PM1c-01, Test case for performance monitoring function default operation.....	74
7.6.1.1 Test description	74
7.6.1.2 Required equipment and test configuration.....	74
7.6.1.3 Test procedure and expected results.....	74
7.6.2 CU-PM1c-02, Test case for performance monitoring function status setting	75
7.6.2.1 Test description	75
7.6.2.2 Required equipment and test configuration.....	75
7.6.2.3 Test procedure and expected results.....	75
7.6.3 CU-PM3a-01, Test case for performance monitoring function data collection	76
7.6.3.1 Test description	76
7.6.3.2 Required equipment and test configuration.....	77
7.6.3.3 Test procedure and expected results.....	77
7.7 Group RF: Report format.....	79
7.7.1 CU-RF1-01, Test case for Report Format for ONU.....	79
7.7.1.1 Test description	79
7.7.1.2 Required equipment and test configuration.....	79
7.7.1.3 Test procedure and expected results.....	79
7.8 Group RPC: Remote ONU Tx power supply control	80
7.8.1 CU-RPC1-01, Test case for remote ONU Tx power supply control, disabled Tx power supply until configured otherwise	80
7.8.1.1 Test description	80
7.8.1.2 Required equipment and test configuration.....	80
7.8.1.3 Test procedure and expected results.....	81
7.8.2 CU-RPC1-02, Test case for remote ONU Tx power supply control, disabled ONU Tx power supply for a preconfigured period of time.....	82
7.8.2.1 Test description	82
7.8.2.2 Required equipment and test configuration.....	82
7.8.2.3 Test procedure and expected results.....	82
7.9 Group SU: Software update.....	83
7.9.1 Software images	83
7.9.2 CU-SU4-01, Test case for software image download process, software image download and verification.....	84

7.9.2.1 Test description	84
7.9.2.2 Required equipment and test configuration.....	84
7.9.2.3 Test procedure and expected results.....	84
7.9.3 CU-SU4-02, Test case for software image download process, successful software image download and failed verification due to incorrect ICS	87
7.9.3.1 Test description	87
7.9.3.2 Required equipment and test configuration.....	87
7.9.3.3 Test procedure and expected results.....	87
7.9.4 CU-SU5-01, Test case for software image activation process	88
7.9.4.1 Test description	88
7.9.4.2 Required equipment and test configuration.....	88
7.9.4.3 Test procedure and expected results.....	88
7.9.5 CU-SU5-02, Test case for software image activation process, failed software image activation and software rollback.....	89
7.9.5.1 Test description	89
7.9.5.2 Required equipment and test configuration.....	90
7.9.5.3 Test procedure and expected results.....	90
7.9.6 CU-SU6-01, Test case for software image committing process, successful software image committing	91
7.9.6.1 Test description	91
7.9.6.2 Required equipment and test configuration.....	91
7.9.6.3 Test procedure and expected results.....	91
7.10 Group USM: ONU transceiver status monitoring.....	92
7.10.1 CU-USM1-01, Test case for measurement of ONU transceiver status parameters.....	92
7.10.1.1 Test description	92
7.10.1.2 Required equipment and test configuration.....	92
7.10.1.3 Test procedure and expected results.....	93
7.10.2 CU-USM4-01, Test case for alarms and warnings associated with ONU transceiver status ...	94
7.10.2.1 Test description	94
7.10.2.2 Required equipment and test configuration.....	94
7.10.2.3 Test procedure and expected results.....	94
7.11 Group UVM: ONU VLAN modes.....	95
7.11.1 CU-UVM2-01, Test case for Transparent VLAN mode, upstream and downstream directions	96
7.11.1.1 Test description	96
7.11.1.2 Required equipment and test configuration.....	96
7.11.1.3 Test procedure and expected results.....	96
7.11.2 CU-UVM3-01, Test case for Tagging VLAN mode, upstream and downstream directions....	99
7.11.2.1 Test description	99
7.11.2.2 Required equipment and test configuration.....	99
7.11.2.3 Test procedure and expected results.....	99
7.11.3 CU-UVM4-01, Test case for Translation VLAN mode, upstream and downstream directions	101
7.11.3.1 Test description	101
7.11.3.2 Required equipment and test configuration.....	101
7.11.3.3 Test procedure and expected results.....	101
7.11.4 CU-UVM5-01, Test case for N:1 Aggregation VLAN mode, upstream and downstream directions, VLAN and MAC-based forwarding.....	103
7.11.4.1 Test description	103
7.11.4.2 Required equipment and test configuration.....	103
7.11.4.3 Test procedure and expected results.....	103
7.11.5 CU-UVM6-01, Test case for Filtering VLAN mode, upstream and downstream directions .	105
7.11.5.1 Test description	105
7.11.5.2 Required equipment and test configuration.....	105
7.11.5.3 Test procedure and expected results.....	105

7.11.6 CU-UVM1-01, Test case for operation of ONU in multiple modes simultaneously, upstream and downstream directions	107
7.11.6.1 Test description	107
7.11.6.2 Required equipment and test configuration	107
7.11.6.3 Test procedure and expected results	107
7.11.7 CU-UVM8-01, Test case for operation of UNI in one VLAN mode only, upstream and downstream directions	110
7.11.7.1 Test description	110
7.11.7.2 Required equipment and test configuration	110
7.11.7.3 Test procedure and expected results	110
8. OLT tests	113
8.1 Introduction	113
8.1.1 Common ONU Emulator requirements	113
8.1.2 Common OLT requirements	113
8.2 Group AU: ONU authentication	113
8.2.1 CT-AU1b-01, Test case for ONU authentication process, MAC-address-based authentication	113
8.2.1.1 Test description	113
8.2.1.2 Required equipment and test configuration	113
8.2.1.3 Test procedure and expected results	114
8.2.2 CT-AU1c-01, Test case for ONU authentication process, Logical-ID-based authentication	115
8.2.2.1 Test description	115
8.2.2.2 Required equipment and test configuration	115
8.2.2.3 Test procedure and expected results	115
8.2.3 CT-AU1d-01, Test case for ONU authentication process, hybrid authentication	117
8.2.3.1 Test description	117
8.2.3.2 Required equipment and test configuration	117
8.2.3.3 Test procedure and expected results	117
8.3 Group DCD: Device and capability discovery	120
8.3.1 CT-DCD5a-01, Test case for eOAM discovery process, successful discovery	120
8.3.1.1 Test description	120
8.3.1.2 Required equipment and test configuration	120
8.3.1.3 Test procedure and expected results	120
8.3.2 CT-DCD5a-02, Test case for eOAM discovery process, failed discovery due to unrecognized eOAM revision	121
8.3.2.1 Test description	121
8.3.2.2 Required equipment and test configuration	121
8.3.2.3 Test procedure and expected results	122
8.3.3 CT-DCD5a-03, Test case for eOAM discovery process, failed discovery	122
8.3.3.1 Test description	122
8.3.3.2 Required equipment and test configuration	122
8.3.3.3 Test procedure and expected results	122
8.3.4 CT-DCD5a-04, Test case for eOAM discovery process, failed discovery	123
8.3.4.1 Test description	123
8.3.4.2 Required equipment and test configuration	123
8.3.4.3 Test procedure and expected results	123
8.3.5 CT-DCD5a-05, Test case for eOAM discovery process, failed discovery	124
8.3.5.1 Test description	124
8.3.5.2 Required equipment and test configuration	124
8.3.5.3 Test procedure and expected results	124
8.3.6 CT-DCD5a-06, Test case for eOAM discovery process, failed discovery	125
8.3.6.1 Test description	125
8.3.6.2 Required equipment and test configuration	125
8.3.6.3 Test procedure and expected results	125

8.3.7 CT-DCD6a-01, Test case for mL-ONU capability discovery, configuration for mL-ONU mode	126
8.3.7.1 Test description	126
8.3.7.2 Required equipment and test configuration	126
8.3.7.3 Test procedure and expected results	126
8.3.8 CT-DCD4-01, Test case for OAM and eOAM keep-alive process	127
8.3.8.1 Test description	127
8.3.8.2 Required equipment and test configuration	127
8.3.8.3 Test procedure and expected results	127
8.4 Group PLD: UNI loop detection	128
8.4.1 CT-PLD1-01, Test case for UNI loop detection	128
8.4.1.1 Test description	128
8.4.1.2 Required equipment and test configuration	128
8.4.1.3 Test procedure and expected results	128
8.5 Group RPC: Remote ONU Tx power supply control	129
8.5.1 CT-RPC1-01, Test case for remote ONU Tx power supply control, disabling Tx power supply until configured otherwise	129
8.5.1.1 Test description	129
8.5.1.2 Required equipment and test configuration	129
8.5.1.3 Test procedure and expected results	129
8.6 Group SU: Software update	130
8.6.1 Software images	130
8.6.2 CT-SU2-01, Test case for software image download process, for IMAGE_OK_OTHER firmware image	131
8.6.2.1 Test description	131
8.6.2.2 Required equipment and test configuration	131
8.6.2.3 Test procedure and expected results	131
8.6.3 CT-SU2-02, Test case for software image download process, with failed image verification	135
8.6.3.1 Test description	135
8.6.3.2 Required equipment and test configuration	135
8.6.3.3 Test procedure and expected results	135
8.6.4 CT-SU3-01, Test case for software image activation process, successful software image activation process	136
8.6.4.1 Test description	136
8.6.4.2 Required equipment and test configuration	136
8.6.4.3 Test procedure and expected results	136
8.6.5 CT-SU4-01, Test case for software image committing process, successful software image committing process	137
8.6.5.1 Test description	137
8.6.5.2 Required equipment and test configuration	138
8.6.5.3 Test procedure and expected results	138
8.7 Group TSM: OLT transceiver status monitoring	139
8.7.1 CT-TSM1-01, Test case for measurement of OLT transceiver status parameters	139
8.7.1.1 Test description	139
8.7.1.2 Required equipment and test configuration	139
8.7.1.3 Test procedure and expected results	140
8.8 Group TVM: OLT VLAN modes	140
8.8.1 CT-TVM2-01, Test case for Transparent VLAN mode, upstream and downstream directions	141
8.8.1.1 Test description	141
8.8.1.2 Required equipment and test configuration	141
8.8.1.3 Test procedure and expected results	141
8.8.2 CT-TVM3-01, Test case for Tagging VLAN mode, upstream and downstream directions	142
8.8.2.1 Test description	142
8.8.2.2 Required equipment and test configuration	142
8.8.2.3 Test procedure and expected results	143
8.8.3 CT-TVM4-01, Test case for Translation VLAN mode, upstream and downstream directions	144

8.8.3.1 Test description	144
8.8.3.2 Required equipment and test configuration.....	144
8.8.3.3 Test procedure and expected results.....	144
8.8.4 CT-TVM5-01, Test case for N:1 Aggregation VLAN mode, upstream and downstream directions.....	146
8.8.4.1 Test description	146
8.8.4.2 Required equipment and test configuration.....	146
8.8.4.3 Test procedure and expected results.....	146
8.8.5 CT-TVM6-01, Test case for Filtering VLAN mode, upstream and downstream directions	148
8.8.5.1 Test description	148
8.8.5.2 Required equipment and test configuration.....	148
8.8.5.3 Test procedure and expected results.....	149

IEEE Standard for Conformance Test Procedures for Service Interoperability in Ethernet Passive Optical Networks, IEEE Std 1904.1™ Package C

Version 001.001

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1. Overview

1.1 Scope

This standard specifies a suite of conformance tests for system-level requirements of Ethernet Passive Optical Network (EPON) equipment, defined in IEEE 1904.1 Package C.

1.2 Purpose

The purpose of this standard is to build upon the IEEE 1904.1 Package C EPON system-level interoperability standard and create a suite of conformance tests. Defining the exact test procedures will allow vendors, network operators, and independent testing facilities to achieve consistent results when testing EPON equipment for conformance with IEEE 1904.1 Package C.

