Technical Specification
MEF 34

Abstract Test Suite
For
Ethernet Access Services

Fedruary 2012

Table of Contents

1. Abstract

This document defines test procedures for testing and certification of Ethernet Access Services namely Access EPL and Access EVPL deployed in operator networks. The test cases are based on requirements defined in MEF 33 'Ethernet Access Services Definitions' and in MEF 23.1 'Carrier Ethernet Class of Service Phase 2'.

2. Terminology

CE-VLAN ID	The 12 bit VLAN ID field in the C-Tag of a Service Frame
Color Forwarding	An OVC attribute defining the relationship between the Color of an egress ENNI Frame and the Color of the corresponding ingress ENNI Frame or Service Frame
CoS Frame Set	A set of Service or ENNI Frames that have a commitment from the Operator or Service Provider subject to a particular set of performance objectives.
CoS Identifier for Service Frames	The mechanism and/or values of the parameters in the mechanism to be used to identify the CoS Name that applies to the frame at a given UNI
CoS Identifier for EFO	The mechanism and/or values of the parameters in the mechanism to be used to identify the CoS Name that applies to the frame at a given ENNI that maps to an OVC End Point.
CoS Label	A CoS Name that is standardized in this document. Each CoS Label identifies four Performance Tiers where each Performance Tier contains a set of performance objectives and associated parameters.
CoS Name	A designation given to one or more sets of performance objectives and associated parameters by the Service Provider or Operator.
CPO	CoS Performance Objective
C-Tag	Subscriber VLAN Tag
EFO	ENNI Frame that maps to OVC End Point
ENNI	A reference point representing the boundary between two Operator MENs that are operated as separate administrative domains
ENNI Frame	The first bit of the Destination Address to the last bit of the Frame Check Sequence of the Ethernet Frame transmitted across the ENNI
EVC	An association of two or more UNIs
External Interface	Either a UNI or an ENNI
FD	Frame Delay
FDR	Frame Delay Range
FLR	Frame Loss Ratio
IFDV	Inter-Frame Delay Variation
MEN	A Metro Ethernet Network comprising a single administrative domain
MFD	Mean Frame Delay
MTU	Maximum Transmission Unit
Operator	Also Network Operator . The Administrative Entity of a MEN

Operator Virtual Connection	An association of OVC EPs
OVC	Operator Virtual Connection
OVC End Point	An association of an OVC with a specific External Interface i.e., UNI, ENNI
OVC EP	OVC End Point
OVC Identifier	String that is unique among all OVCs in the Operator MEN
PT	Performance Tier
Service Frame	An Ethernet frame transmitted across the UNI toward the Service Provider or an Ethernet frame transmitted across the UNI toward the Subscriber
Service Provider	The organization providing UNI to UNI Ethernet service(s)
Subscriber	The organization purchasing and/or using Ethernet Services.
S-Tag	Service VLAN Tag.
S-VLAN ID	The 12 bit VLAN ID field in the S-Tag of an ENNI Frame
UNI	The physical demarcation point between the responsibility of the Service Provider and the responsibility of the Subscriber

3. Scope

The Abstract Test Suite for Ethernet Access Services describes test procedures based on requirements defined in MEF 33 ‘Ethernet Access Services Definitions’ and in MEF 23.1 ‘Carrier Ethernet Class of Service Phase 2’.

An overview of the different groups of tests for Access EPL is provided as follows:

- Test cases for Operator Service Attributes
- Test cases for Service OAM
- Test cases for Bandwidth Profile
- Test Cases for Performance Attributes

An overview of the different groups of tests for Access EVPL is provided as follows:

- Test cases for Operator Service Attributes
- Test cases for Service OAM
- Test cases for Bandwidth Profile
- Test Cases for Performance Attributes

Point-to-point OVCs from ENNI to ENNI and Multipoint OVCs are outside the scope of this document. The Abstract Test Suite for Ethernet Access Services may be updated in the future to reflect new work done in the MEF Technical Committee.

4. References

MEF 23.1 Carrier Ethernet Class of Service Phase 2
MEF 26.1 External Network Network Interface (ENNI) Phase 1
MEF 33 Ethernet Access Services Definitions

5. Compliance Levels

The key words "**MUST**", "**MUST NOT**", "**REQUIRED**", "**SHALL**", "**SHALL NOT**", "**SHOULD**", "**SHOULD NOT**", "**RECOMMENDED**", "**MAY**", and "**OPTIONAL**" in this document are to be interpreted as described in RFC 2119. All key words **MUST** be use upper case, bold text.

6. Test Status Definitions

MANDATORY status: This means that a test case **MUST** be executed because it verifies an absolute requirement or an absolute requirement dependent on an optional feature. If the requirement is absolute the test must be executed. If the requirement is absolute but dependent on an optional feature and that feature is supported, the test case must be executed. If the optional feature is not supported, the test case is not executed and it is declared as "not applicable".

OPTIONAL status: This word means that a test case **MAY** or **MAY NOT** be executed because it verifies a requirement that is not absolute. The decision to execute such a test case will usually depend on the ability to support a particular feature that is not tied to an absolute requirement. If such a test case is not executed it is declared as "not applicable".

7. Introduction

This document defines test procedures for Access EPL and Access EVPL services, the OVC-based services defined in MEF 33 'Ethernet Access Service Definitions'.

The conformance requirements of Access EPL and Access EVPL Services verified in this Abstract Test Suite are defined in MEF 33 'Ethernet Access Service Definitions' whereas the requirements to verify Service Performance such as One-Way Frame Delay, One-Way Mean Frame Delay, Inter-Frame Delay Variation, Frame Delay Range and Frame Loss Ratio are defined in MEF 23.1 'Carrier Ethernet Class of Service Phase 2'.

These test procedures and associated certification program intend to help Operators to ensure that the OVC-based services they deploy are compliant to MEF technical specifications and support MEF defined Service Level Specifications.

These test procedures and associated certification program also intend to help Service Providers streamline the process for interconnecting OVC-based services and ensure that their end-to-end EVC-based services will preserve their attributes when delivered across out-of-franchise Operator MENs.

This Abstract Test Suite complements the existing Abstract Test Suites defined for EVC-based services, MEF 9 'Abstract Test for Ethernet Services at the UNI' and MEF 14 'Abstract Test Suite for Traffic Management Phase 1'.

8. Test Configuration for Ethernet Access Services

All test cases for Access EPL and Access EVPL Services defined in this document must be executed using a single test topology, where testers with PHYs that match the UNIs and the ENNI are attached to the external interfaces. A recommended minimum topology is depicted in Figure 1.

Configurations details such as OVC End Point maps at the UNI and at the ENNI, Bandwidth Profile parameters, values and variables are specified for each test case in Section 10 for Access EPL and in Section 11 for Access EVPL.

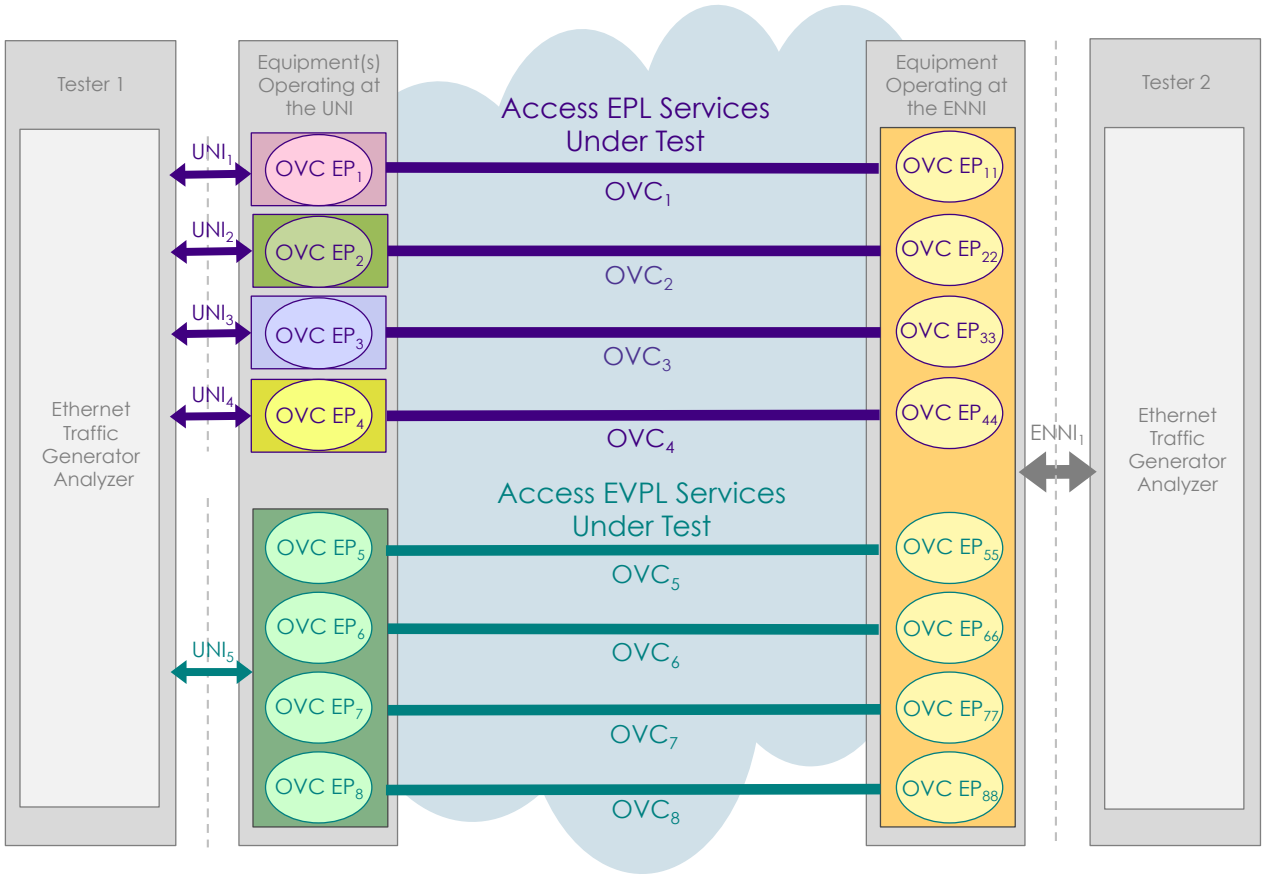


Figure 1: Ethernet Access Services overall test configuration

For Operator Service Attributes and Service OAM handling test cases, it is important to note:

- C-tag and S-tag formats of the Service Frames and ENNI Frames are specified in IEEE 802.1ad sections 9.5, 9.6 and 9.7.