1.3 Mandatory and optional requirements

This standard defines the configuration of test equipment and testing procedures required to test EPON device's conformance with the IEEE 1904.1 Service Interoperability in the Ethernet Passive Optical Networks (SIEPON). The mandatory and optional requirements included in this standard cover the test equipment and the test procedures, but not the expected behavior of the device under test (DUT).

1.4 Test suite version and conformance test identifier

1.4.1 Major and minor conformance test suite versions

The numbering of the conformance test suite uses the following format: **AAA.aaa**, where **AAA** represents the major conformance test suite version and **aaa** represents the minor conformance test suite version. The major and minor version numbers are used to indicate the current revision of this standard, where

- The major version **AAA** represents a major revision of this standard, where at least one of the conformance tests was subject to a major change, requiring retesting of any equipment conforming with the previous version of the conformance test suite.
- The minor version **aaa** represents a minor revision of this standard, where at least one of the conformance tests was subject to a minor change, not requiring retesting of any equipment conforming with the current major version of the conformance test suite.

This standard specifies version **001.001** of the suite of conformance tests.

1.4.2 Conformance test identifier

Each conformance test described in this standard is unequivocally designated with a conformance test identifier with the following format: **XXXX-nn.BBB.bbb**, where

- **XXXX** represents the identifier of the primary Protocol Implementation Conformance Statements (PICS) item covered by the given conformance test, as defined in IEEE Std 1904.1, Annex 4C. When a conformance test covers more than one PICS item, only the primary PICS item (i.e., the PICS item describing the feature, function, or behavior subject to conformance testing) is reflected in the conformance test identifier. For example, if the given conformance test is focused on Queue Service Discipline (QSD) feature for the Package C Optical Network Unit (ONU), **XXXX** in the conformance test identifier is equal to CU-QSD1.
- **nn** represents the conformance test index when multiple conformance tests are required to examine the very same PICS item. The value of this field starts with 01 and its maximum value is 99.
- **BBB** represents the major version of the conformance test. The value of this field starts with 001, and its maximum value is 999.
- **bbb** represents the minor version of the conformance test. The value of this field starts with 001, and its maximum value is 999.

For example, if the given conformance test is focused on the QSD feature for the Package C ONU and covers PICS item CU-QSD1, this is the second conformance test required to fully examine this feature, there were three major releases of this conformance test, and the test is now on second minor release, then the associated conformance test identifier has the following form:

CU-QSD1-02.003.002

1.4.3 Updating conformance test identifier and test suite version

During the life cycle of this standard, individual conformance tests are likely to be modified to cater to new requirements and changes to existing requirements as well as to address any maintenance requests. For this

reason, it is critical to understand changes in the conformance test identifier numbering and their impact on conformance testing and certification of devices.

When a conformance test is modified, and if the modifications introduced to that conformance test are insignificant and the results obtained using the previous conformance test version are still valid for the device certified based on that conformance test, then the major version **BBB** does not change, and the minor version **bbb** is incremented.

$$\text{XXXX-nn.BBB.bbb} \rightarrow \text{XXXX-nn.BBB.(bbb+1)}$$

When a conformance test is modified, and if the modifications introduced to that conformance test are so significant that the test results obtained using the previous conformance test version are not applicable anymore for the device certified based on that conformance test, then the major test version **BBB** is set to the value equal to the major version of this standard plus one, and the minor version **bbb** is set to **001**.

$$\text{XXXX-nn.BBB.bbb} \rightarrow \text{XXXX-nn.(AAA+1).001}$$

When a minor version of at least one conformance test is incremented and the major version of all conformance tests is not incremented, then only the minor version of the entire test suite **aaa** is incremented.

$$\text{AAA.aaa} \rightarrow \text{AAA.(aaa+1)}$$

When major changes are made to at least one conformance test, the major version **AAA** of the entire test suite is incremented. When the major version **AAA** of the test suite is incremented, the minor version of the test suite **aaa** is set to **001**.

$$\text{AAA.aaa} \rightarrow \text{(AAA+1).001}$$

1.5 Overview of clauses

The following is an overview of the scope of individual clauses included in this specification:

- Clause 1 provides an overview of the IEEE 1904.1/Conformance03 specifications, including the scope and purpose of the specification and the scope of individual clauses. It also includes the definition of the test suite version and a detailed description of the conformance test identifier and the rules governing it.
- Clause 2 lists normative references used within this specification.
- Clause 3 outlines definitions of specific terms as used in this standard. Terms may be introduced in this specification or may exist with multiple industry definitions. Additionally, a list of acronyms used in this standard is included.
- Clause 4 describes the most common conformance test configurations, together with the functional requirements for individual devices used for their instrumentation.
- Clause 5 provides a conformance map, where PICS defined in IEEE Std 1904.1 are mapped to individual conformance tests specified in this standard. Two lists are available, one for the ONU and one for the Optical Line Terminal (OLT).
- Clause 6 serves as a repository of all configuration and management messages used in individual test cases.
- Clause 7 serves as a repository of ONU-specific conformance tests.
- Clause 8 serves as a repository of OLT-specific conformance tests.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

IEEE Std 1904.1™-2013, IEEE Standard for Service Interoperability in Ethernet Passive Optical Networks (SIEPON).^{1, 2}

IEEE Std 802.1Q™-2011, IEEE Standard for Information technology—Telecommunications and information systems—Local and metropolitan area networks—Media Access Control (MAC) Bridges and Virtual Bridge Local Area Networks.

IEEE Std 802.3™-2012, IEEE Standard for Ethernet.

¹ IEEE publications are available from The Institute of Electrical and Electronics Engineers (<http://standards.ieee.org/>).

² The IEEE standards or products referred to in this clause are trademarks of The Institute of Electrical and Electronics Engineers, Inc.

3. Definitions, acronyms, and abbreviations

3.1 Definitions

For the purposes of this document, the terms and definitions given in IEEE Std 1904.1-2013 apply. The *IEEE Standards Dictionary Online* should be referenced for terms not defined in this clause.³

3.2 Acronyms and abbreviations

AU	authentication
bL-ONU	base Line Optical Network Unit
C-ONU	Client Optical Network Unit
CPE	Customer Premise Equipment
DA	Destination Address
DCD	device and capability discovery
DUT	device under test
eOAM	extended Operations, Administration, and Maintenance
eOAMPDU	extended Operations, Administration, and Maintenance protocol data unit
EPON	Ethernet Passive Optical Network
FCS	frame check sequence
ICS	image check sequence
IGMP	Internet Group Management Protocol
LLID	Logical Link Identifier
L-ONU	Line Optical Network Unit
MA	MAC aging
MAC	Media Access Control
MDI	Medium Dependent Interface
mL-ONU	multiple Line Optical Network Unit (ONU with multiple L-ONUs)
MPCP	Multipoint Control Protocol
MPCPDU	Multipoint Control Protocol data unit
NMS	network management system
NNI	Network-to-Network Interface

³ The *IEEE Standards Dictionary Online* subscriptions are available at
http://www.ieee.org/portal/innovate/products/standard/standards_dictionary.html.

OAM	Operations, Administration and Maintenance
OAMPDU	Operations, Administration, and Maintenance protocol data unit
ODN	Optical Distribution Network
OLT	Optical Line Terminal
ONU	Optical Network Unit
OUI	organizationally unique identifier
PCP	Priority Code Point
PDU	protocol data unit
PLD	port loop detection
PM	performance monitoring
PON	Passive Optical Network
PSC	Power Splitter/Combiner
RF	<i>REPORT</i> MPCPDU format
RPS	power supply control
Rx	receiver
SA	Source Address
sL-ONU	single Line Optical Network Unit (ONU with a single L-ONU)
SU	software update
TLV	Type/Length/Value
TRx	transceiver (transmitter + receiver)
TSM	OLT transceiver status monitoring
TVM	OLT VLAN mode
Tx	transmitter
UNI	user network interface
USM	ONU transceiver status monitoring
UVM	ONU VLAN mode
VLAN	Virtual Local Area Network

3.3 Package C organizationally unique identifier (OUI) value

EPON ONU or OLT subject to conformance tests defined in this standard implement Operations, Administration, and Maintenance (OAM)-based management protocols per IEEE Std 802.3, Clause 57, and specifically extended OAM (eOAM) mechanisms for managing various features defined in IEEE Std 1904.1. The eOAM mechanisms utilize the Organization Specific OAM protocol data unit (OAMPDU), as defined in IEEE Std 802.3, 57.4.3.6, where each package defined in IEEE Std 1904.1 is identified by a specific value of OUI. For Package C, the value of OUI_C is equal to 0xC4-E0-32, as defined in IEEE Std 1904.1, 4.4.

4. Test equipment and test configuration

4.1 Functional requirements for test equipment

4.1.1 Introduction

This subclause provides definitions of the essential elements of the conformance test setup, namely the Packet Analyzer, Passive Optical Network (PON) Protocol Analyzer, Packet Generator, Optical Distribution Network (ODN), OLT Emulator, and ONU Emulator, which are connected together as shown in 4.2.

Subclauses 4.1.2 through 4.1.7 specify aggregated functional requirements needed to support the entire set of defined test cases. However, for any individual test case, a device is not required to support any functions or capabilities beyond those required by the given test case.

Individual devices are specified in terms of functional requirements and do not impose specific implementation. For test purposes, functions of two or more logical devices described in the following subclauses may be combined into a single physical device, as long as the new device meets all the requirements outlined in the following subclauses.

4.1.2 Packet Analyzer

The Packet Analyzer is a device that is connected to the OLT Network-to-Network Interface (NNI) and/or ONU User Network Interface (UNI) as detailed in 4.2 and that supports the following functions:

- Capture of selected packets transmitted by the OLT across the NNI toward the metro/aggregation network.
- Capture of selected packets transmitted by the ONU across the UNI toward connected Customer Premise Equipment (CPEs).
- Analysis of the content of captured packets, including a capability to examine and display/output the content of individual fields in captured packets.

4.1.3 PON Protocol Analyzer

The PON Protocol Analyzer is a device that is connected to the ODN as detailed in 4.2.2, 4.2.3, 4.2.4, and 4.2.5 and that supports the following functions:

- Capture of upstream packets, including Multipoint Control Protocol data units (MPCPDUs), OAMPDUs, eOAM protocol data units (eOAMPDUs), and data frames, as specified in IEEE Std 802.3 and IEEE Std 1904.1, transmitted by any of the connected ONUs toward the OLT.
- Capture of downstream packets, including MPCPDUs, OAMPDUs, eOAMPDUs, and data frames, as specified in IEEE Std 802.3 and IEEE Std 1904.1, transmitted by the OLT toward any of the connected ONUs.
- Simultaneous capture of downstream and upstream packets i.e., implementation of at least two capture interfaces, one of which is configured to capture upstream packets and the other is configured to capture downstream packets.
- Analysis of the content of captured packets, including a capability to examine and display/output the content of individual fields in captured packets.

The PON Protocol Analyzer does not modify the content of any upstream or downstream packets. Additionally, when connected to the ODN, this device affects the channel insertion loss value as specified in 4.1.5.

4.1.4 Packet Generator

The Packet Generator is a device that is connected to the OLT NNI and/or ONU UNI as shown in 4.2 and that supports the following functions:

- Generation of a predefined number of data packets of preconfigured type, meeting specific packet size distribution and type requirements.
- Capability to configure the following parameters (with examples) of the packet stream:
 - Packet type and content (e.g., VLAN tagged or untagged, IPv4, IPv6, Internet Group Management Protocol (IGMP)).
 - Profile of the packet stream (constant rate or bursty, continuous or specific number).
 - Packet size distribution (uniformly random packet sizes or specific probability distribution function).

The Packet Generator is not connected to the ODN and does not influence the loss observed between OLT_MDI and ONU_MDI. This device may be connected to the OLT NNI and ONU UNI via copper or fiber links, depending on the interface types supported on the DUT.

4.1.4.1 Size of Ethernet frame

In certain test cases, it is necessary to define the size of Ethernet frames transmitted by the Packet Generator. When defined, the size of an Ethernet frame accounts for all the fields included in an Ethernet frame as defined in IEEE Std 802.3, 3.1.1 and 3.2, starting from the Destination Media Access Control (MAC) address and ending with the frame check sequence (FCS) field, including all IEEE 802.1Q VLAN tags and Tunneling tags (if present). Preamble is not included in the size of the Ethernet frame.

4.1.5 ODN

Testing conformance of the ODN with the respective IEEE 802.3 requirements is outside of the scope of this standard. Various aspects of physical layer transmission, e.g., target sensitivities, launch powers, immunity to dispersion, are not part of the conformance tests.

However, for the proper execution of the conformance tests described in this standard, the ODN needs to conform to several basic requirements. The target channel insertion loss for the ODN used for the conformance tests under this standard is recommended to range between 15 dB and 20 dB. The ODN can be realized by connecting the splitter with either fiber cables of appropriate length or attenuators to achieve the minimum recommended channel insertion loss of 15 dB. The recommended split ratio for Power Splitter/Combiner (PSC) (see 4.2 for more details) is 2:N (N = 16). The recommended maximum distance between the OLT and the furthest ONU is 20 km, to limit the observed signal dispersion. During the design of the ODN for conformance testing under this standard, the loss introduced by the additional splitter ports used to connect the PON Protocol Analyzer needs to be accounted for.

Specific requirements for the minimum channel insertion loss for specific Physical Medium Dependent layers can be found in IEEE Std 802.3, Clause 75 for 10G-EPON devices and Clause 60 for 1G-EPON devices.

4.1.6 OLT Emulator

The OLT Emulator is used to perform conformance testing of ONUs, replacing the regular OLT in EPON, and it is connected to the ODN as shown in 4.2. The OLT Emulator supports the following functions:

- Performing all functions of the OLT as defined in IEEE Std 802.3, including physical layer, MAC layer, and Multipoint Control Protocol (MPCP) layer functions.
- Performing all functions of the OLT as defined in IEEE Std 1904.1, Table 4-1 for Package C, including OAM and eOAM discovery, bandwidth allocation, and management.

The OLT Emulator is capable of executing all MPCP, OAM, and eOAM processes, as specified in IEEE Std 802.3 and IEEE Std 1904.1. Additionally, the OLT Emulator is capable of executing custom processes and generating custom MPCPDUs, OAMPDUs, and eOAMPDUs as described in more detail in individual test cases.

4.1.7 ONU Emulator

The ONU Emulator is used to perform conformance testing of OLT, replacing regular ONUs in EPON, and it is connected to the ODN as shown in 4.2. The ONU Emulator supports the following functions:

- Performing all functions of the ONU as defined in IEEE Std 802.3, including physical layer, MAC layer, and MPCP layer functions.
- Performing all functions of the ONU as defined in IEEE Std 1904.1, Table 4-1 for Package C, including OAM and eOAM discovery, bandwidth allocation, and management.

The ONU Emulator is capable of executing all MPCP, OAM, and eOAM processes, as specified in IEEE Std 802.3 and IEEE Std 1904.1. Additionally, the ONU Emulator is capable of executing custom processes and generating custom MPCPDUs, OAMPDUs, and eOAMPDUs as described in more detail in individual test cases.

4.2 Test equipment configurations

4.2.1 Introduction

This subclause outlines the common test configurations used by individual conformance test cases defined in Clause 7 and Clause 8 of this standard. In total the following four configurations without optical line protection are described:

- ONU under test without the Packet Generator/Analyzer; see 4.2.2
- OLT under test without the Packet Generator/Analyzer; see 4.2.3
- ONU under test with the Packet Generator/Analyzer; see 4.2.4
- OLT under test with the Packet Generator/Analyzer; see 4.2.5

Individual test cases covered in Clause 7 and Clause 8 may specify their own modified test configurations, as needed, building from the generic test configurations defined in the following subclauses.

4.2.2 ONU under test without Packet Generator/Analyzer

In this scenario, the ONU (DUT) is subject to conformance testing using the test equipment configuration shown in Figure 1. The PON Protocol Analyzer is connected to PSC (with 2:N split, where N is defined in 4.1.5), to capture both upstream and downstream traffic exchanged between OLT_MDI and ONU_MDI.

In this test configuration, there is no Packet Generator/Analyzer connected to either the NNI on the OLT Emulator or the UNI on the DUT. This test configuration is therefore optimum for testing interaction between the OLT and DUT not affecting subscriber traffic, e.g., software download.

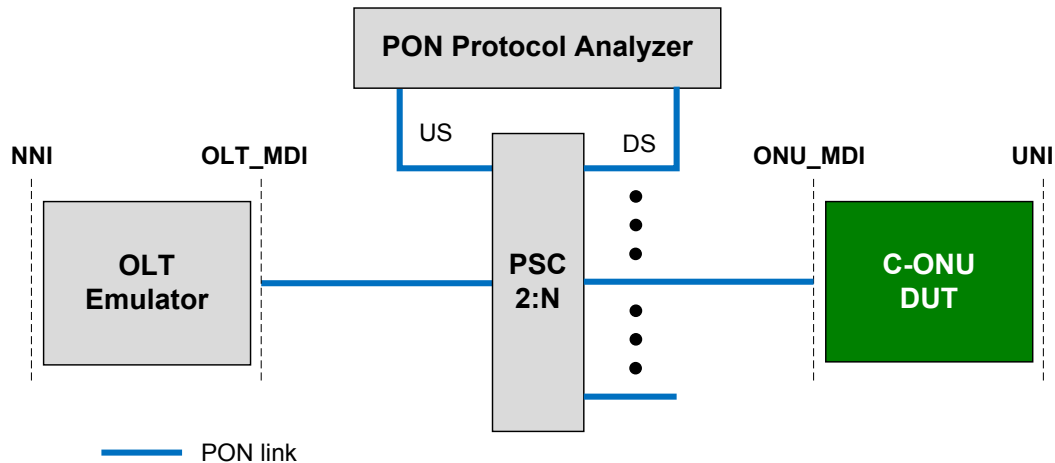


**Figure 1—Test equipment configuration for testing ONU (DUT)
 with no line protection, without Packet Generator/Analyzer**

4.2.3 OLT under test without Packet Generator/Analyzer

In this scenario, the OLT (DUT) is subject to conformance testing using the test equipment configuration shown in Figure 2. The PON Protocol Analyzer is connected to PSC (with 2:N split, where N is defined in 4.1.5), to capture both upstream and downstream traffic exchanged between OLT_MDI and ONU_MDI.

In this test configuration, there is no Packet Generator/Analyzer connected to either the UNI on the ONU Emulator or the NNI on the DUT. This test configuration is therefore optimum for testing interaction between the ONU and the DUT not affecting subscriber traffic, e.g., software download.

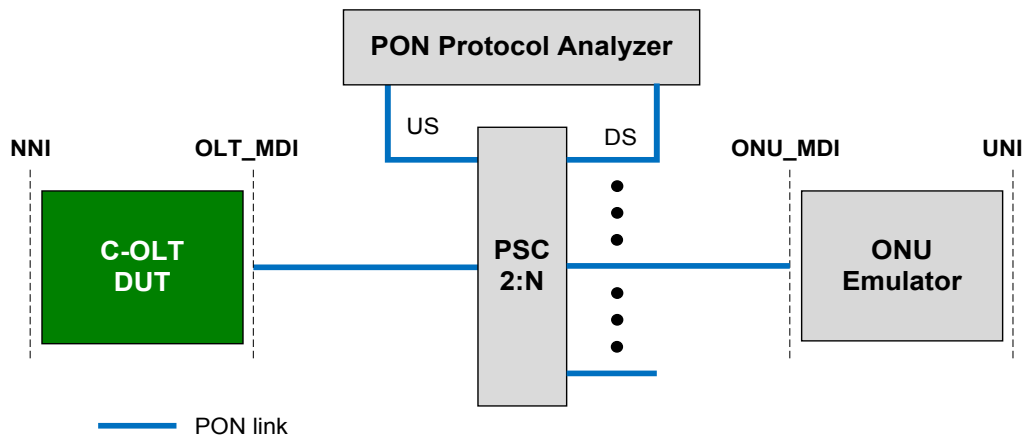


**Figure 2—Test equipment configuration for testing OLT (DUT)
 with no line protection, without Packet Generator/Analyzer**

4.2.4 ONU under test with Packet Generator/Analyzer

In this scenario, the ONU (DUT) is subject to conformance testing using the test equipment configuration shown in Figure 3. The PON Protocol Analyzer is connected to PSC (with 2:N split, where N is defined in 4.1.5), to capture both upstream and downstream traffic exchanged between OLT_MDI and ONU_MDI.

In this test configuration, the Packet Generator/Analyzer is connected to both the NNI on the OLT Emulator as well as the UNI on the DUT. This test configuration is therefore optimum for testing interaction between the OLT and DUT affecting subscriber traffic, e.g., authentication.

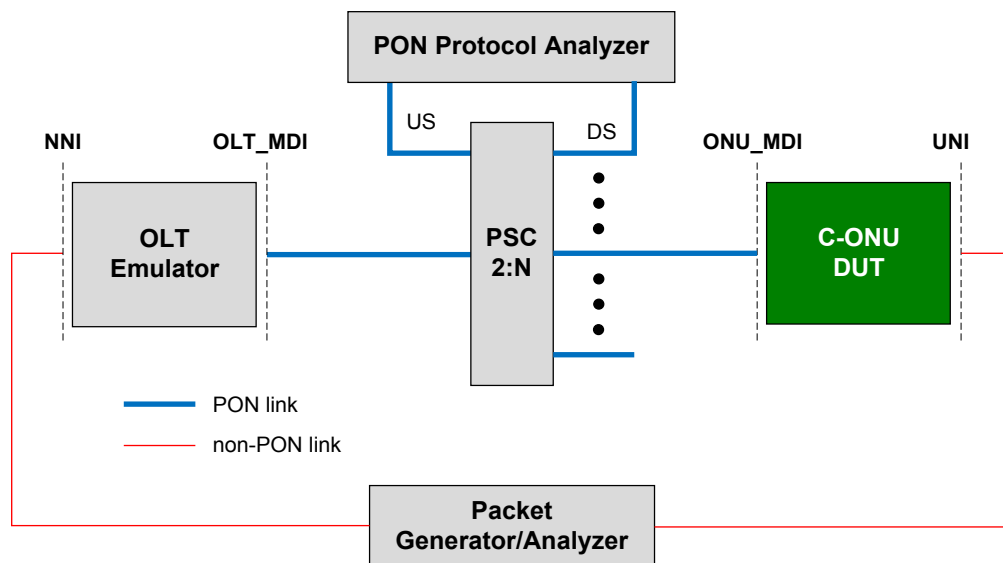


Figure 3—Test equipment configuration for testing ONU (DUT) with no line protection, with Packet Generator/Analyzer

4.2.5 OLT under test with Packet Generator/Analyzer

In this scenario, the OLT (DUT) is subject to conformance testing using the test equipment configuration shown in Figure 4. The PON Protocol Analyzer is connected to PSC (with 2:N split, where N is defined in 4.1.5), to capture both upstream and downstream traffic exchanged between OLT_MDI and ONU_MDI.

In this test configuration, the Packet Generator/Analyzer is connected to both the UNI on the ONU Emulator and the NNI on the DUT. This test configuration is therefore optimum for testing interaction between the ONU and the DUT affecting subscriber traffic, e.g., authentication.