- The OVC MTU size (in bytes) and the maximum number of CE-VLAN IDs per OVC are to be provided by the Operator.

For Bandwidth Profile test cases, the measurements are made in terms of Service Frame traffic or ENNI Frame traffic where the Service Frame or the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence.

At the UNI and at the ENNI, one Bandwidth Profile is defined for each range of values, 1Mbps – 10 Mbps, 10Mbps – 100 Mbps, 100 Mbps – 1 Gbps and 1 Gbps – 10 Gbps associated with the applicable UNI speeds. It is to be noted that the requirement to support increments for each applicable range equal to 1/10 x UNI speed is tested by using prime number values for CIR.

The Bandwidth Profile enforcement verifications are executed by measuring the amount of traffic (in bytes) delivered at the egress OVC End Point that needs to be within a tolerance of the calculated amount of traffic (in bytes) accepted as Green at the ingress OVC End Point during the test time interval.

For the test cases where the Bandwidth Profile enforcement verification is executed from the UNI to the ENNI, appending the S-Tag adds four bytes per frame. These need to be subtracted when calculating the amount of traffic (in bytes) delivered to the egress OVC End Point.

For the test cases where the Bandwidth Profile enforcement verification is executed from the ENNI to the UNI, removing the S-Tag eliminates four bytes per frame. These need to be added when calculating the amount of traffic (in bytes) delivered to the egress OVC End Point.

For the test cases defined to verify One-Way Frame Delay, One-Way Mean Frame Delay, Inter-Frame Delay Variation, Frame Delay Range and Frame Loss Ratio, the OVC Related Performance Service Attributes apply to "Qualified" Service Frames or "Qualified" ENNI Frames as defined in MEF 26.1 section 7.2.16 Service Level Specification.

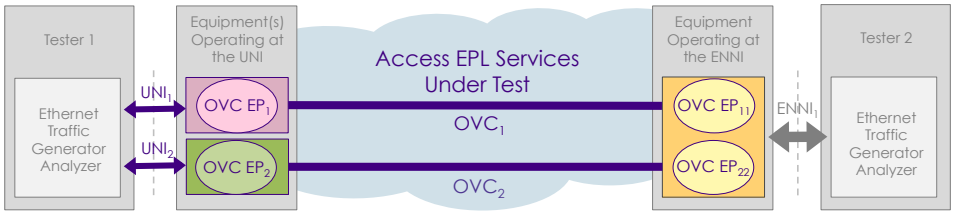
Also for the Access EPL and Access EVPL performance test cases, the applicable CoS Label and Performance Tier are to be provided by the Operator.

9. Test Case Template for Ethernet Access Services

Abstract Test Suite for Ethernet Access Services	
Test Name	Name derived from reference documents
Test Definition ID	A unique punctuated alphanumeric string assigned to each test case. Example: **AEPL1_R3_R12** • **AEPL1**: Test Case number 1 applicable to Access EPL • **R3_R12**: Requirement numbers of the requirements that need to be satisfied (See Annex 1 for the list of requirements for Access EPL and Access EVPL Services)
Test Type	Conformance or Performance
Test Status	Mandatory, Conditional Mandatory or Optional
Requirement Description	Description of the requirements that **MUST** or **SHOULD** be satisfied
Test Object	Succinct description of the test purpose
Test Configuration	Succinct description of the test bed configuration
Test Configuration Schematic	Test bed schematic. The variables can augment it
End Point Maps	Samples of OVC EP Maps are suggested. Variables augment them
Bandwidth Profile	Samples of Bandwidth Profile tables are suggested. Variables augment it
Test Procedure	Succinct description of the test procedure
Units	Units can be time units, rates, counts, etc, such as milliseconds, frames per second or numbers of valid frames
Variables	If any, variables such as UNI and ENNI interface speeds and bandwidth profile parameters are to be described
Results	Pass or Fail
Remarks	Description of any particular observations that might affect the test result

10.1 Test Cases for Access EPL – Operator Service Attributes

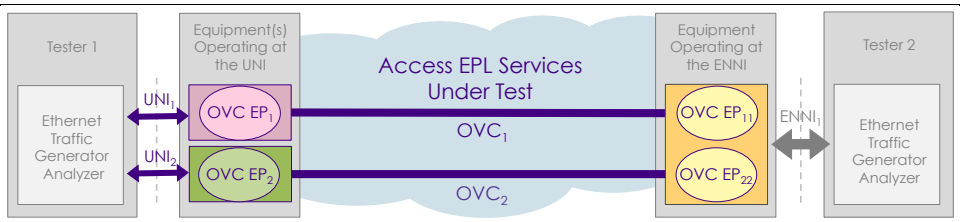
Test Case 1.1: CE-VLAN ID For Untagged and Priority Tagged Frames

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>CE-VLAN ID For Untagged and Priority Tagged Frames</td></tr>
<tr><td>Test Definition ID</td><td>AEPL1_R1_R3_R13</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R1] For an Access EPL service, the CE-VLAN ID for untagged and priority tagged Frames MUST be a value from 1 – 4094
[R3] For an Access EPL service, the OVC EP Map at the UNI MUST contain all CE-VLAN ID values {1, 2…4095} mapped to a single OVC EP
[R13] Each S-VLAN ID value associated with an instance of Access EPL Service MUST map to a distinct End Point, of Type = “OVC”</td></tr>
<tr><td>Test Object</td><td>Verify that for an Access EPL service, the CE-VLAN ID for untagged and priority tagged Frames is a value from 1 – 4094</td></tr>
<tr><td>Test Configuration</td><td>At least two OVCs, each one associating one OVC EP at a UNI and one OVC EP at the ENNI are configured. All CE-VLAN ID values are mapped to the OVC EP at each UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI1</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP1</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>111</td><td>OVC EP11</td></tr>
<tr><td>222</td><td>OVC EP22</td></tr>
</table>
<table>
<tr><th colspan="2">Map at UNI2</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP2</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI1 and UNI2</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP1</td><td>CIR1 CBS1 EIR1 EBS1 CF1 CM1</td></tr>
<tr><td>OVC EP2</td><td>CIR2 CBS2 EIR2 EBS2 CF2 CM2</td></tr>
</table>
Note 1: CIR1 = 3 Mbps, CIR2 = 30 Mbps
Note 2: CBS1 ≥ 12176 Bytes, CBS2 ≥ 12176 Bytes
Note 3: EIR1, EIR 2, EBS1, EBS2, CF1 and CF2 equal to 0
Note 4: CM1 and CM2 in color-blind mode
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP11</td><td>CIR11 CBS11 EIR11 EBS11 CF11 CM11</td></tr>
<tr><td>OVC EP22</td><td>CIR22 CBS22 EIR22 EBS22 CF22 CM22</td></tr>
</table>
Note 1: CIR11 = 3 Mbps, CIR22 = 30 Mbps
Note 2: CBS11 ≥ 12176 Bytes, and CBS22 ≥ 12176 Bytes
Note 3: EIR11, EIR 22, EBS11, EBS22, CF11 and CF22 equal to 0
Note 4: CM11 and CM22 in color-aware mode
Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>

Tester 1 offers untagged and priority tagged Service Frames at UNI1 configured in OVC1 and at UNI2 configured in OVC2
Tester 2 verifies that the untagged Service Frames offered at UNI1 are delivered single-tagged with S-VLAN ID equal to 111 and that the priority tagged Service Frames offered at UNI1 are delivered double-tagged with CE-VLAN ID equal to 0 and S-VLAN ID equal to 111 at ENNI1 configured in OVC1. Tester 2 also verifies that the untagged Service Frames offered at UNI2 are delivered single-tagged with S-VLAN ID equal to 222 and that the priority tagged Service Frames offered at UNI2 are delivered double-tagged with CE-VLAN ID equal to 0 and S-VLAN ID equal to 222 at ENNI1 configured in OVC2
Tester 2 offers single-tagged ENNI Frames with S-VLAN ID equal to 111 and double-tagged ENNI frames with CE-VLAN ID equal to 0 and S-VLAN ID equal to 111 at ENNI1 configured in OVC1 and also offers single-tagged ENNI Frames with S-VLAN ID equal to 222 and double-tagged ENNI frames with CE-VLAN ID equal to 0 and S-VLAN ID equal to 222 at ENNI1 configured in OVC2
Tester 1 verifies that the single-tagged ENNI Frames with S-VLAN ID equal to 111 are delivered untagged and that the double-tagged ENNI frames with CE-VLAN ID equal to 0 and S-VLAN ID equal to 111 are delivered with CE-VLAN ID equal to 0 at UNI1 configured in OVC1. Tester 1 also verifies that the single-tagged ENNI Frames with S-VLAN ID equal to 222 are delivered untagged and that the double-tagged ENNI frames with CE-VLAN ID equal to 0 and S-VLAN ID equal to 222 are delivered with CE-VLAN ID equal to 0 at UNI2 configured in OVC2
</td></tr>
<tr><td>Units</td><td>CE-VLAN ID and S-VLAN ID values</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds and bandwidth profile parameters CBS1, CBS2, CBS11, CBS22</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>C-tag and S-tag formats are specified in IEEE 802.1ad sections 9.5, 9.6 and 9.7</td></tr>
</table>

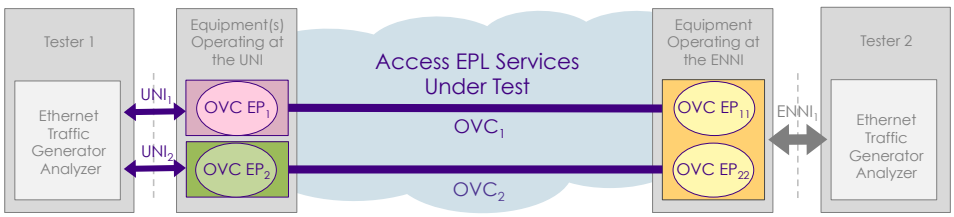
Test Case 3.1: OVC Maximum Transmission Unit Size