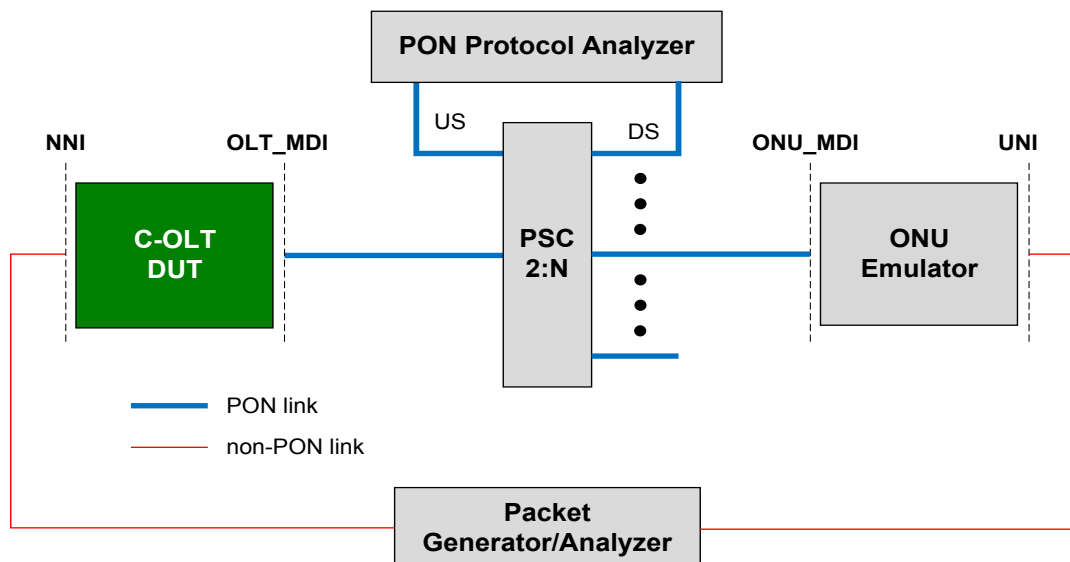


Figure 4—Test equipment configuration for testing OLT (DUT) with no line protection, with Packet Generator/Analyzer

4.3 Frame flow configurations

The Packet Generator is configured to generate flows of Ethernet frames with specific VLAN tags, destination MAC addresses, or source MAC addresses, as shown in individual tables. The size of each Ethernet frame is 1000 octets. Each flow consists of K packets ($K = 2000$). The order of frames belonging to different flows in the aggregated stream is not specified.

Unless explicitly shown in the individual tables, particular fields in the S-Tag and C-tag header shall use IEEE Std 802.1Q-compliant values (default values).

When the MAC address defined in any tables included in this subclause contains the keyword *UNIn*, the value of the MAC address is derived from the *UNIn* port number, represented in a 1-octet-wide format. For example, for the MAC address of 0xC4-E0-32-11-11-UNIn, the resulting MAC address for *UNI1* is equal to 0xC4-E0-32-11-11-01; for *UNI2*, 0xC4-E0-32-11-11-02; and for *UNI21*, 0xC4-E0-32-11-11-15. For the downstream direction flow, this value is expected in the Destination Address (DA) field. For the upstream direction flow, this value is expected in the Source Address (SA) field.

When the VID value defined in any tables included in this subclause contains the keyword *UNIn*, the value of the VID is derived from the *UNIn* port number, represented in a 1-octet-wide format. For example, for the VID value of 0x1-UNIn, the resulting VID value for *UNI1* is equal to 0x1-01; for *UNI2*, 0x1-02; and for *UNI21*, 0x1-15.

Table 1—Packet Generator frame flow configuration A^a

Frame flow number	SA
1	0xC4-E0-32-00-UNIn-01
2	0xC4-E0-32-00-UNIn-02
3	0xC4-E0-32-00-UNIn-03

^a The DA in generated frames is set to 0xFF-FF-FF-FF-FF-FF.

Table 2—Packet Generator frame flow configuration B^a

Frame flow number	DA
1	0xC4-E0-32-00-UNIn-01
2	0xC4-E0-32-00-UNIn-02
3	0xC4-E0-32-00-UNIn-03
4	0xC4-E0-32-00-UNIn-04
5	0x11-00-00-00-UNIn-03
6	0x00-00-00-00-FF-01

^a The SA in generated frames can be set to 0xC4-E0-32-12-34-56.

Table 3—Packet Generator frame flow configuration C

Frame group number	MAC	Frame size	Number of downstream frames	Number of upstream frames ^a
1	0xC4-E0-32-11-11-UNIn	60 (Undersize)	D1	U1
2		64	D2	U2
3		100	D3	U3
4		200	D4	U4
5		400	D5	U5
6		800	D6	U6
7		1200	D7	U7
8		1520 (Oversize)	D8	U8
9	0xff-ff-ff-ff-ff-ff	500	D9	0
10	0x01-00-5e-11-11-11	500	D10	0

^a Number of frames configured for each corresponding frame group, in positive integer value. Rather than being uniform, D1 – D10, U1 – U8 use random values, which are later used in the performance monitoring parameter calculations (see 6.6.5 and 6.6.6) to determine their accuracy.

Table 4—Packet Generator frame flow configuration D

Frame flow number	VLAN0-VID	VLAN0-PCP
1	0x0-03	0b000
2	0x0-03	0b001
3	0x0-03	0b010
4	0x0-03	0b011
5	0x0-03	0b100
6	0x0-03	0b101
7	0x0-03	0b110
8	0x0-03	0b111

Table 5—Packet Generator frame flow configuration E

Frame flow number	MAC	S-Tag	C-Tag
1	0xC4-E0-32-11-11-UNIn	not present	not present
2		not present	C-VID = 0x1-UNIn
3		not present	C-VID = 0x9-UNIn
4		not present	C-VID = 0xF-UNIn
5		S-VID = 0x1-UNIn	not present
6		S-VID = 0x9-UNIn	not present
7		S-VID = 0xF-UNIn	not present
8		S-VID = 0x1-UNIn	C-VID = 0x1-UNIn
9		S-VID = 0x9-UNIn	C-VID = 0x1-UNIn
10		S-VID = 0xF-UNIn	C-VID = 0x1-UNIn
11		S-VID = 0x1-UNIn	C-VID = 0x9-UNIn
12		S-VID = 0x9-UNIn	C-VID = 0x9-UNIn
13		S-VID = 0xF-UNIn	C-VID = 0x9-UNIn
14		S-VID = 0x1-UNIn	C-VID = 0xF-UNIn
15		S-VID = 0x9-UNIn	C-VID = 0xF-UNIn
16		S-VID = 0xF-UNIn	C-VID = 0xF-UNIn

Table 6—Packet Generator frame flow configuration F

Frame flow number	MAC	S-Tag	C-Tag
1	0xC4-E0-32-11-11-UNIn	not present	not present
2		not present	C-VID = 0x1-UNIn
3		not present	C-VID = 0x2-UNIn
4		not present	C-VID = 0x9-UNIn
5		not present	C-VID = 0xF-UNIn
6		S-VID = 0x1-UNIn	not present
7		S-VID = 0x2-UNIn	not present
8		S-VID = 0x9-UNIn	not present
9		S-VID = 0xF-UNIn	not present
10		S-VID = 0x1-UNIn	C-VID = 0x1-UNIn
11		S-VID = 0x2-UNIn	C-VID = 0x1-UNIn
12		S-VID = 0x9-UNIn	C-VID = 0x1-UNIn
13		S-VID = 0xF-UNIn	C-VID = 0x1-UNIn
14		S-VID = 0x1-UNIn	C-VID = 0x2-UNIn
15		S-VID = 0x2-UNIn	C-VID = 0x2-UNIn
16		S-VID = 0x9-UNIn	C-VID = 0x2-UNIn
17		S-VID = 0xF-UNIn	C-VID = 0x2-UNIn
18		S-VID = 0x1-UNIn	C-VID = 0x9-UNIn
19		S-VID = 0x2-UNIn	C-VID = 0x9-UNIn
20		S-VID = 0x9-UNIn	C-VID = 0x9-UNIn
21		S-VID = 0xF-UNIn	C-VID = 0x9-UNIn
22		S-VID = 0x1-UNIn	C-VID = 0xF-UNIn
23		S-VID = 0x2-UNIn	C-VID = 0xF-UNIn
24		S-VID = 0x9-UNIn	C-VID = 0xF-UNIn
25		S-VID = 0xF-UNIn	C-VID = 0xF-UNIn

Table 7—Packet Generator frame flow configuration G

Frame flow number	MAC	S-Tag	C-Tag
1	0xC4-E0-32-11-11-UNIn	not present	not present
2		not present	C-VID = 0x5-UNIn
3		not present	C-VID = 0x6-UNIn
4		not present	C-VID = 0x9-UNIn
5		not present	C-VID = 0xF-UNIn
6		S-VID = 0x5-UNIn	not present
7		S-VID = 0x6-UNIn	not present
8		S-VID = 0x9-UNIn	not present
9		S-VID = 0xF-UNIn	not present
10		S-VID = 0x5-UNIn	C-VID = 0x5-UNIn
11		S-VID = 0x6-UNIn	C-VID = 0x5-UNIn
12		S-VID = 0x9-UNIn	C-VID = 0x5-UNIn
13		S-VID = 0xF-UNIn	C-VID = 0x5-UNIn
14		S-VID = 0x5-UNIn	C-VID = 0x6-UNIn
15		S-VID = 0x6-UNIn	C-VID = 0x6-UNIn
16		S-VID = 0x9-UNIn	C-VID = 0x6-UNIn
17		S-VID = 0xF-UNIn	C-VID = 0x6-UNIn
18		S-VID = 0x5-UNIn	C-VID = 0x9-UNIn
19		S-VID = 0x6-UNIn	C-VID = 0x9-UNIn
20		S-VID = 0x9-UNIn	C-VID = 0x9-UNIn
21		S-VID = 0xF-UNIn	C-VID = 0x9-UNIn
22		S-VID = 0x5-UNIn	C-VID = 0xF-UNIn
23		S-VID = 0x6-UNIn	C-VID = 0xF-UNIn
24		S-VID = 0x9-UNIn	C-VID = 0xF-UNIn
25		S-VID = 0xF-UNIn	C-VID = 0xF-UNIn

Table 8—Packet Generator frame flow configuration H

Frame flow number	SA	S-Tag	C-Tag
1	SA = 0xC4-E0-32-11-11-UNIn	not present	not present
2		not present	C-VID = 0x1-UNIn
3		not present	C-VID = 0x2-UNIn
4		not present	C-VID = 0x9-UNIn
5		not present	C-VID = 0xF-UNIn
6		S-VID = 0x1-UNIn	not present
7		S-VID = 0x2-UNIn	not present
8		S-VID = 0x9-UNIn	not present
9		S-VID = 0xF-UNIn	not present
10		S-VID = 0x1-UNIn	C-VID = 0x1-UNIn
11		S-VID = 0x2-UNIn	C-VID = 0x1-UNIn
12		S-VID = 0x9-UNIn	C-VID = 0x1-UNIn
13		S-VID = 0xF-UNIn	C-VID = 0x1-UNIn
14		S-VID = 0x1-UNIn	C-VID = 0x2-UNIn
15		S-VID = 0x2-UNIn	C-VID = 0x2-UNIn
16		S-VID = 0x9-UNIn	C-VID = 0x2-UNIn
17		S-VID = 0xF-UNIn	C-VID = 0x2-UNIn
18		S-VID = 0x1-UNIn	C-VID = 0x9-UNIn
19		S-VID = 0x2-UNIn	C-VID = 0x9-UNIn
20		S-VID = 0x9-UNIn	C-VID = 0x9-UNIn
21		S-VID = 0xF-UNIn	C-VID = 0x9-UNIn
22		S-VID = 0x1-UNIn	C-VID = 0xF-UNIn
23		S-VID = 0x2-UNIn	C-VID = 0xF-UNIn
24		S-VID = 0x9-UNIn	C-VID = 0xF-UNIn
25		S-VID = 0xF-UNIn	C-VID = 0xF-UNIn

Table 9—Packet Generator frame flow configuration I

Frame flow number	DA	S-Tag	C-Tag
1	DA = 0xC4-E0-32-11-11-UNIn	not present	not present
2		not present	C-VID = 0x3-UNIn
3		not present	C-VID = 0x4-UNIn
4		not present	C-VID = 0x9-UNIn
5		not present	C-VID = 0xA-UNIn
6		S-VID = 0x3-UNIn	not present
7		S-VID = 0x4-UNIn	not present
8		S-VID = 0x9-UNIn	not present
9		S-VID = 0xA-UNIn	not present
10		S-VID = 0x3-UNIn	C-VID = 0x3-UNIn
11		S-VID = 0x4-UNIn	C-VID = 0x3-UNIn
12		S-VID = 0x9-UNIn	C-VID = 0x3-UNIn
13		S-VID = 0xA-UNIn	C-VID = 0x3-UNIn
14		S-VID = 0x3-UNIn	C-VID = 0x4-UNIn
15		S-VID = 0x4-UNIn	C-VID = 0x4-UNIn
16		S-VID = 0x9-UNIn	C-VID = 0x4-UNIn
17		S-VID = 0xA-UNIn	C-VID = 0x4-UNIn
18		S-VID = 0x3-UNIn	C-VID = 0x9-UNIn
19		S-VID = 0x4-UNIn	C-VID = 0x9-UNIn
20		S-VID = 0x9-UNIn	C-VID = 0x9-UNIn
21		S-VID = 0xA-UNIn	C-VID = 0x9-UNIn
22		S-VID = 0x3-UNIn	C-VID = 0xA-UNIn
23		S-VID = 0x4-UNIn	C-VID = 0xA-UNIn
24		S-VID = 0x9-UNIn	C-VID = 0xA-UNIn
25		S-VID = 0xA-UNIn	C-VID = 0xA-UNIn

Table 10—Packet Generator frame flow configuration J

Frame flow number	SA	S-Tag	C-Tag
1	SA = 0xC4-E0-32-11-00-UNIn	not present	not present
2	SA = 0xC4-E0-32-11-01-UNIn	not present	C-VID = 0x1-UNIn
3	SA = 0xC4-E0-32-11-02-UNIn	not present	C-VID = 0x2-UNIn
4	SA = 0xC4-E0-32-11-03-UNIn	not present	C-VID = 0x3-UNIn
5	SA = 0xC4-E0-32-11-04-UNIn	not present	C-VID = 0x4-UNIn
6	SA = 0xC4-E0-32-11-05-UNIn	not present	C-VID = 0x5-UNIn
7	SA = 0xC4-E0-32-11-06-UNIn	not present	C-VID = 0x6-01
8	SA = 0xC4-E0-32-11-09-UNIn	not present	C-VID = 0x9-UNIn
9	SA = 0xC4-E0-32-11-0F-UNIn	not present	C-VID = 0xF-UNIn
10	SA = 0xC4-E0-32-11-10-UNIn	S-VID = 0x1-UNIn	not present
11	SA = 0xC4-E0-32-11-20-UNIn	S-VID = 0x2-UNIn	not present
12	SA = 0xC4-E0-32-11-30-UNIn	S-VID = 0x3-UNIn	not present
13	SA = 0xC4-E0-32-11-40-UNIn	S-VID = 0x4-UNIn	not present
14	SA = 0xC4-E0-32-11-50-UNIn	S-VID = 0x5-UNIn	not present
15	SA = 0xC4-E0-32-11-60-UNIn	S-VID = 0x6-01	not present
16	SA = 0xC4-E0-32-11-90-UNIn	S-VID = 0x9-UNIn	not present
17	SA = 0xC4-E0-32-11-F0-UNIn	S-VID = 0xF-UNIn	not present
18	SA = 0xC4-E0-32-11-11-UNIn	S-VID = 0x1-UNIn	C-VID = 0x1-UNIn
19	SA = 0xC4-E0-32-11-21-UNIn	S-VID = 0x2-UNIn	C-VID = 0x1-UNIn
20	SA = 0xC4-E0-32-11-31-UNIn	S-VID = 0x3-UNIn	C-VID = 0x1-UNIn
21	SA = 0xC4-E0-32-11-41-UNIn	S-VID = 0x4-UNIn	C-VID = 0x1-UNIn
22	SA = 0xC4-E0-32-11-51-UNIn	S-VID = 0x5-UNIn	C-VID = 0x1-UNIn
23	SA = 0xC4-E0-32-11-61-UNIn	S-VID = 0x6-01	C-VID = 0x1-UNIn
24	SA = 0xC4-E0-32-11-91-UNIn	S-VID = 0x9-UNIn	C-VID = 0x1-UNIn
25	SA = 0xC4-E0-32-11-F1-UNIn	S-VID = 0xF-UNIn	C-VID = 0x1-UNIn
26	SA = 0xC4-E0-32-11-12-UNIn	S-VID = 0x1-UNIn	C-VID = 0x2-UNIn
27	SA = 0xC4-E0-32-11-22-UNIn	S-VID = 0x2-UNIn	C-VID = 0x2-UNIn
28	SA = 0xC4-E0-32-11-32-UNIn	S-VID = 0x3-UNIn	C-VID = 0x2-UNIn
29	SA = 0xC4-E0-32-11-42-UNIn	S-VID = 0x4-UNIn	C-VID = 0x2-UNIn
30	SA = 0xC4-E0-32-11-52-UNIn	S-VID = 0x5-UNIn	C-VID = 0x2-UNIn
31	SA = 0xC4-E0-32-11-62-UNIn	S-VID = 0x6-01	C-VID = 0x2-UNIn
32	SA = 0xC4-E0-32-11-92-UNIn	S-VID = 0x9-UNIn	C-VID = 0x2-UNIn
33	SA = 0xC4-E0-32-11-F2-UNIn	S-VID = 0xF-UNIn	C-VID = 0x2-UNIn
34	SA = 0xC4-E0-32-11-13-UNIn	S-VID = 0x1-UNIn	C-VID = 0x3-UNIn
35	SA = 0xC4-E0-32-11-23-UNIn	S-VID = 0x2-UNIn	C-VID = 0x3-UNIn
36	SA = 0xC4-E0-32-11-33-UNIn	S-VID = 0x3-UNIn	C-VID = 0x3-UNIn
37	SA = 0xC4-E0-32-11-43-UNIn	S-VID = 0x4-UNIn	C-VID = 0x3-UNIn
38	SA = 0xC4-E0-32-11-53-UNIn	S-VID = 0x5-UNIn	C-VID = 0x3-UNIn
39	SA = 0xC4-E0-32-11-63-UNIn	S-VID = 0x6-01	C-VID = 0x3-UNIn
40	SA = 0xC4-E0-32-11-93-UNIn	S-VID = 0x9-UNIn	C-VID = 0x3-UNIn
41	SA = 0xC4-E0-32-11-F3-UNIn	S-VID = 0xF-UNIn	C-VID = 0x3-UNIn
42	SA = 0xC4-E0-32-11-14-UNIn	S-VID = 0x1-UNIn	C-VID = 0x4-UNIn
43	SA = 0xC4-E0-32-11-24-UNIn	S-VID = 0x2-UNIn	C-VID = 0x4-UNIn
44	SA = 0xC4-E0-32-11-34-UNIn	S-VID = 0x3-UNIn	C-VID = 0x4-UNIn
45	SA = 0xC4-E0-32-11-44-UNIn	S-VID = 0x4-UNIn	C-VID = 0x4-UNIn
46	SA = 0xC4-E0-32-11-54-UNIn	S-VID = 0x5-UNIn	C-VID = 0x4-UNIn
47	SA = 0xC4-E0-32-11-64-UNIn	S-VID = 0x6-01	C-VID = 0x4-UNIn
48	SA = 0xC4-E0-32-11-94-UNIn	S-VID = 0x9-UNIn	C-VID = 0x4-UNIn
49	SA = 0xC4-E0-32-11-F4-UNIn	S-VID = 0xF-UNIn	C-VID = 0x4-UNIn
50	SA = 0xC4-E0-32-11-15-UNIn	S-VID = 0x1-UNIn	C-VID = 0x5-UNIn

Table 10—Packet Generator frame flow configuration J (continued)

Frame flow number	SA	S-Tag	C-Tag
51	SA = 0xC4-E0-32-11-25-UNIn	S-VID = 0x2-UNIn	C-VID = 0x5-UNIn
52	SA = 0xC4-E0-32-11-35-UNIn	S-VID = 0x3-UNIn	C-VID = 0x5-UNIn
53	SA = 0xC4-E0-32-11-45-UNIn	S-VID = 0x4-UNIn	C-VID = 0x5-UNIn
54	SA = 0xC4-E0-32-11-55-UNIn	S-VID = 0x5-UNIn	C-VID = 0x5-UNIn
55	SA = 0xC4-E0-32-11-65-UNIn	S-VID = 0x6-01	C-VID = 0x5-UNIn
56	SA = 0xC4-E0-32-11-95-UNIn	S-VID = 0x9-UNIn	C-VID = 0x5-UNIn
57	SA = 0xC4-E0-32-11-F5-UNIn	S-VID = 0xF-UNIn	C-VID = 0x5-UNIn
58	SA = 0xC4-E0-32-11-16-UNIn	S-VID = 0x1-UNIn	C-VID = 0x6-01
59	SA = 0xC4-E0-32-11-26-UNIn	S-VID = 0x2-UNIn	C-VID = 0x6-01
60	SA = 0xC4-E0-32-11-36-UNIn	S-VID = 0x3-UNIn	C-VID = 0x6-01
61	SA = 0xC4-E0-32-11-46-UNIn	S-VID = 0x4-UNIn	C-VID = 0x6-01
62	SA = 0xC4-E0-32-11-56-UNIn	S-VID = 0x5-UNIn	C-VID = 0x6-01
63	SA = 0xC4-E0-32-11-66-UNIn	S-VID = 0x6-01	C-VID = 0x6-01
64	SA = 0xC4-E0-32-11-96-UNIn	S-VID = 0x9-UNIn	C-VID = 0x6-01
65	SA = 0xC4-E0-32-11-F6-UNIn	S-VID = 0xF-UNIn	C-VID = 0x6-01
66	SA = 0xC4-E0-32-11-19-UNIn	S-VID = 0x1-UNIn	C-VID = 0x9-UNIn
67	SA = 0xC4-E0-32-11-29-UNIn	S-VID = 0x2-UNIn	C-VID = 0x9-UNIn
68	SA = 0xC4-E0-32-11-39-UNIn	S-VID = 0x3-UNIn	C-VID = 0x9-UNIn
69	SA = 0xC4-E0-32-11-49-UNIn	S-VID = 0x4-UNIn	C-VID = 0x9-UNIn
70	SA = 0xC4-E0-32-11-59-UNIn	S-VID = 0x5-UNIn	C-VID = 0x9-UNIn
71	SA = 0xC4-E0-32-11-69-UNIn	S-VID = 0x6-01	C-VID = 0x9-UNIn
72	SA = 0xC4-E0-32-11-99-UNIn	S-VID = 0x9-UNIn	C-VID = 0x9-UNIn
73	SA = 0xC4-E0-32-11-F9-UNIn	S-VID = 0xF-UNIn	C-VID = 0x9-UNIn
74	SA = 0xC4-E0-32-11-1F-UNIn	S-VID = 0x1-UNIn	C-VID = 0xF-UNIn
75	SA = 0xC4-E0-32-11-2F-UNIn	S-VID = 0x2-UNIn	C-VID = 0xF-UNIn
76	SA = 0xC4-E0-32-11-3F-UNIn	S-VID = 0x3-UNIn	C-VID = 0xF-UNIn
77	SA = 0xC4-E0-32-11-4F-UNIn	S-VID = 0x4-UNIn	C-VID = 0xF-UNIn
78	SA = 0xC4-E0-32-11-5F-UNIn	S-VID = 0x5-UNIn	C-VID = 0xF-UNIn
79	SA = 0xC4-E0-32-11-6F-UNIn	S-VID = 0x6-01	C-VID = 0xF-UNIn
80	SA = 0xC4-E0-32-11-9F-UNIn	S-VID = 0x9-UNIn	C-VID = 0xF-UNIn
81	SA = 0xC4-E0-32-11-FF-UNIn	S-VID = 0xF-UNIn	C-VID = 0xF-UNIn