Abstract Test Suite for Ethernet Access Services

Test Name	OVC Maximum Transmission Unit Size
Test Definition ID	AEPL3_R3_R6_R13
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R6] For an Access EPL service, the OVC Maximum Transmission Unit Size **MUST** be integer number of bytes ≥ 1526 [R3] For an Access EPL service, the OVC EP Map at the UNI **MUST** contain all CE-VLAN ID values {1, 2…4095} mapped to a single OVC EP [R13] Each S-VLAN ID value associated with an instance of Access EPL Service **MUST** map to a distinct End Point, of Type = "OVC"
Test Object	Verify that for an Access EPL service, the OVC Maximum Transmission Unit Size is an integer number of bytes ≥ 1526
Test Configuration	At least two OVCs, each one associating one OVC EP at a UNI and one OVC EP at the ENNI are configured. All CE-VLAN ID values are mapped to the OVC EP at each UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_1** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_1$ **Map at UNI_2** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_2$ **Map at $ENNI_1$** S-VLAN ID: 111 → OVC End Point: $OVC\ EP_{11}$ S-VLAN ID: 222 → OVC End Point: $OVC\ EP_{22}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_1 and UNI_2** $OVC\ EP_1$: $CIR_1\ CBS_1\ EIR_1\ EBS_1\ CF_1\ CM_1$ $OVC\ EP_2$: $CIR_2\ CBS_2\ EIR_2\ EBS_2\ CF_2\ CM_2$ Note 1: CIR_1 = 3 Mbps, CIR_2 = 30 Mbps Note 2: $CBS_1 \geq$ 12176 Bytes, $CBS_2 \geq$ 12176 Bytes Note 3: EIR_1, EIR_2, EBS_1, EBS_2, CF_1 and CF_2 equal to 0 Note 4: CM_1 and CM_2 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** $OVC\ EP_{11}$: $CIR_{11}\ CBS_{11}\ EIR_{11}\ EBS_{11}\ CF_{11}\ CM_{11}$ $OVC\ EP_{22}$: $CIR_{22}\ CBS_{22}\ EIR_{22}\ EBS_{22}\ CF_{22}\ CM_{22}$ Note 1: CIR_{11} = 3 Mbps, CIR_{22} = 30 Mbps Note 2: $CBS_{11} \geq$ 12176 Bytes, and $CBS_{22} \geq$ 12176 Bytes Note 3: EIR_{11}, EIR_{22}, EBS_{11}, EBS_{22}, CF_{11} and CF_{22} equal to 0 Note 4: CM_{11} and CM_{22} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers untagged, priority tagged and C-tagged Service Frames with CE-VLAN ID equal to 11 and frame size equal to the OVC_1 MTU size at UNI_1 configured in OVC_1 and with CE-VLAN ID equal to 11 and frame size equal to the OVC_2 MTU size at at UNI_2 configured in OVC_2 • Tester 2 verifies that all the untagged Service Frames offered at UNI_1 are delivered single-tagged with S-VLAN ID equal to 111 and that all the priority tagged and C-tagged Service Frames offered at UNI_1 are delivered double-tagged with S-VLAN ID equal to 111 at $ENNI_1$ configured in OVC_1. Tester 2 also verifies that all the untagged Service Frames offered at UNI_2 are delivered single-tagged with S-VLAN ID equal to 222 at $ENNI_1$ configured in OVC_2 and that all the priority tagged and C-tagged Service Frames offered at UNI_2 are delivered double-tagged with S-VLAN ID equal to 222 at $ENNI_1$ configured in OVC_2 • Tester 2 offers single-tagged ENNI Frames with S-VLAN ID equal to 111, double-tagged ENNI frames with CE-VLAN ID equal to 0 and S-VLAN ID equal to 111 and double-tagged ENNI frames with CE-VLAN ID equal to 11 and S-VLAN ID equal to 111 and frame size equal to the OVC_1 MTU size at $ENNI_1$ configured in OVC_1. Tester 2 also offers single-tagged ENNI Frames with S-VLAN ID equal to 222, double-tagged ENNI frames with CE-VLAN ID equal to 0 and S-VLAN ID equal to 222 and double-tagged ENNI frames with CE-VLAN ID equal to 11 and S-VLAN ID equal to 222 and frame size equal to the OVC_2 MTU size at $ENNI_1$ configured in OVC_2 • Tester 1 verifies that all the ENNI Frames with S-VLAN ID 111 offered at $ENNI_1$ configured in OVC_1 are received untagged, priority tagged and C-tagged with CE-VLAN ID equal to 11 at UNI_1. Tester 1 also verifies that all the ENNI Frames with S-VLAN ID 222 offered at $ENNI_1$ configured in OVC_2 are received untagged, priority tagged and C-tagged with CE-VLAN ID equal to 11 at UNI_2
Units	Number of valid frames received at the external interfaces
Variables	OVC MTU Size, UNI and ENNI interface speeds and bandwidth profile parameters CBS_1, CBS_2, CBS_{11}, CBS_{22}
Results	Pass or fail

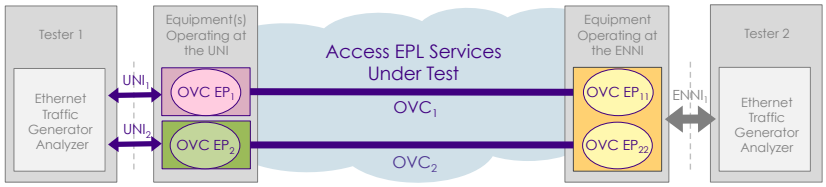
Remarks	Note 1: OVC MTU size of the Access Services under test are to be provided by the Operator Note 2: The OVC MTU size MUST be ≤ to the MTU size of each External Interface where an OVC EP exists that is associated by the OVC

Test Case 4.1: CE-VLAN ID Preservation

Abstract Test Suite for Ethernet Access Services	
Test Name	CE-VLAN ID Preservation
Test Definition ID	AEPL4_R3_R7_R13
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R7] For an Access EPL service, CE-VLAN ID Preservation **MUST** be Yes [R3] For an Access EPL service, the OVC EP Map at the UNI **MUST** contain all CE-VLAN ID values {1, 2…4095} mapped to a single OVC EP [R13] Each S-VLAN ID value associated with an instance of Access EPL Service **MUST** map to a distinct End Point, of Type = "OVC"
Test Object	Verify that for an Access EPL service, all CE-VLAN IDs mapped to the OVC are preserved
Test Configuration	At least two OVCs, each one associating one OVC EP at a UNI and one OVC EP at the ENNI are configured. All CE-VLAN ID values are mapped to the OVC EP at each UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_1** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_1$ **Map at UNI_2** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_2$ **Map at $ENNI_1$** S-VLAN ID 111 → $OVC\ EP_{11}$ S-VLAN ID 222 → $OVC\ EP_{22}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_1 and UNI_2** OVC End Point: $OVC\ EP_1$ — Parameters: $CIR_1\ CBS_1\ EIR_1\ EBS_1\ CF_1\ CM_1$ OVC End Point: $OVC\ EP_2$ — Parameters: $CIR_2\ CBS_2\ EIR_2\ EBS_2\ CF_2\ CM_2$ Note 1: CIR_1 = 3 Mbps, CIR_2 = 30 Mbps Note 2: $CBS_1 \geq$ 12176 Bytes, $CBS_2 \geq$ 12176 Bytes Note 3: EIR_1, EIR_2, EBS_1, EBS_2, CF_1 and CF_2 equal to 0 Note 4: CM_1 and CM_2 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{11}$ — Parameters: $CIR_{11}\ CBS_{11}\ EIR_{11}\ EBS_{11}\ CF_{11}\ CM_{11}$ OVC End Point: $OVC\ EP_{22}$ — Parameters: $CIR_{22}\ CBS_{22}\ EIR_{22}\ EBS_{22}\ CF_{22}\ CM_{22}$ Note 1: CIR_{11} = 3 Mbps, CIR_{22} = 30 Mbps Note 2: $CBS_{11} \geq$ 12176 Bytes, and $CBS_{22} \geq$ 12176 Bytes Note 3: EIR_{11}, EIR_{22}, EBS_{11}, EBS_{22}, CF_{11} and CF_{22} equal to 0 Note 4: CM_{11} and CM_{22} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN IDs equal to 1,2…4095 at UNI_1 configured in OVC_1 and at UNI_2 configured in OVC_2 • Tester 2 verifies that the C-tagged Service Frames offered at UNI_1 are delivered double-tagged with CE-VLAN IDs equal to 1,2…4095 and S-VLAN ID equal to 111 at $ENNI_1$ configured in OVC_1. Tester 2 also verifies that the C-tagged Service Frames offered at UNI_2 are delivered double-tagged with CE-VLAN IDs equal to 1,2…4095 and S-VLAN ID equal to 222 at $ENNI_1$ configured in OVC_2 • Tester 2 offers double-tagged ENNI Frames with CE-VLAN IDs equal to 1,2…4095 and S-VLAN ID equal to 111 at $ENNI_1$ configured in OVC_1 and double-tagged ENNI Frames with CE-VLAN IDs equal to 1,2…4095 and S-VLAN ID equal to 222 at the $ENNI_1$ configured in OVC_2 • Tester 1 verifies that the ENNI Frames offered at $ENNI_1$ double-tagged with CE-VLAN IDs equal to 1,2…4095 and S-VLAN ID equal to 111 are received C-tagged at UNI_1 configured in OVC_1 with CE-VLAN IDs equal to 1,2…4095 and that the ENNI Frames offered at $ENNI_1$ double-tagged with CE-VLAN IDs equal to 1,2…4095 and S-VLAN ID equal to 222 are received C-tagged at UNI_2 configured in OVC_2 with CE-VLAN IDs equal to 1,2…4095
Units	CE-VLAN ID and S-VLAN ID values
Variables	UNI and ENNI interface speeds and bandwidth profile parameters CBS_1, CBS_2, CBS_{11}, CBS_{22}
Results	Pass or fail

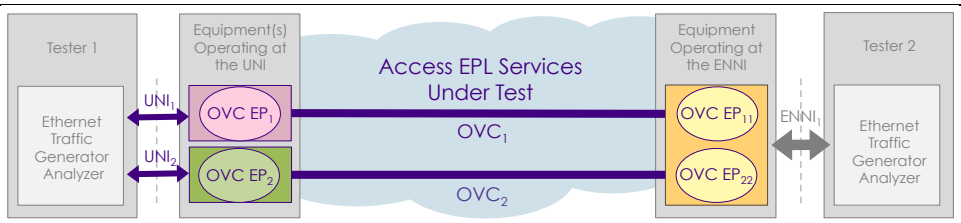
Remarks	C-tag and S-tag formats are specified in IEEE 802.1ad sections 9.5, 9.6 and 9.7

Test Case 5.1: CE-VLAN CoS ID Value Preservation

Abstract Test Suite for Ethernet Access Services	
Test Name	CE-VLAN CoS ID Value Preservation
Test Definition ID	AEPL5_R3_R8_R13
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R8] For an Access EPL service, CE-VLAN CoS ID Value Preservation **MUST** be Yes [R3] For an Access EPL service, the OVC EP Map at the UNI **MUST** contain all CE-VLAN ID values {1, 2…4095} mapped to a single OVC EP [R13] Each S-VLAN ID value associated with an instance of Access EPL Service **MUST** map to a distinct End Point, of Type = "OVC"
Test Object	Verify that for an Access EPL service, the CE-VLAN CoS are preserved
Test Configuration	At least two OVCs, each one associating one OVC EP at a UNI and one OVC EP at the ENNI are configured. All CE-VLAN ID values with specific CoS are mapped to the OVC EP at each UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_1** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_1$ **Map at UNI_2** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_2$ **Map at $ENNI_1$** S-VLAN ID: 111 → OVC End Point: $OVC\ EP_{11}$ S-VLAN ID: 222 → OVC End Point: $OVC\ EP_{22}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_1 and UNI_2** $OVC\ EP_1$: $CIR_1\ CBS_1\ EIR_1\ EBS_1\ CF_1\ CM_1$ $OVC\ EP_2$: $CIR_2\ CBS_2\ EIR_2\ EBS_2\ CF_2\ CM_2$ Note 1: CIR_1 = 3 Mbps, CIR_2 = 30 Mbps Note 2: $CBS_1 \geq$ 12176 Bytes, $CBS_2 \geq$ 12176 Bytes Note 3: EIR_1, EIR_2, EBS_1, EBS_2, CF_1 and CF_2 equal to 0 Note 4: CM_1 and CM_2 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** $OVC\ EP_{11}$: $CIR_{11}\ CBS_{11}\ EIR_{11}\ EBS_{11}\ CF_{11}\ CM_{11}$ $OVC\ EP_{22}$: $CIR_{22}\ CBS_{22}\ EIR_{22}\ EBS_{22}\ CF_{22}\ CM_{22}$ Note 1: CIR_{11} = 3 Mbps, CIR_{22} = 30 Mbps Note 2: $CBS_{11} \geq$ 12176 Bytes, and $CBS_{22} \geq$ 12176 Bytes Note 3: EIR_{11}, EIR_{22}, EBS_{11}, EBS_{22}, CF_{11} and CF_{22} equal to 0 Note 4: CM_{11} and CM_{22} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN IDs equal to 1,2…500 and CE-VLAN CoS equal to 0, CE-VLAN IDs equal to 501,502…1000 and CE-VLAN CoS equal to 1, CE-VLAN IDs equal to 1001,1002…1500 and CE-VLAN CoS equal to 2, CE-VLAN IDs equal to 1501,1502…2000 and CE-VLAN CoS equal to 3, CE-VLAN IDs equal to 2001,2002…2500 and CE-VLAN CoS equal to 4, CE-VLAN IDs equal to 2501,2502…3000 and CE-VLAN CoS equal to 5, CE-VLAN IDs equal to 3001,3002…3500 and CE-VLAN CoS equal to 6, CE-VLAN IDs equal to 3501,3502…4095 and CE-VLAN CoS equal to 7, at UNI_1 configured in OVC_1 and at UNI_2 configured in OVC_2 • Tester 2 verifies that the C-tagged Service Frames offered at UNI_1 are delivered double-tagged with CE-VLAN IDs equal to 1,2…500, CE-VLAN CoS equal to 0 and S-VLAN ID equal to 111, CE-VLAN IDs equal to 501,502…1000, CE-VLAN CoS equal to 1 and S-VLAN ID equal to 111, etc at $ENNI_1$ configured in OVC_1. Tester 2 also verifies that the C-tagged Service Frames offered at UNI_2 are delivered double-tagged with CE-VLAN IDs equal to 1,2…500, CE-VLAN CoS equal to 0 and S-VLAN ID equal to 222, CE-VLAN IDs equal to 501,502…1000, CE-VLAN CoS equal to 1 and S-VLAN ID equal to 222, etc at $ENNI_1$ configured in OVC_2 • Tester 2 offers double-tagged ENNI Frames with CE-VLAN IDs equal to 1,2…500, CE-VLAN CoS equal to 0 and S-VLAN ID 111, etc at $ENNI_1$ configured in OVC_1. Tester 2 also offers double-tagged ENNI Frames with CE-VLAN IDs equal to 1,2…500, CE-VLAN CoS equal to 0 and S-VLAN ID 222, etc at $ENNI_1$ configured in OVC_2. • Tester 1 verifies that the ENNI Frames offered at $ENNI_1$ double-tagged with CE-VLAN IDs equal to 1,2…500, CE-VLAN CoS equal to 0 and S-VLAN ID equal to 111, CE-VLAN IDs equal to 501,502…1000 and CE-VLAN CoS equal to 1 and S-VLAN ID equal to 111, etc are received C-tagged at UNI_1 configured in OVC_1 with CE-VLAN IDs equal to 1,2…500 and CE-VLAN CoS equal to 0, CE-VLAN IDs equal to 501,502…1000 and CE-VLAN CoS equal to 1, etc and that the ENNI Frames offered at $ENNI_1$ double-tagged with CE-VLAN IDs equal to 1,2…500, CE-VLAN CoS equal to 0 and S-VLAN ID equal to 222, CE-VLAN IDs equal to 501,502…1000, CE-VLAN CoS equal to 1 and S-VLAN ID equal to 222, etc are received C-tagged at UNI_2 configured in OVC_2 with CE-VLAN IDs equal to 1,2…500 and CE-VLAN CoS equal to 0, CE-VLAN IDs equal to 501,502…1000 and CE-VLAN CoS equal to 1, etc
Units	CE-VLAN ID, CE-VLAN CoS and S-VLAN ID values
Variables	UNI and ENNI interface speeds and bandwidth profile parameters CBS_1, CBS_2, CBS_{11}, CBS_{22}
Results	Pass or fail

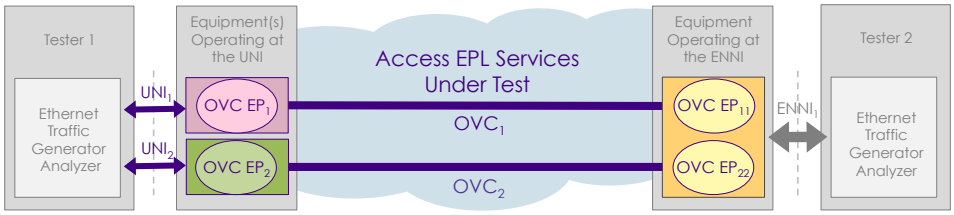
Remarks	C-tag and S-VLAN ID formats are specified in IEEE 802.1ad sections 9.5, 9.6 and 9.7

Test Case 6.1: Unicast, Multicast and Broadcast Unconditional Frame Delivery

Abstract Test Suite for Ethernet Access Services	
Test Name	Unicast, Multicast and Broadcast Unconditional Frame Delivery
Test Definition ID	AEPL6_R3_R10_R13
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R10] For an Access EPL service, unicast, multicast and broadcast frame delivery **MUST** be unconditional [R3] For an Access EPL service, the OVC EP Map at the UNI **MUST** contain all CE-VLAN ID values {1, 2…4095} mapped to a single OVC EP [R13] Each S-VLAN ID value associated with an instance of Access EPL Service **MUST** map to a distinct End Point, of Type = "OVC"
Test Object	Verify that for an Access EPL service, the unicast, multicast and broadcast frames are delivered unconditionally
Test Configuration	At least two OVCs, each one associating one OVC EP at a UNI and one OVC EP at the ENNI are configured. All CE-VLAN ID values are mapped to the OVC EP at each UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_1** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_1$ **Map at UNI_2** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_2$ **Map at $ENNI_1$** S-VLAN ID: 111 → OVC End Point: $OVC\ EP_{11}$ S-VLAN ID: 222 → OVC End Point: $OVC\ EP_{22}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_1 and UNI_2** OVC EP: $OVC\ EP_1$ — Parameters: $CIR_1\ CBS_1\ EIR_1\ EBS_1\ CF_1\ CM_1$ OVC EP: $OVC\ EP_2$ — Parameters: $CIR_2\ CBS_2\ EIR_2\ EBS_2\ CF_2\ CM_2$ Note 1: CIR_1 = 3 Mbps, CIR_2 = 30 Mbps Note 2: $CBS_1 \geq$ 12176 Bytes, $CBS_2 \geq$ 12176 Bytes Note 3: EIR_1, EIR_2, EBS_1, EBS_2, CF_1 and CF_2 equal to 0 Note 4: CM_1 and CM_2 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC EP: $OVC\ EP_{11}$ — Parameters: $CIR_{11}\ CBS_{11}\ EIR_{11}\ EBS_{11}\ CF_{11}\ CM_{11}$ OVC EP: $OVC\ EP_{22}$ — Parameters: $CIR_{22}\ CBS_{22}\ EIR_{22}\ EBS_{22}\ CF_{22}\ CM_{22}$ Note 1: CIR_{11} = 3 Mbps, CIR_{22} = 30 Mbps Note 2: $CBS_{11} \geq$ 12176 Bytes, and $CBS_{22} \geq$ 12176 Bytes Note 3: EIR_{11}, EIR_{22}, EBS_{11}, EBS_{22}, CF_{11} and CF_{22} equal to 0 Note 4: CM_{11} and CM_{22} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers untagged, priority tagged and C-tagged Service Frames with CE-VLAN ID equal to 11 with unicast, multicast and broadcast destination address at UNI_1 configured in OVC_1 and at UNI_2 configured in OVC_2 • Tester 2 verifies that all the unicast, multicast and broadcast untagged Service Frames offered at UNI_1 are delivered single-tagged with S-VLAN ID equal to 111 and that all the unicast, multicast and broadcast priority tagged and C-tagged Service Frames offered at UNI_1 are delivered double-tagged with S-VLAN ID equal to 111 at $ENNI_1$ configured in OVC_1. Tester 2 also verifies that all the unicast, multicast and broadcast untagged Service Frames offered at UNI_1 are delivered single-tagged with S-VLAN ID equal to 222 at $ENNI_1$ configured in OVC_2 and that all the unicast, multicast and broadcast priority tagged and C-tagged Service Frames offered at UNI_2 are delivered double-tagged with S-VLAN ID equal to 222 at $ENNI_1$ configured in OVC_2 • Tester 2 offers unicast, multicast and broadcast single-tagged ENNI Frames with S-VLAN ID equal to 111, double-tagged ENNI frames with CE-VLAN ID equal to 0 and S-VLAN ID equal to 111 and double-tagged ENNI frames with CE-VLAN ID equal to 11 and S-VLAN ID equal to 111 at $ENNI_1$ configured in OVC_1. Tester 2 also offers unicast, multicast and broadcast single-tagged ENNI Frames with S-VLAN ID equal to 222, double-tagged ENNI frames with CE-VLAN ID equal to 0 and S-VLAN ID equal to 222 and double-tagged ENNI frames with CE-VLAN ID equal to 11 and S-VLAN ID equal to 222 at $ENNI_1$ configured in OVC_2 • Tester 1 verifies that all the unicast, multicast and broadcast ENNI Frames with S-VLAN ID 111 offered at $ENNI_1$ configured in OVC_1 are received untagged, priority tagged and C-tagged with CE-VLAN ID equal to 11 at UNI_1. Tester 1 also verifies that all the unicast, multicast and broadcast ENNI Frames with S-VLAN ID 222 offered at $ENNI_1$ configured in OVC_2 are received untagged, priority tagged and C-tagged with CE-VLAN ID equal to 11 at UNI_2
Units	Number of valid frames received at the external interfaces
Variables	UNI and ENNI interface speeds and bandwidth profile parameters CBS_1, CBS_2, CBS_{11}, CBS_{22}
Results	Pass or fail
Remarks	The multicast frames MUST NOT be Layer 2 Control Protocol frames