Table 11 —Packet Generator frame flow configuration K

Frame flow number	DA ^a	S-Tag	C-Tag
1	DA = 0xC4-E0-32-11-YY-UNIn	not present	not present
2		not present	C-VID = 0xA-UNIn
3		not present	C-VID = 0xB-UNIn
4		not present	C-VID = 0xC-UNIn
5		not present	C-VID = 0xD-UNIn
6		not present	C-VID = 0x9-UNIn
7		not present	C-VID = 0xF-UNIn
8		S-VID = 0xA-UNIn	not present
9		S-VID = 0xB-UNIn	not present
10		S-VID = 0xC-UNIn	not present
11		S-VID = 0xD-UNIn	not present
12		S-VID = 0x9-UNIn	not present
13		S-VID = 0xF-UNIn	not present
14		S-VID = 0xA-UNIn	C-VID = 0xA-UNIn
15		S-VID = 0xB-UNIn	C-VID = 0xA-UNIn
16		S-VID = 0xC-UNIn	C-VID = 0xA-UNIn
17		S-VID = 0xD-UNIn	C-VID = 0xA-UNIn
18		S-VID = 0x9-UNIn	C-VID = 0xA-UNIn
19		S-VID = 0xF-UNIn	C-VID = 0xA-UNIn
20		S-VID = 0xA-UNIn	C-VID = 0xB-UNIn
21		S-VID = 0xB-UNIn	C-VID = 0xB-UNIn
22		S-VID = 0xC-UNIn	C-VID = 0xB-UNIn
23		S-VID = 0xD-UNIn	C-VID = 0xB-UNIn
24		S-VID = 0x9-UNIn	C-VID = 0xB-UNIn
25		S-VID = 0xF-UNIn	C-VID = 0xB-UNIn
26		S-VID = 0xA-UNIn	C-VID = 0xC-UNIn
27		S-VID = 0xB-UNIn	C-VID = 0xC-UNIn
28		S-VID = 0xC-UNIn	C-VID = 0xC-UNIn
29		S-VID = 0xD-UNIn	C-VID = 0xC-UNIn
30		S-VID = 0x9-UNIn	C-VID = 0xC-UNIn
31		S-VID = 0xF-UNIn	C-VID = 0xC-UNIn
32		S-VID = 0xA-UNIn	C-VID = 0xD-UNIn
33		S-VID = 0xB-UNIn	C-VID = 0xD-UNIn
34		S-VID = 0xC-UNIn	C-VID = 0xD-UNIn
35		S-VID = 0xD-UNIn	C-VID = 0xD-UNIn
36		S-VID = 0x9-UNIn	C-VID = 0xD-UNIn
37		S-VID = 0xF-UNIn	C-VID = 0xD-UNIn
38		S-VID = 0xA-UNIn	C-VID = 0x9-UNIn
39		S-VID = 0xB-UNIn	C-VID = 0x9-UNIn
40		S-VID = 0xC-UNIn	C-VID = 0x9-UNIn
41		S-VID = 0xD-UNIn	C-VID = 0x9-UNIn
42		S-VID = 0x9-UNIn	C-VID = 0x9-UNIn
43		S-VID = 0xF-UNIn	C-VID = 0x9-UNIn
44		S-VID = 0xA-UNIn	C-VID = 0xF-UNIn
45		S-VID = 0xB-UNIn	C-VID = 0xF-UNIn
46		S-VID = 0xC-UNIn	C-VID = 0xF-UNIn
47		S-VID = 0xD-UNIn	C-VID = 0xF-UNIn
48		S-VID = 0x9-UNIn	C-VID = 0xF-UNIn
49		S-VID = 0xF-UNIn	C-VID = 0xF-UNIn

^a The value of YY in the MAC address varies between 0x00 and 0xFF for each S-VID and C-VID combination.

Table 12—Packet Generator frame flow configuration L

Frame flow number	SA-MAC	S-Tag	C-Tag
1	SA = 0xC4-E0-32-11-00-UNIn	not present	not present
2		not present	C-VID = 0x1-00
3		not present	C-VID = 0x2-00
4		not present	C-VID = 0x3-00
5		not present	C-VID = 0x4-00
6		not present	C-VID = 0x5-00
7		S-VID = 0x1-00	not present
8		S-VID = 0x2-00	not present
9		S-VID = 0x3-00	not present
10		S-VID = 0x4-00	not present
11		S-VID = 0x5-00	not present
12		S-VID = 0x6-00	not present
13		S-VID = 0x1-00	C-VID = 0x1-00
14		S-VID = 0x2-00	C-VID = 0x2-00
15		S-VID = 0x3-00	C-VID = 0x3-00
16		S-VID = 0x4-00	C-VID = 0x4-00
17		S-VID = 0x5-00	C-VID = 0x5-00
18		S-VID = 0x6-00	C-VID = 0x6-00

Table 13—Packet Generator frame flow configuration M

Frame flow number	DA-MAC	S-Tag	C-Tag
1	DA = 0xC4-E0-32-11-00-UNIn	not present	not present
2		not present	C-VID = 0x1-00
3		not present	C-VID = 0x2-00
4		not present	C-VID = 0x3-00
5		not present	C-VID = 0x4-00
6		not present	C-VID = 0x5-00
7		not present	C-VID = 0x6-00
8		not present	C-VID = 0x7-01
9		not present	C-VID = 0x7-02
10		not present	C-VID = 0x7-03
11		S-VID = 0x1-00	not present
12		S-VID = 0x2-00	not present
13		S-VID = 0x3-00	not present
14		S-VID = 0x4-00	not present
15		S-VID = 0x5-00	not present
16		S-VID = 0x6-00	not present
17		S-VID = 0x7-01	not present
18		S-VID = 0x7-02	not present
19		S-VID = 0x7-03	not present
20		S-VID = 0x1-00	C-VID = 0x1-00
21		S-VID = 0x2-00	C-VID = 0x2-00
22		S-VID = 0x3-00	C-VID = 0x3-00
23		S-VID = 0x4-00	C-VID = 0x4-00
24		S-VID = 0x5-00	C-VID = 0x5-00
25		S-VID = 0x6-00	C-VID = 0x6-00
26		S-VID = 0x7-01	C-VID = 0x7-01
27		S-VID = 0x7-02	C-VID = 0x7-02
29		S-VID = 0x7-03	C-VID = 0x7-03

5. Conformance map

5.1 Introduction

This clause defines the mapping between IEEE 1904.1 Package C PICS items for the ONU (see 5.2) and the OLT (see 5.3) and individual test cases.

5.2 Mapping between IEEE 1904.1 Package C PICS for ONU and test cases

The mapping between IEEE 1904.1 Package C PICS items for the ONU and related test cases is shown in Table 14.

Table 14—Mapping between IEEE 1904.1 Package C PICS for ONU and test cases

Package C PICS item	Compliance verified in the following test(s)
CU-AU0	CU-AU1a-01.001.001, CU-AU1b-01.001.001
CU-AU1a	CU-AU1a-01.001.001
CU-AU1b	CU-AU1b-01.001.001
CU-AU4a	CU-AU1a-01.001.001, CU-AU1b-01.001.001
CU-DCD0	CU-DCD3-01.001.001, CU-DCD3-02.001.001, CU-DCD3-03.001.001, CU-DCD5a-01.001.001
CU-DCD1	CU-DCD3-01.001.001
CU-DCD2a	CU-DCD3-01.001.001
CU-DCD2b	CU-DCD3-01.001.001
CU-DCD3	CU-DCD3-01.001.001, CU-DCD3-02.001.001, CU-DCD3-03.001.001, CU-DCD5a-01.001.001
CU-DCD4	CU-DCD4-01.001.001
CU-DCD5a	CU-DCD5a-01.001.001
CU-DCD5b	CU-DCD5b-01.001.001
CU-DCD6	CU-DCD5a-01.001.001
CU-DCD7	CU-DCD5a-01.001.001
CU-DCD8a	CU-DCD3-01.001.001
CU-DCD8b	CU-DCD5a-01.001.001
CU-MA0	CU-MA1-01.001.001, CU-MA1-02.001.001, CU-MA1-03.001.001
CU-MA1a	CU-MA1-01.001.001, CU-MA1-02.001.001, CU-MA1-03.001.001
CU-MA1b	CU-MA1-01.001.001, CU-MA1-02.001.001, CU-MA1-03.001.001
CU-ME9a	CU-SU5-01.001.001, CU-SU5-02.001.001, CU-SU6-01.001.001, CU-DCD3-01.001.001, CU-DCD4-01.001.001
CU-ME9b	CU-DCD3-01.001.001
CU-ME10	CU-DCD3-01.001.001
CU-ME11	CU-DCD3-01.001.001
CU-ME12	CU-USM1-01.001.001
CU-ME13	CU-DCD3-01.001.001, CU-DCD5b-01.001.001
CU-ME29a	CU-UVM2-01.001.001, CU-UVM3-01.001.001, CU-UVM4-01.001.001, CU-UVM5-01.001.001, CU-UVM6-01.001.001, CU-UVM1-01.001.001, CU-UVM8-01.001.001
CU-ME29b	CU-UVM3-01.001.001, CU-UVM4-01.001.001, CU-UVM5-01.001.001, CU-UVM6-01.001.001, CU-UVM1-01.001.001, CU-UVM8-01.001.001
CU-ME29c	CU-UVM2-01.001.001, CU-UVM1-01.001.001
CU-ME29d	CU-UVM3-01.001.001, CU-UVM1-01.001.001, CU-UVM8-01.001.001
CU-ME29e	CU-UVM4-01.001.001
CU-ME29f	CU-UVM5-01.001.001
CU-ME29g	CU-UVM6-01.001.001

**Table 14—Mapping between IEEE 1904.1 Package C PICS for ONU and test cases
 (continued)**

Package C PICS item	Compliance verified in the following test(s)
CU-ME30e	CU-UVM2-01.001.001, CU-UVM3-01.001.001, CU-UVM4-01.001.001, CU-UVM5-01.001.001, CU-UVM6-01.001.001
CU-ME38	CU-RPC1-01.001.001, CU-RPC1-02.001.001
CU-ME39	CU-DCD5a-01.001.001
CU-ME41	CU-MA1-01.001.001, CU-MA1-02.001.001, CU-MA1-03.001.001
CU-ME42	CU-PM1c-01.001.001, CU-PM1c-02.001.001, CU-PM3a-01.001.001
CU-ME43a	CU-PM1c-01.001.001, CU-PM3a-01.001.001
CU-ME44a	CU-PM1c-01.001.001, CU-PM3a-01.001.001
CU-ME45	CU-UVM1-01.001.001, CU-UVM8-01.001.001
CU-ME56a	CU-DCD5a-01.001.001, CU-DCD5b-01.001.001, CT-DCD6a-01.001.001
CU-MG5a	CU-DCD3-01.001.001, CU-DCD3-02.001.001, CU-DCD3-03.001.001
CU-MG5b	CU-DCD3-01.001.001, CU-DCD3-02.001.001, CU-DCD3-03.001.001
CU-MG5c	CU-DCD3-01.001.001, CU-DCD3-02.001.001, CU-DCD3-03.001.001
CU-MG5d	CU-DCD3-01.001.001, CU-DCD3-02.001.001, CU-DCD3-03.001.001
CU-MG6a	CU-USM4-01.001.001
CU-MG6b	CU-USM4-01.001.001
CU-MG6c	CU-USM4-01.001.001
CU-MG6d	CU-USM4-01.001.001
CU-MG6e	CU-USM4-01.001.001
CU-MG13	CU-AU1b-01.001.001
CU-MG14	CU-AU1b-01.001.001
CU-MG15	CU-AU1b-01.001.001
CU-MG16	CU-AU1b-01.001.001
CU-MG18	CU-SU4-01.001.001, CU-SU4-02.001.001
CU-MG19	CU-SU4-01.001.001, CU-SU4-02.001.001
CU-MG20	CU-SU4-01.001.001, CU-SU4-02.001.001
CU-MG21	CU-SU4-01.001.001, CU-SU4-02.001.001
CU-MG22	CU-SU4-01.001.001, CU-SU4-02.001.001
CU-MG23	CU-SU4-01.001.001, CU-SU4-02.001.001
CU-MG24	CU-SU5-01.001.001, CU-SU5-02.001.001
CU-MG25	CU-SU5-01.001.001, CU-SU5-02.001.001
CU-MG26	CU-SU6-01.001.001
CU-MG27	CU-SU6-01.001.001
CU-MG33a	CU-USM4-01.001.001
CU-MG37a	CU-USM4-01.001.001
CU-MG39a	CU-USM4-01.001.001
CU-MG40a	CU-MA1-01.001.001, CU-MA1-02.001.001, CU-MA1-03.001.001
CU-MG40b	CU-MA1-01.001.001, CU-MA1-02.001.001, CU-MA1-03.001.001
CU-MG40c	CU-MA1-01.001.001, CU-MA1-02.001.001, CU-MA1-03.001.001
CU-MG40d	CU-MA1-01.001.001, CU-MA1-02.001.001, CU-MA1-03.001.001
CU-PM1c	CU-PM1c-01.001.001, CU-PM1c-02.001.001, CU-PM3a-01.001.001
CU-PM2a	CU-PM3a-01.001.001
CU-PM2b	CU-PM3a-01.001.001
CU-PM2c	CU-PM1c-01.001.001
CU-PM2d	CU-PM1c-01.001.001
CU-PM2e	CU-PM3a-01.001.001
CU-PM2f	CU-PM3a-01.001.001
CU-PM3a	CU-PM3a-01.001.001