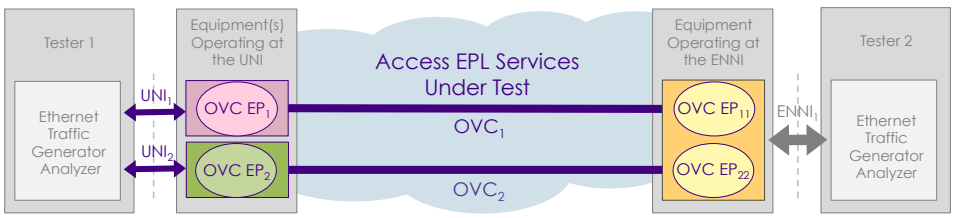
10.2 Test Cases for Access EPL – Service OAM Frames Handling

Test Case 7.1: Service OAM Connectivity Check Messages (CCM) Handling

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Service OAM Connectivity Check Messages (CCM) Handling</td></tr>
<tr><td>Test Definition ID</td><td>AEPL7_R3_R13_R14</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R14] The Access EPL and Access EVPL Services MUST be configurable to tunnel all SOAM frames at the default Test and Subscriber MEG levels as defined in the SOAM FM IA (MEF 30) document, section 7.1.
[R3] For an Access EPL service, the OVC EP Map at the UNI MUST contain all CE-VLAN ID values {1, 2…4095} mapped to a single OVC EP
[R13] Each S-VLAN ID value associated with an instance of Access EPL Service MUST map to a distinct End Point, of Type = “OVC”</td></tr>
<tr><td>Test Object</td><td>Verify that for an Access EPL service, CCM frames are tunneled at the default Test, and Subscriber MEG levels as defined in the SOAM FM IA (MEF 30), section 7.1</td></tr>
<tr><td>Test Configuration</td><td>At least two OVCs, each one associating one OVC EP at a UNI and one OVC EP at the ENNI are configured. All CE-VLAN ID values are mapped to the OVC EP at each UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI1</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP1</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>111</td><td>OVC EP11</td></tr>
<tr><td>222</td><td>OVC EP22</td></tr>
</table>
<table>
<tr><th colspan="2">Map at UNI2</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP2</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI1 and UNI2</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP1</td><td>CIR1 CBS1 EIR1 EBS1 CF1 CM1</td></tr>
<tr><td>OVC EP2</td><td>CIR2 CBS2 EIR2 EBS2 CF2 CM2</td></tr>
<tr><td colspan="2">Note 1: CIR1 = 3 Mbps, CIR2 = 30 Mbps
Note 2: CBS1 ≥ 12176 Bytes, CBS2 ≥ 12176 Bytes
Note 3: EIR1, EIR 2, EBS1, EBS2, CF1 and CF2 equal to 0
Note 4: CM1 and CM2 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP11</td><td>CIR11 CBS11 EIR11 EBS11 CF11 CM11</td></tr>
<tr><td>OVC EP22</td><td>CIR22 CBS22 EIR22 EBS22 CF22 CM22</td></tr>
<tr><td colspan="2">Note 1: CIR11 = 3 Mbps, CIR22 = 30 Mbps
Note 2: CBS11 ≥ 12176 Bytes, and CBS22 ≥ 12176 Bytes
Note 3: EIR11, EIR 22, EBS11, EBS22, CF11 and CF22 equal to 0
Note 4: CM11 and CM22 in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>

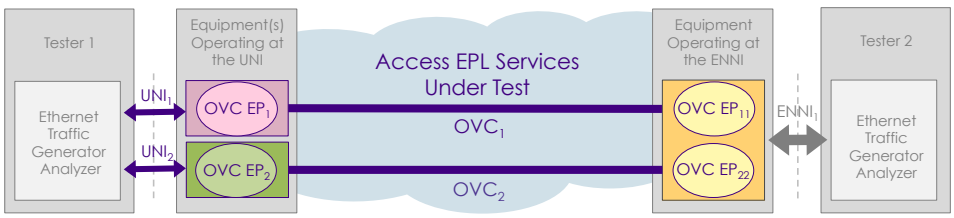
Tester 1 offers untagged CCM messages at MEG level 5, and 6 at UNI1 configured in OVC1 and at UNI2 configured in OVC2
Tester 2 verifies that all the untagged CCM messages at MEG level 5, and 6 offered at UNI1 are delivered single-tagged with S-VLAN ID equal to 111 at ENNI1 configured in OVC1. Tester 2 also verifies that all the untagged CCM messages at MEG level 5, and 6 offered at UNI2 are delivered single-tagged with S-VLAN ID equal to 222 at ENNI1 configured in OVC2
Tester 2 offers single-tagged CCM messages at MEG level 5, and 6 with S-VLAN ID equal to 111 at ENNI1 configured in OVC1 and single-tagged CCM messages at MEG level 5, and 6 with S-VLAN ID equal to 222 at ENNI1 configured in OVC2
Tester 1 verifies that all the single-tagged CCM messages at MEG level 5, and 6 with S-VLAN ID equal to 111 offered at ENNI1 are received untagged at UNI1 configured in OVC1. Tester 1 also verifies that all the single-tagged CCM messages at MEG level 5, and 6 with S-VLAN ID equal to 222 offered at ENNI1 are received untagged at UNI2 configured in OVC2
</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the external interfaces</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds and bandwidth profile parameters CBS1, CBS2, CBS11, CBS22</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td></td></tr>
</table>

Test Case 8.1: Service OAM Linktrace Messages (LTM/LTR) Handling

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Service OAM Linktrace Messages (LTM/LTR) Handling</td></tr>
<tr><td>Test Definition ID</td><td>AEPL8_R3_R13_R14</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R14] The Access EPL and Access EVPL Services MUST be configurable to tunnel all SOAM frames at the default Test and Subscriber MEG levels as defined in the SOAM FM IA (MEF 30) document, section 7.1.
[R3] For an Access EPL service, the OVC EP Map at the UNI MUST contain all CE-VLAN ID values {1, 2…4095} mapped to a single OVC EP
[R13] Each S-VLAN ID value associated with an instance of Access EPL Service MUST map to a distinct End Point, of Type = “OVC”</td></tr>
<tr><td>Test Object</td><td>Verify that for an Access EPL service, LTM and LTR frames are tunneled at the default Test, and Subscriber MEG levels as defined in the SOAM FM IA (MEF 30), section 7.1</td></tr>
<tr><td>Test Configuration</td><td>At least two OVCs, each one associating one OVC EP at a UNI and one OVC EP at the ENNI are configured. All CE-VLAN ID values are mapped to the OVC EP at each UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI1</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP1</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>111</td><td>OVC EP11</td></tr>
<tr><td>222</td><td>OVC EP22</td></tr>
</table>
<table>
<tr><th colspan="2">Map at UNI2</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP2</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI1 and UNI2</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP1</td><td>CIR1 CBS1 EIR1 EBS1 CF1 CM1</td></tr>
<tr><td>OVC EP2</td><td>CIR2 CBS2 EIR2 EBS2 CF2 CM2</td></tr>
<tr><td colspan="2">Note 1: CIR1 = 3 Mbps, CIR2 = 30 Mbps
Note 2: CBS1 ≥ 12176 Bytes, CBS2 ≥ 12176 Bytes
Note 3: EIR1, EIR 2, EBS1, EBS2, CF1 and CF2 equal to 0
Note 4: CM1 and CM2 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP11</td><td>CIR11 CBS11 EIR11 EBS11 CF11 CM11</td></tr>
<tr><td>OVC EP22</td><td>CIR22 CBS22 EIR22 EBS22 CF22 CM22</td></tr>
<tr><td colspan="2">Note 1: CIR11 = 3 Mbps, CIR22 = 30 Mbps
Note 2: CBS11 ≥ 12176 Bytes, and CBS22 ≥ 12176 Bytes
Note 3: EIR11, EIR 22, EBS11, EBS22, CF11 and CF22 equal to 0
Note 4: CM11 and CM22 in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>