**Table 14—Mapping between IEEE 1904.1 Package C PICS for ONU and test cases
(continued)**

Package C PICS item	Compliance verified in the following test(s)
CU-RF0	CU-RF1-01.001.001
CU-RF1	CU-RF1-01.001.001
CU-RF4	CU-RF1-01.001.001
CU-RF6b	CU-RF1-01.001.001
CU-RF7b	CU-RF1-01.001.001
CU-RPC0	CU-RPC1-01.001.001, CU-RPC1-02.001.001
CU-RPC1a	CU-RPC1-01.001.001, CU-RPC1-02.001.001
CU-RPC1b	CU-RPC1-01.001.001, CU-RPC1-02.001.001
CU-RPC1c	CU-RPC1-02.001.001
CU-RPC1d	CU-RPC1-01.001.001, CU-RPC1-02.001.001
CU-SU0	CU-SU4-01.001.001, CU-SU4-02.001.001, CU-SU5-01.001.001, CU-SU5-02.001.001, CU-SU6-01.001.001
CU-SU1	CU-SU5-02.001.001
CU-SU3	CU-SU4-01.001.001, CU-SU4-02.001.001
CU-SU4	CU-SU4-01.001.001, CU-SU4-02.001.001
CU-SU5	CU-SU5-01.001.001, CU-SU5-02.001.001
CU-SU6	CU-SU6-01.001.001
CU-SU7a	CU-SU5-01.001.001, CU-SU5-02.001.001
CU-SU7b	CU-SU5-01.001.001, CU-SU5-02.001.001
CU-SU8	CU-SU4-01.001.001, CU-SU4-02.001.001, CU-SU5-01.001.001, CU-SU5-02.001.001, CU-SU6-01.001.001
CU-USM0	CU-USM1-01.001.001
CU-USM1	CU-USM1-01.001.001
CU-USM2	CU-USM4-01.001.001
CU-USM3a	CU-USM1-01.001.001
CU-USM4a	CU-USM4-01.001.001
CU-USM4b	CU-USM4-01.001.001
CU-UVM0	CU-UVM2-01.001.001, CU-UVM3-01.001.001, CU-UVM4-01.001.001, CU-UVM5- 01.001.001, CU-UVM6-01.001.001, CU-UVM1-01.001.001
CU-UVM1a	CU-UVM2-01.001.001, CU-UVM3-01.001.001, CU-UVM4-01.001.001, CU-UVM5- 01.001.001, CU-UVM6-01.001.001, CU-UVM1-01.001.001
CU-UVM1b	CU-UVM1-01.001.001
CU-UVM2a	CU-UVM2-01.001.001
CU-UVM2b	CU-UVM2-01.001.001
CU-UVM2c	CU-UVM2-01.001.001
CU-UVM3a	CU-UVM3-01.001.001
CU-UVM3b	CU-UVM3-01.001.001
CU-UVM3c	CU-UVM3-01.001.001
CU-UVM3d	CU-UVM3-01.001.001
CU-UVM3e	CU-UVM3-01.001.001
CU-UVM4a	CU-UVM4-01.001.001
CU-UVM4b	CU-UVM4-01.001.001
CU-UVM4c	CU-UVM4-01.001.001
CU-UVM4d	CU-UVM4-01.001.001
CU-UVM4e	CU-UVM4-01.001.001
CU-UVM5a	CU-UVM5-01.001.001
CU-UVM5b	CU-UVM5-01.001.001
CU-UVM5c	CU-UVM5-01.001.001
CU-UVM5d	CU-UVM5-01.001.001

**Table 14—Mapping between IEEE 1904.1 Package C PICS for ONU and test cases
(continued)**

Package C PICS item	Compliance verified in the following test(s)
CU-UVM5e	CU-UVM5-01.001.001
CU-UVM6a	CU-UVM6-01.001.001
CU-UVM6b	CU-UVM6-01.001.001
CU-UVM6c	CU-UVM6-01.001.001
CU-UVM6d	CU-UVM6-01.001.001
CU-UVM6e	CU-UVM6-01.001.001
CU-UVM7	CU-UVM2-01.001.001
CU-UVM8b	CU-UVM8-01.001.001
CU-UVM8c	CU-UVM8-01.001.001

5.3 Mapping between IEEE 1904.1 Package C PICS for OLT and test cases

The mapping between IEEE 1904.1 Package C PICS items for the OLT and related test cases is shown in Table 15.

Table 15—Mapping between IEEE 1904.1 Package C PICS for OLT and test cases

Package C PICS item	Compliance verified in the following test(s)
CT-AU0	CT-AU1b-01.001.001, CT-AU1c-01.001.001, CT-AU1d-01.001.001
CT-AU1b	CT-AU1b-01.001.001
CT-AU1c	CT-AU1c-01.001.001
CT-AU1d	CT-AU1d-01.001.001
CT-AU2a	CT-AU1b-01.001.001, CT-AU1c-01.001.001, CT-AU1d-01.001.001
CT-DCD0	CT-DCD5a-01.001.001, CT-DCD5a-02.001.001, CT-DCD5a-03.001.001, CT-DCD5a-04.001.001, CT-DCD5a-05.001.001, CT-DCD5a-06.001.001, CT-DCD6a-01.001.001
CT-DCD2	CT-DCD5a-01.001.001
CT-DCD3a	CT-DCD5a-01.001.001
CT-DCD3b	CT-DCD5a-01.001.001
CT-DCD4	CT-DCD4-01.001.001
CT-DCD5a	CT-DCD5a-01.001.001, CT-DCD5a-02.001.001, CT-DCD5a-03.001.001, CT-DCD5a-04.001.001, CT-DCD5a-05.001.001, CT-DCD5a-06.001.001
CT-DCD5b	CT-DCD6a-01.001.001
CT-DCD6a	CT-DCD6a-01.001.001
CT-DCD7a	CT-DCD6a-01.001.001
CT-ME13	CT-DCD6a-01.001.001
CT-ME27	CT-PLD1-01.001.001
CT-ME28	CT-PLD1-01.001.001
CT-ME38	CT-RPC1-01.001.001
CT-ME56	CT-DCD6a-01.001.001
CT-MG6a	CT-DCD5a-01.001.001, CT-DCD5a-02.001.001, CT-DCD5a-03.001.001, CT-DCD5a-04.001.001, CT-DCD5a-05.001.001, CT-DCD5a-06.001.001
CT-MG6b	CT-DCD5a-01.001.001, CT-DCD5a-02.001.001, CT-DCD5a-03.001.001, CT-DCD5a-04.001.001, CT-DCD5a-05.001.001, CT-DCD5a-06.001.001
CT-MG6c	CT-DCD5a-01.001.001, CT-DCD5a-02.001.001, CT-DCD5a-03.001.001, CT-DCD5a-04.001.001, CT-DCD5a-05.001.001, CT-DCD5a-06.001.001
CT-MG6d	CT-DCD5a-01.001.001, CT-DCD5a-02.001.001, CT-DCD5a-03.001.001, CT-DCD5a-04.001.001, CT-DCD5a-05.001.001, CT-DCD5a-06.001.001

**Table 15—Mapping between IEEE 1904.1 Package C PICS for OLT and test cases
(continued)**

Package C PICS item	Compliance verified in the following test(s)
CT-MG14	CT-AU1c-01.001.001, CT-AU1d-01.001.001
CT-MG15	CT-AU1c-01.001.001, CT-AU1d-01.001.001
CT-MG16	CT-AU1c-01.001.001, CT-AU1d-01.001.001
CT-MG17	CT-AU1c-01.001.001, CT-AU1d-01.001.001
CT-MG19	CT-SU2-01.001.001, CT-SU2-02.001.001, CT-SU3-01.001.001, CT-SU4-01.001.001
CT-MG20	CT-SU2-01.001.001, CT-SU2-02.001.001, CT-SU3-01.001.001, CT-SU4-01.001.001
CT-MG21	CT-SU2-01.001.001, CT-SU2-02.001.001, CT-SU4-01.001.001
CT-MG22	CT-SU3-01.001.001
CT-MG23	CT-SU2-01.001.001, CT-SU2-02.001.001, CT-SU3-01.001.001, CT-SU4-01.001.001
CT-MG24	CT-SU2-01.001.001, CT-SU2-02.001.001, CT-SU3-01.001.001, CT-SU4-01.001.001
CT-MG25	CT-SU3-01.001.001
CT-MG26	CT-SU3-01.001.001
CT-MG27	CT-SU4-01.001.001
CT-MG28	CT-SU4-01.001.001
CT-PLD0	CT-PLD1-01.001.001
CT-PLD1	CT-PLD1-01.001.001
CT-PLD2	CT-PLD1-01.001.001
CT-RPC0	CT-RPC1-01.001.001
CT-RPC1a	CT-RPC1-01.001.001
CT-RPC1c	CT-RPC1-01.001.001
CT-SU0	CT-SU2-01.001.001, CT-SU2-02.001.001, CT-SU3-01.001.001, CT-SU4-01.001.001
CT-SU1	CT-SU2-01.001.001, CT-SU2-02.001.001, CT-SU3-01.001.001, CT-SU4-01.001.001
CT-SU2	CT-SU2-01.001.001, CT-SU2-02.001.001
CT-SU3	CT-SU3-01.001.001
CT-SU4	CT-SU4-01.001.001
CT-SU5	CT-SU2-01.001.001, CT-SU2-02.001.001, CT-SU3-01.001.001, CT-SU4-01.001.001
CT-TSM0	CT-TSM1-01.001.001
CT-TSM1a	CT-TSM1-01.001.001
CT-TSM2	CT-TSM1-01.001.001
CT-TVM0	CT-TVM2-01.001.001, CT-TVM3-01.001.001, CT-TVM4-01.001.001, CT-TVM5-01.001.001, CT-TVM6-01.001.001
CT-TVM1	CT-TVM2-01.001.001, CT-TVM3-01.001.001, CT-TVM4-01.001.001, CT-TVM5-01.001.001, CT-TVM6-01.001.001
CT-TVM2a	CT-TVM2-01.001.001
CT-TVM2b	CT-TVM2-01.001.001
CT-TVM2c	CT-TVM2-01.001.001
CT-TVM3b	CT-TVM3-01.001.001
CT-TVM3c	CT-TVM3-01.001.001
CT-TVM3d	CT-TVM3-01.001.001
CT-TVM3e	CT-TVM3-01.001.001
CT-TVM4a	CT-TVM4-01.001.001
CT-TVM4b	CT-TVM4-01.001.001
CT-TVM4c	CT-TVM4-01.001.001
CT-TVM4d	CT-TVM4-01.001.001
CT-TVM5a	CT-TVM5-01.001.001
CT-TVM5b	CT-TVM5-01.001.001
CT-TVM5c	CT-TVM5-01.001.001
CT-TVM5d	CT-TVM5-01.001.001

**Table 15—Mapping between IEEE 1904.1 Package C PICS for OLT and test cases
(continued)**

Package C PICS item	Compliance verified in the following test(s)
CT-TVM6a	CT-TVM6-01.001.001
CT-TVM6b	CT-TVM6-01.001.001
CT-TVM6c	CT-TVM6-01.001.001
CT-TVM6d	CT-TVM6-01.001.001

6. Message and TLV primitives

This clause describes the set of common configuration messages, including OAMPDUs, eOAMPDUs, and MPCPDUs, exchanged between the ONU and the OLT during individual test cases. Individual eOAMPDUs are defined in IEEE Std 1904.1, 13.1 and 13.2. Individual Type/Length/Values (TLVs) are defined in IEEE Std 1904.1, 14.2.