Tester 1 offers untagged LTM and LTR messages at MEG level 5, and 6 at UNI1 configured in OVC1 and at UNI2 configured in OVC2
Tester 2 verifies that all the untagged LTM and LTR messages at MEG level 5, and 6 offered at UNI1 are delivered single-tagged with S-VLAN ID equal to 111 at ENNI1 configured in OVC1. Tester 2 also verifies that all the untagged LTM and LTR messages at MEG level 5, and 6 offered at UNI2 are delivered single-tagged with S-VLAN ID equal to 222 at ENNI1 configured in OVC2
Tester 2 offers single-tagged LTM and LTR messages at MEG level 5, and 6 with S-VLAN ID equal to 111 at ENNI1 configured in OVC1 and single-tagged LTM and LTR messages at MEG level 5, and 6 with S-VLAN ID equal to 222 at ENNI1 configured in OVC2
Tester 1 verifies that all the single-tagged LTM and LTR messages at MEG level 5, and 6 with S-VLAN ID equal to 111 offered at ENNI1 are received untagged at UNI1 configured in OVC1. Tester 1 also verifies that all the single-tagged LTM and LTR messages at MEG level 5, and 6 with S-VLAN ID equal to 222 offered at ENNI1 are received untagged at UNI2 configured in OVC2
</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the external interfaces</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds and bandwidth profile parameters CBS1, CBS2, CBS11, CBS22</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td></td></tr>
</table>

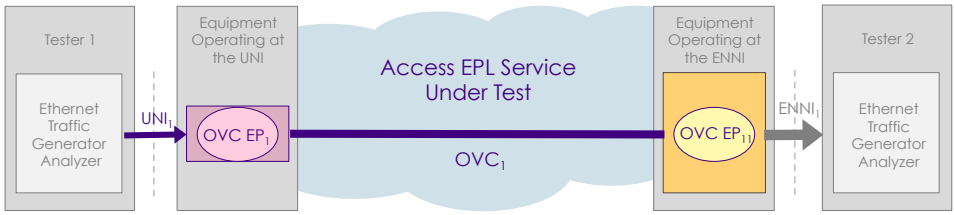
Test Case 9.1: Service OAM Loopback Messages (LBM/LBR) Handling

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Service OAM Loopback Messages (LBM/LBR) Handling</td></tr>
<tr><td>Test Definition ID</td><td>AEPL9_R3_R13_R14</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R14] The Access EPL and Access EVPL Services MUST be configurable to tunnel all SOAM frames at the default Test and Subscriber MEG levels as defined in the SOAM FM IA (MEF 30) document, section 7.1.
[R3] For an Access EPL service, the OVC EP Map at the UNI MUST contain all CE-VLAN ID values {1, 2…4095} mapped to a single OVC EP
[R13] Each S-VLAN ID value associated with an instance of Access EPL Service MUST map to a distinct End Point, of Type = “OVC”</td></tr>
<tr><td>Test Object</td><td>Verify that for an Access EPL service, LBM and LBR frames are tunneled at the default Test, and Subscriber MEG levels as defined in the SOAM FM IA (MEF 30), section 7.1</td></tr>
<tr><td>Test Configuration</td><td>At least two OVCs, each one associating one OVC EP at a UNI and one OVC EP at the ENNI are configured. All CE-VLAN ID values are mapped to the OVC EP at each UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI1</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP1</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>111</td><td>OVC EP11</td></tr>
<tr><td>222</td><td>OVC EP22</td></tr>
</table>
<table>
<tr><th colspan="2">Map at UNI2</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP2</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI1 and UNI2</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP1</td><td>CIR1 CBS1 EIR1 EBS1 CF1 CM1</td></tr>
<tr><td>OVC EP2</td><td>CIR2 CBS2 EIR2 EBS2 CF2 CM2</td></tr>
<tr><td colspan="2">Note 1: CIR1 = 3 Mbps, CIR2 = 30 Mbps
Note 2: CBS1 ≥ 12176 Bytes, CBS2 ≥ 12176 Bytes
Note 3: EIR1, EIR 2, EBS1, EBS2, CF1 and CF2 equal to 0
Note 4: CM1 and CM2 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP11</td><td>CIR11 CBS11 EIR11 EBS11 CF11 CM11</td></tr>
<tr><td>OVC EP22</td><td>CIR22 CBS22 EIR22 EBS22 CF22 CM22</td></tr>
<tr><td colspan="2">Note 1: CIR11 = 3 Mbps, CIR22 = 30 Mbps
Note 2: CBS11 ≥ 12176 Bytes, and CBS22 ≥ 12176 Bytes
Note 3: EIR11, EIR 22, EBS11, EBS22, CF11 and CF22 equal to 0
Note 4: CM11 and CM22 in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>

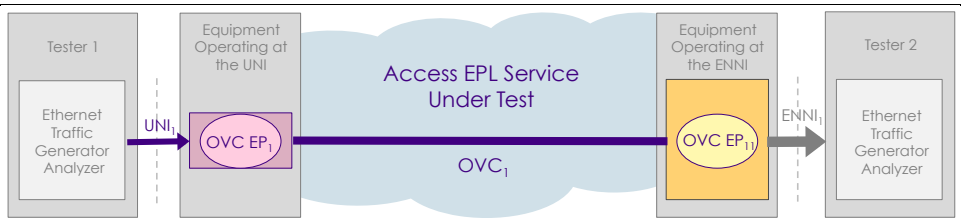
Tester 1 offers untagged LBM and LBR messages at MEG level 5, and 6 at UNI1 configured in OVC1 and at UNI2 configured in OVC2
Tester 2 verifies that all the untagged LBM and LBR messages at MEG level 5, and 6 offered at UNI1 are delivered single-tagged with S-VLAN ID equal to 111 at ENNI1 configured in OVC1. Tester 2 also verifies that all the untagged LBM and LBR messages at MEG level 5, and 6 offered at UNI2 are delivered single-tagged with S-VLAN ID equal to 222 at ENNI1 configured in OVC2
Tester 2 offers single-tagged LBM and LBR messages at MEG level 5, and 6 with S-VLAN ID equal to 111 at ENNI1 configured in OVC1 and single-tagged LBM and LBR messages at MEG level 5, and 6 with S-VLAN ID equal to 222 at ENNI1 configured in OVC2
Tester 1 verifies that all the single-tagged LBM and LBR messages at MEG level 5, and 6 with S-VLAN ID equal to 111 offered at ENNI1 are received untagged at UNI1 configured in OVC1. Tester 1 also verifies that all the single-tagged LBM and LBR messages at MEG level 5, and 6 with S-VLAN ID equal to 222 offered at ENNI1 are received untagged at UNI2 configured in OVC2
</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the external interfaces</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds and bandwidth profile parameters CBS1, CBS2, CBS11, CBS22</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td></td></tr>
</table>

10.3 Test Cases for Access EPL – Bandwidth Profile

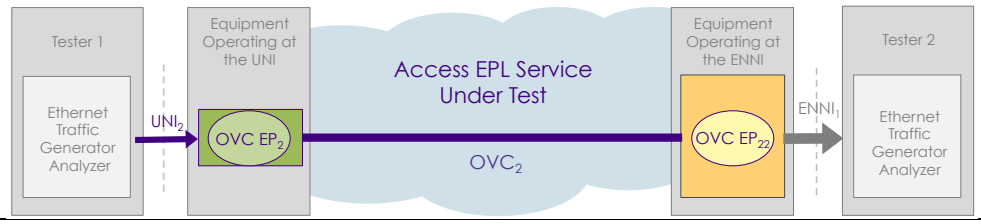
Test Case 10.1: Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 1

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 1</td></tr>
<tr><td>Test Definition ID</td><td>AEPL10_R4_R5_R9</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name
[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R9] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI1</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP1</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>111</td><td>OVC EP11</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP1</td><td>CIR1 CBS1 EIR1 EBS1 CF1 CM1</td></tr>
<tr><td colspan="2">Note 1: CIR1 = 3 Mbps
Note 2: CBS1 ≥ 12176 Bytes
Note 3: EIR1, EBS1, and CF1 equal to 0
Note 4: CM1 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP11</td><td>CIR11 CBS11 EIR11 EBS11 CF11 CM11</td></tr>
<tr><td colspan="2">Note 1: CIR11 = 3 Mbps
Note 2: CBS11 ≥ 12176 Bytes
Note 3: EIR11, EBS11, and CF11 equal to 0
Note 4: CM11 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 11 and CE-VLAN CoS equal to 0,1,2…7 of length λ at a constant rate greater than CIR_1 to the ingress OVC End Point (OVC EP_1 at UNI_1) during a time interval T
• Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 11, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 111 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP_{11} at $ENNI_1$).
• The amount of Green traffic delivered at the egress OVC EP_{11} at $ENNI_1$ must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP_{11} at $ENNI_1$</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS_1, CBS_{11}</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

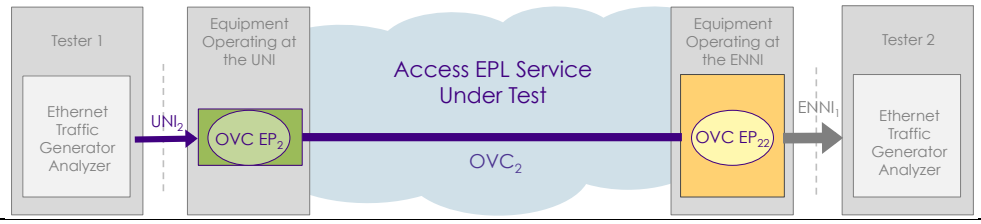
Test Case 11.1: Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 1

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 1</td></tr>
<tr><td>Test Definition ID</td><td>AEPL11_R4_R5_R9</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name
[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
1 – 10 Mb/s, increments of 1 Mbps (Range 1)
10 – 100 Mb/s, increments of 10 Mbps (Range 2)
100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R9] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI, and color forwarding is yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td><table><tr><th colspan="2">Map at UNI1</th></tr><tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr><tr><td>1,2*…4095</td><td>OVC EP1</td></tr></table><table><tr><th colspan="2">Map at ENNI1</th></tr><tr><td>S-VLAN ID</td><td>OVC End Point</td></tr><tr><td>111</td><td>OVC EP11</td></tr></table>Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td><table><tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI1</th></tr><tr><td>OVC End Point</td><td>Parameters</td></tr><tr><td>OVC EP1</td><td>CIR1 CBS1 EIR1 EBS1 CF1 CM1</td></tr><tr><td colspan="2">Note 1: CIR1 = 3 Mbps
Note 2: CBS1 ≥ 12176 Bytes
Note 3: EIR1, EBS1, and CF1 equal to 0
Note 4: CM1 in color-blind mode</td></tr></table><table><tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr><tr><td>OVC End Point</td><td>Parameters</td></tr><tr><td>OVC EP11</td><td>CIR11 CBS11 EIR11 EBS11 CF11 CM11</td></tr><tr><td colspan="2">Note 1: CIR11 = 3 Mbps
Note 2: CBS11 ≥ 12176 Bytes
Note 3: EIR11, EBS11, and CF11 equal to 0
Note 4: CM11 in color-aware mode</td></tr></table></td></tr>
<tr><td>Test Procedure</td><td>Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 11 and CE-VLAN CoS equal to 0,1,2…7 of length λ, using an input traffic pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP1 at UNI1) during a time interval T
Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 11, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 111 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP11 at ENNI1)
The amount of Green traffic delivered at the egress OVC EP11 at ENNI1 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP11 at ENNI1</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, Burst length B, idle period I, time interval T, tolerance F_{CBS} and bandwidth profile parameters CBS1, CBS11</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</td></tr>
</table>

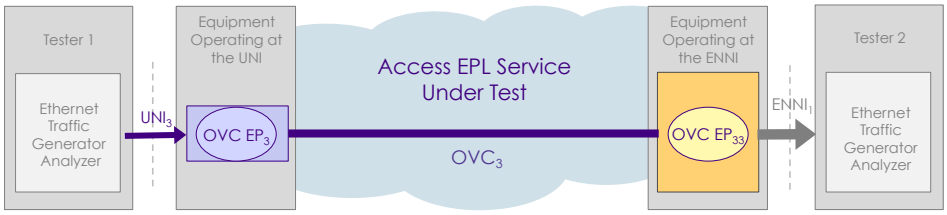
Test Case 12.1: Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 2

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 2</td></tr>
<tr><td>Test Definition ID</td><td>AEPL12_R4_R5_R9</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if the UNI Speed is greater than 10 Mbps</td></tr>
<tr><td>Requirement Description</td><td>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name
[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R9] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 30 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI$_2$</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP$_2$</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI$_1$</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>222</td><td>OVC EP$_{22}$</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI$_2$</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP$_2$</td><td>CIR$_2$ CBS$_2$ EIR$_2$ EBS$_2$ CF$_2$ CM$_2$</td></tr>
<tr><td colspan="2">Note 1: CIR$_2$ = 30 Mbps
Note 2: CBS$_2$ ≥ 12176 Bytes
Note 3: EIR$_2$, EBS$_2$, and CF$_2$ equal to 0
Note 4: CM$_2$ in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI$_1$</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP$_{22}$</td><td>CIR$_{22}$ CBS$_{22}$ EIR$_{22}$ EBS$_{22}$ CF$_{22}$ CM$_{22}$</td></tr>
<tr><td colspan="2">Note 1: CIR$_{22}$ = 30 Mbps
Note 2: CBS$_{22}$ ≥ 12176 Bytes
Note 3: EIR$_{22}$, EBS$_{22}$, and CF$_{22}$ equal to 0
Note 4: CM$_{22}$ in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 12 and CE-VLAN CoS equal to 0,1,2…7 of length λ at a constant rate greater than CIR$_2$ to the ingress OVC End Point (OVC EP$_2$ at UNI$_2$) during a time interval T
• Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 12, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 222 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP$_{22}$ at ENNI$_1$).
• The amount of Green traffic delivered at the egress OVC EP$_{22}$ at ENNI$_1$ must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP$_{22}$ at ENNI$_1$</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS$_2$, CBS$_{22}$</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

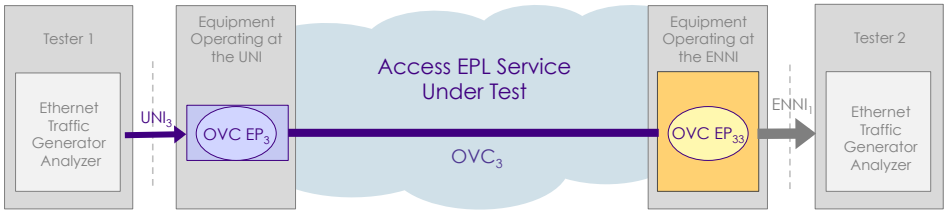
Test Case 13.1: Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 2

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 2</td></tr>
<tr><td>Test Definition ID</td><td>AEPL13_R4_R5_R9</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if the UNI Speed is greater than 10 Mbps</td></tr>
<tr><td>Requirement Description</td><td>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name
[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
1 – 10 Mb/s, increments of 1 Mbps (Range 1)
10 – 100 Mb/s, increments of 10 Mbps (Range 2)
100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R9] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 30 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI, and color forwarding is yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI2</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP2</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>222</td><td>OVC EP22</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI2</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP2</td><td>CIR2 CBS2 EIR2 EBS2 CF2 CM2</td></tr>
<tr><td colspan="2">Note 1: CIR2 = 30 Mbps
Note 2: CBS2 ≥ 12176 Bytes
Note 3: EIR2, EBS2, and CF2 equal to 0
Note 4: CM2 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP22</td><td>CIR22 CBS22 EIR22 EBS22 CF22 CM22</td></tr>
<tr><td colspan="2">Note 1: CIR22 = 30 Mbps
Note 2: CBS22 ≥ 12176 Bytes
Note 3: EIR22, EBS22, and CF22 equal to 0
Note 4: CM22 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 12 and CE-VLAN CoS equal to 0,1,2…7 of length λ, using an input traffic pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP2 at UNI2) during a time interval T
Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 12, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 222 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP22 at ENNI1)
The amount of Green traffic delivered at the egress OVC EP22 at ENNI1 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP22 at ENNI1</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, Burst length B, idle period I, time interval T, tolerance F_{CBS} and bandwidth profile parameters CBS2, CBS22</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</td></tr>
</table>

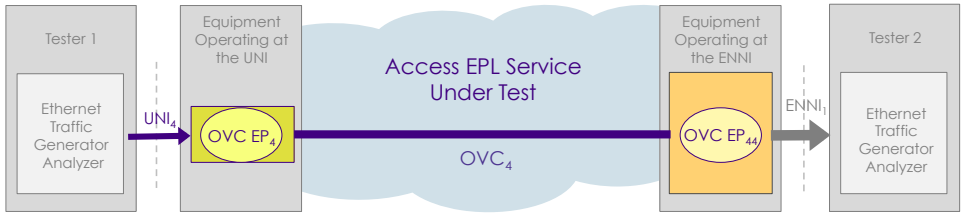
Test Case 14.1: Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 3

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 3</td></tr>
<tr><td>Test Definition ID</td><td>AEPL14_R4_R5_R9</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if the UNI Speed is greater than 100 Mbps</td></tr>
<tr><td>Requirement Description</td><td>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name
[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
1 – 10 Mb/s, increments of 1 Mbps (Range 1)
10 – 100 Mb/s, increments of 10 Mbps (Range 2)
100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R9] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI3</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP3</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>333</td><td>OVC EP33</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI3</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP3</td><td>CIR3 CBS3 EIR3 EBS3 CF3 CM3</td></tr>
<tr><td colspan="2">Note 1: CIR3 = 300 Mbps
Note 2: CBS3 ≥ 12176 Bytes
Note 3: EIR3, EBS3, and CF3 equal to 0
Note 4: CM3 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP33</td><td>CIR33 CBS33 EIR33 EBS33 CF33 CM33</td></tr>
<tr><td colspan="2">Note 1: CIR33 = 300 Mbps
Note 2: CBS33 ≥ 12176 Bytes
Note 3: EIR33, EBS33, and CF33 equal to 0
Note 4: CM33 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 13 and CE-VLAN CoS equal to 0,1,2…7 of length λ at a constant rate greater than CIR3 to the ingress OVC End Point (OVC EP3 at UNI3) during a time interval T
Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 13, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 333 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP33 at ENNI1).
The amount of Green traffic delivered at the egress OVC EP33 at ENNI1 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP33 at ENNI1</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS3, CBS33</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

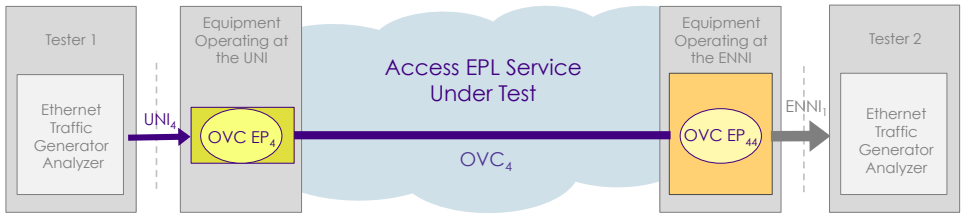
Test Case 15.1: Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 3

Abstract Test Suite for Ethernet Access Services	
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 3
Test Definition ID	AEPL15_R4_R5_R9
Test Type	Conformance
Test Status	Mandatory if the UNI Speed is greater than 100 Mbps
Requirement Description	[R4] The CoS Identifier for Service Frames **MUST** be the OVC End Point; that OVC **MUST** have a single CoS Name [R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and **MUST** allow configuration to support CIR of: • 1 – 10 Mb/s, increments of 1 Mbps (Range 1) • 10 – 100 Mb/s, increments of 10 Mbps (Range 2) • 100 – 1000 Mb/s, increments of 100 Mbps (Range 3) • 1 – 10 Gb/s, increments of 1 Gbps (Range 4) It **MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color blind" and it **MUST** have CBS ≥ 12176 Bytes [R9] Color Forwarding **SHOULD** be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI **MUST** be marked green via the S-Tag as per MEF 23.1
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI, and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval *T*, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_3** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_3$ **Map at $ENNI_1$** S-VLAN ID: 333 → OVC End Point: $OVC\ EP_{33}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_3** OVC End Point: $OVC\ EP_3$ — Parameters: $CIR_3\ CBS_3\ EIR_3\ EBS_3\ CF_3\ CM_3$ Note 1: CIR_3 = 300 Mbps Note 2: $CBS_3 \geq 12176$ Bytes Note 3: EIR_3, EBS_3, and CF_3 equal to 0 Note 4: CM_3 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{33}$ — Parameters: $CIR_{33}\ CBS_{33}\ EIR_{33}\ EBS_{33}\ CF_{33}\ CM_{33}$ Note 1: CIR_{33} = 300 Mbps Note 2: $CBS_{33} \geq 12176$ Bytes Note 3: EIR_{33}, EBS_{33}, and CF_{33} equal to 0 Note 4: CM_{33} in color-aware mode
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 13 and CE-VLAN CoS equal to 0,1,2…7 of length λ, using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP_3 at UNI_3) during a time interval *T* • Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 13, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 333 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP_{33} at $ENNI_1$) • The amount of Green traffic delivered at the egress OVC EP_{33} at $ENNI_1$ must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval *T* that should be delivered to the egress OVC EP_{33} at $ENNI_1$
Units	Number of valid frames received at the ENNI
Variables	UNI and ENNI interface speeds, Service Frame length λ, Burst length *B*, idle period *I*, time interval *T*, tolerance F_{CBS} and bandwidth profile parameters CBS_3, CBS_{33}
Results	Pass or fail
Remarks	Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence Note 2: Green Color Identifiers defined in MEF 23.1 Table 4