While individual test cases generally show the DUT generating a single eOAMPDU containing multiple TLVs, specific implementations are allowed to generate multiple eOAMPDUs to transmit the same TLVs. Both implementations are acceptable and shall be handled appropriately by the test equipment.

6.1 Common messages

This subclause defines a set of eOAMPDUs used by a number of test cases defined in this standard.

6.1.1 Get_Request(TLV1, ..., TLVn) primitive

This primitive provides a shortcut notation for the *eOAM_Get_Request* eOAMPDU, as shown in Table 16.

**Table 16—Structure of eOAMPDU represented by
Get_Request(TLV1, ..., TLVn) primitive**

Size (octets)	Field	Value
6	Destination Address	0x01-80-C2-00-00-02
6	Source Address	Varies (OLT MAC address)
2	Length/Type	0x88-09
1	Subtype	0x03
2	Flags	0x00-50
1	Code	0xFE
3	OUI	OUI_C
1	Opcode	0x01
Varies	TLV1	Content of TLV1
Varies	...	...
Varies	TLVn	Content of TLVn
Varies	Pad	0x00-...-00 (presence depends on number of TLVs)
4	FCS	Varies

6.1.2 Get_Response(TLV1, ..., TLVn) primitive

This primitive provides a shortcut notation for the *eOAM_Get_Response* eOAMPDU, as shown in Table 17.

**Table 17—Structure of eOAMPDU represented by
Get_Response(TLV1, ..., TLVn) primitive**

Size (octets)	Field	Value
6	Destination Address	0x01-80-C2-00-00-02
6	Source Address	Varies (ONU MAC address)
2	Length/Type	0x88-09
1	Subtype	0x03
2	Flags	0x00-50
1	Code	0xFE
3	OUI	OUI_C

**Table 17—Structure of eOAMPDU represented by
Get_Response(TLV1, ..., TLVn) primitive (continued)**

Size (octets)	Field	Value
1	Opcode	0x02
Varies	TLV1	Content of TLV1
Varies	...	...
Varies	TLVn	Content of TLVn
Varies	Pad	0x00-...-00 (presence depends on number of TLVs)
4	FCS	Varies

6.1.3 Set_Request(TLV1, ..., TLVn) primitive

This primitive provides a shortcut notation for the *eOAM_Set_Request* eOAMPDU, as shown in Table 18.

**Table 18—Structure of eOAMPDU represented by
Set_Request(TLV1, ..., TLVn) primitive**

Size (octets)	Field	Value
6	Destination Address	0x01-80-C2-00-00-02
6	Source Address	Varies (OLT MAC address)
2	Length/Type	0x88-09
1	Subtype	0x03
2	Flags	0x00-50
1	Code	0xFE
3	OUI	OUI_C
1	Opcode	0x03
Varies	TLV1	Content of TLV1
Varies	...	...
Varies	TLVn	Content of TLVn
Varies	Pad	0x00-...-00 (presence depends on number of TLVs)
4	FCS	Varies

6.1.4 Set_Response(TLV1, ..., TLVn) primitive

This primitive provides a shortcut notation for the *eOAM_Set_Response* eOAMPDU, as shown in Table 19.

**Table 19—Structure of eOAMPDU represented by
Set_Response(TLV1, ..., TLVn) primitive**

Size (octets)	Field	Value
6	Destination Address	0x01-80-C2-00-00-02
6	Source Address	Varies (ONU MAC address)
2	Length/Type	0x88-09
1	Subtype	0x03
2	Flags	0x00-50
1	Code	0xFE
3	OUI	OUI_C
1	Opcode	0x04
Varies	TLV1	Content of TLV1
Varies	...	...
Varies	TLVn	Content of TLVn
Varies	Pad	0x00-...-00 (presence depends on number of TLVs)
4	FCS	Varies

6.1.5 TLV_Object_ID(object, instance) primitive

This primitive represents the structure of the *Object_ID* TLV, as shown in Table 20.

**Table 20—Structure of TLV represented by
TLV_Object_ID(object, instance) primitive**

Size (octets)	Field	Value
1	Branch	0x37
2	ObjectType	0x00-01 when object = UNI 0x00-03 when object = LLID 0x00-04 when object = PON 0xFF-FF when object = ONU
1	Length	0x04
4	ObjectInstance	instance

6.1.6 TLV_Attribute(attribute_id) primitive

This primitive represents the structure of an extended attribute-related Variable Descriptor TLV, as shown in Table 22. Individual values for the *attribute_id* parameter are defined in Table 21.

Table 21—Definition of attribute_id parameter values

attribute_id parameter	Value
ONU Serial	0x00-01
ONU ChipsetFirmware	0x00-02
ONU ChipsetId	0x00-03
ONU TRx Status	0x00-05
ONU Capabilities	0x00-07
MAC Aging	0x00-A4
PM Status	0x00-B1
PM Current	0x00-B2
PM History	0x00-B3

**Table 22—Structure of TLV represented by
TLV_Attribute(attribute_id) primitive**

Size (octets)	Field	Value
1	Branch	0xC7
2	Leaf	Value of attribute_id parameter per Table 21

6.1.7 TLV_Action(action_id) primitive

This primitive represents the structure of any action-related Variable Descriptor TLV, as shown in Table 24. Individual values for the *action_id* parameter are defined in Table 23.

Table 23—Definition of action_id parameter values

action_id parameter	Value
ONU Reboot	0x00-01
ONU ML Mode	0x02-02

**Table 24—Structure of TLV represented by
TLV_Action(action_id) primitive**

Size (octets)	Field	Value
1	Branch	0xC9
2	Leaf	Value of action_id parameter per Table 23

6.1.8 TLV_Attribute_Response(attribute_id, code) primitive

This primitive represents the structure of any attribute-related Variable Container TLV, as shown in Table 25. Individual values for the attribute_id parameter are defined in Table 21.

**Table 25—Structure of TLV represented by
TLV_Attribute_Response(attribute_id, code) primitive**

Size (octets)	Field	Value
1	Branch	0xC7
2	Leaf	Value of attribute_id parameter per Table 21
1	Length	Value of code parameter: OK = 0x80

6.1.9 TLV_Action_Response(action_id, code) primitive

This primitive represents the structure of any action-related Variable Container TLV, as shown in Table 26. Individual values for the action_id parameter are defined in Table 23.

**Table 26—Structure of TLV represented by
TLV_Action_Response(action_id, code) primitive**

Size (octets)	Field	Value
1	Branch	0xC9
2	Leaf	Value of action_id parameter per Table 23
1	Length	Value of code parameter: OK = 0x80

6.2 Group AU messages

This subclause defines a set of MPCPDUs and eOAMPDUs used by the group of test cases related to the ONU authentication (AU) function, as specified in this standard.

6.2.1 MPCP_GATE_Discovery() primitive

The MPCP_GATE_Discovery() primitive has the format as specified in Table 27 (for a 1G-EPON ONU) or Table 28 (for a 10G-EPON ONU).

Table 27—Structure of MPCP_GATE_Discovery () (for 1G-EPON ONU)

Size (octets)	Field	Value
6	Destination Address	0x01-80-C2-00-00-01
6	Source Address	Varies (OLT MAC address)
2	Length/Type	0x88-08
2	Opcode	0x00-02
4	Timestamp	Varies
1	Number of grants/Flags	0x09
4	Grant #1 Start time	Varies
2	Grant #1 Length	Length sufficient to send a <i>REGISTER</i> MPCPDU including the overhead.
2	Sync Time	Varies
31	Pad	0x00-...-00
4	FCS	Varies

Table 28—Structure of MPCP_GATE_Discovery () (for 10G-EPON ONU)

Size (octets)	Field	Value
6	Destination Address	0x01-80-C2-00-00-01
6	Source Address	Varies (OLT MAC address)
2	Length/Type	0x88-08
2	Opcode	0x00-02
4	Timestamp	Varies
1	Number of grants/Flags	0x09
4	Grant #1 Start time	Varies
2	Grant #1 Length	Length sufficient to send a <i>REGISTER</i> MPCPDU including the overhead.
2	Sync Time	Varies
2	Discovery Information	0xC8-00
29	Pad	0x00-...-00
4	FCS	Varies

6.2.2 MPCP_GATE () primitive

The MPCP_GATE () primitive has the format as specified in Table 29.

Table 29—Structure of MPCP_GATE ()

Size (octets)	Field	Value
6	Destination Address	0x01-80-C2-00-00-01
6	Source Address	Varies (OLT MAC address)
2	Length/Type	0x88-08
2	Opcode	0x00-02
4	Timestamp	Varies
1	Number of grants/Flags	0x01 or 0x11 ^a
4	Grant #1 Start time	Varies
2	Grant #1 Length	Length exceeding maximum size of data frame.
Varies	...	...
Varies	Pad	0x00-...-00
4	FCS	Varies

^a Multiple grants are allowed.

6.2.3 MPCP_REGISTER_REQ() primitive

The MPCP_REGISTER_REQ() primitive has the format as specified in Table 30 (for a 1G-EPON ONU) or Table 31 (for a 10G-EPON ONU).

Table 30—Structure of MPCP_REGISTER_REQ() (for 1G-EPON ONU)

Size (octets)	Field	Value
6	Destination Address	0x01-80-C2-00-00-01
6	Source Address	Varies (DUT MAC address)
2	Length/Type	0x88-08
2	Opcode	0x00-04
4	Timestamp	Varies
1	Flags	0x01
1	Pending grants	Varies
38	Pad	0x00-...-00
4	FCS	Varies

Table 31—Structure of MPCP_REGISTER_REQ() (for 10G-EPON ONU)

Size (octets)	Field	Value
6	Destination Address	0x01-80-C2-00-00-01
6	Source Address	Varies (DUT MAC address)
2	Length/Type	0x88-08
2	Opcode	0x00-04
4	Timestamp	Varies
1	Flags	0x01
1	Pending grants	Varies
2	Discovery Information	0x48-00 (for ONU upstream channel operating at 10 Gb/s) or 0x88-00 (for ONU upstream channel operating at 1 Gb/s)
1	Laser On Time	Varies
1	Laser Off Time	Varies
34	Pad	0x00-...-00
4	FCS	Varies

6.2.4 MPCP_REGISTER(flag) primitive

This primitive provides a shortcut notation for the REGISTER MPCPDU, as shown in Table 32 (for a 1G-EPON ONU) or Table 33 (for a 10G-EPON ONU).

Table 32—Structure of REGISTER MPCPDU represented by MPCP_REGISTER(flag) primitive (for 1G-EPON ONU)

Size (octets)	Field	Value
6	Destination Address	DUT MAC address
6	Source Address	Varies (OLT MAC address)
2	Length/Type	0x88-08
2	Opcode	0x00-05
4	Timestamp	Varies
2	Assigned port	Varies
1	Flags	0x02 when flag = Deregister 0x03 when flag = Ack 0x04 when flag = Nack