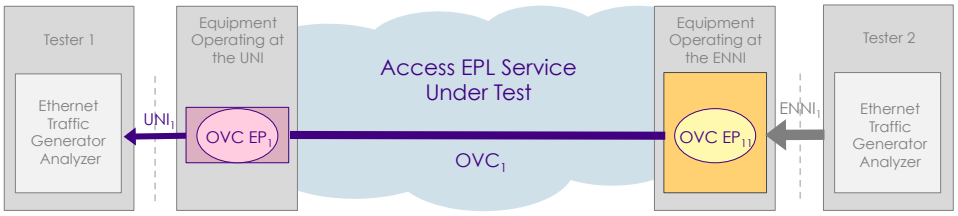
Test Case 16.1: Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 4

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 4</td></tr>
<tr><td>Test Definition ID</td><td>AEPL16_R4_R5_R9</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if the UNI Speed is greater than 1 Gbps</td></tr>
<tr><td>Requirement Description</td><td>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name
[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R9] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Gbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI4</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP4</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>444</td><td>OVC EP44</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI4</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP4</td><td>CIR4 CBS4 EIR4 EBS4 CF4 CM4</td></tr>
<tr><td colspan="2">Note 1: CIR4 = 3 Gbps
Note 2: CBS4 ≥ 12176 Bytes
Note 3: EIR4, EBS4, and CF4 equal to 0
Note 4: CM4 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP44</td><td>CIR44 CBS44 EIR44 EBS44 CF44 CM44</td></tr>
<tr><td colspan="2">Note 1: CIR44 = 3 Gbps
Note 2: CBS44 ≥ 12176 Bytes
Note 3: EIR44, EBS44, and CF44 equal to 0
Note 4: CM44 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 14 and CE-VLAN CoS equal to 0,1,2…7 of length λ at a constant rate greater than CIR4 to the ingress OVC End Point (OVC EP4 at UNI4) during a time interval T
• Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 14, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 444 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP44 at ENNI1).
• The amount of Green traffic delivered at the egress OVC EP44 at ENNI1 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP44 at ENNI1</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS4, CBS44</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

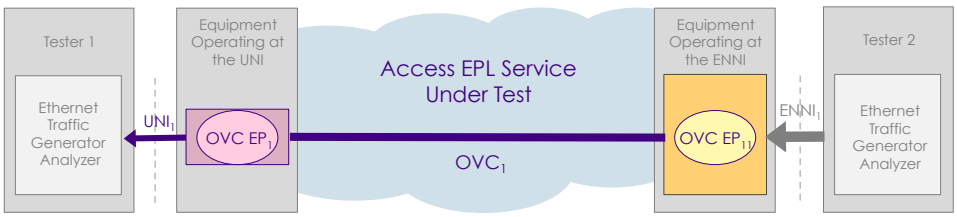
Test Case 17.1: Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 4

Abstract Test Suite for Ethernet Access Services	
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 4
Test Definition ID	AEPL17_R4_R5_R9
Test Type	Conformance
Test Status	Mandatory if the UNI Speed is greater than 1 Gbps
Requirement Description	[R4] The CoS Identifier for Service Frames **MUST** be the OVC End Point; that OVC **MUST** have a single CoS Name [R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and **MUST** allow configuration to support CIR of: • 1 – 10 Mb/s, increments of 1 Mbps (Range 1) • 10 – 100 Mb/s, increments of 10 Mbps (Range 2) • 100 – 1000 Mb/s, increments of 100 Mbps (Range 3) • 1 – 10 Gb/s, increments of 1 Gbps (Range 4) It **MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color blind" and it **MUST** have CBS ≥ 12176 Bytes [R9] Color Forwarding **SHOULD** be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI **MUST** be marked green via the S-Tag as per MEF 23.1
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Gbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI, and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval *T*, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_4** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_4$ **Map at $ENNI_1$** S-VLAN ID: 444 → OVC End Point: $OVC\ EP_{44}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_4** OVC End Point: $OVC\ EP_4$ — Parameters: CIR_4 CBS_4 EIR_4 EBS_4 CF_4 CM_4 Note 1: CIR_4 = 3 Gbps Note 2: $CBS_4 \geq$ 12176 Bytes Note 3: EIR_4, EBS_4, and CF_4 equal to 0 Note 4: CM_4 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{44}$ — Parameters: CIR_{44} CBS_{44} EIR_{44} EBS_{44} CF_{44} CM_{44} Note 1: CIR_{44} = 3 Gbps Note 2: $CBS_{44} \geq$ 12176 Bytes Note 3: EIR_{44}, EBS_{44}, and CF_{44} equal to 0 Note 4: CM_{44} in color-aware mode
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 14 and CE-VLAN CoS equal to 0,1,2…7 of length λ, using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP_4 at UNI_4) during a time interval *T* • Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 14, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 444 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP_{44} at $ENNI_1$) • The amount of Green traffic delivered at the egress OVC EP_{44} at $ENNI_1$ must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval *T* that should be delivered to the egress OVC EP_{44} at $ENNI_1$
Units	Number of valid frames received at the ENNI
Variables	UNI and ENNI interface speeds, Service Frame length λ, Burst length *B*, idle period *I*, time interval *T*, tolerance F_{CBS} and bandwidth profile parameters CBS_4, CBS_{44}
Results	Pass or fail
Remarks	Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence Note 2: Green Color Identifiers defined in MEF 23.1 Table 4

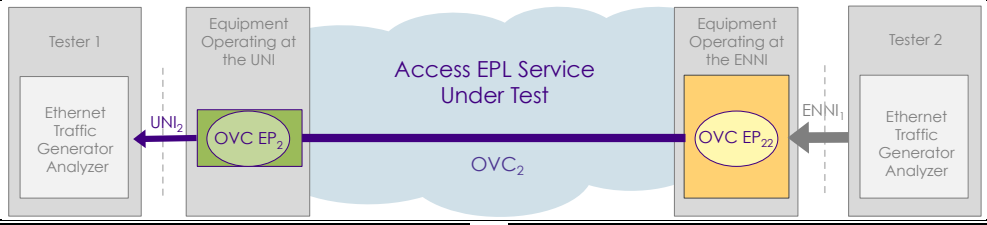
Test Case 18.1: Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 1

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 1</td></tr>
<tr><td>Test Definition ID</td><td>AEPL18_R11_R12</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R11] The CoS Identifier for ENNI Frames MUST be the OVC End Point to which the ENNI Frame is mapped; that OVC MUST have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}
[R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI1</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP1</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>111</td><td>OVC EP11</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP1</td><td>CIR1 CBS1 EIR1 EBS1 CF1 CM1</td></tr>
<tr><td colspan="2">Note 1: CIR1 = 3 Mbps
Note 2: CBS1 ≥ 12176 Bytes
Note 3: EIR1, EBS1, and CF1 equal to 0
Note 4: CM1 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP11</td><td>CIR11 CBS11 EIR11 EBS11 CF11 CM11</td></tr>
<tr><td colspan="2">Note 1: CIR11 = 3 Mbps
Note 2: CBS11 ≥ 12176 Bytes
Note 3: EIR11, EBS11, and CF11 equal to 0
Note 4: CM11 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 11, CE-VLAN CoS equal to 1, S-VLAN ID equal to 111 and S-VLAN CoS equal to Green of length λ at a constant rate greater than CIR_{11} to the ingress OVC End Point (OVC EP_{11} at $ENNI_1$) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 11 and CE-VLAN CoS equal to 1 delivered at the egress OVC End Point (OVC EP_1 at UNI_1). The amount of traffic delivered at the egress OVC EP_1 at UNI_1 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP_1 at UNI_1
• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 11, CE-VLAN CoS equal to 1, S-VLAN ID equal to 111 and S-VLAN CoS equal to Yellow of length λ at a constant rate greater than CIR_{11} to the ingress OVC End Point (OVC EP_{11} at $ENNI_1$) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 11 and CE-VLAN CoS equal to 1 delivered at the egress OVC End Point (OVC EP_1 at UNI_1). The amount of traffic delivered at the egress OVC EP_1 at UNI_1 must be zero</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the UNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, ENNI Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS_1, CBS_{11}</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

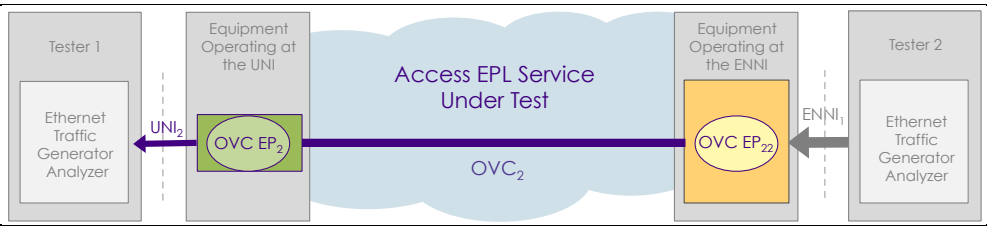
Test Case 19.1: Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 1

Abstract Test Suite for Ethernet Access Services	
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 1
Test Definition ID	AEPL19_R11_R12
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R11] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and **MUST** allow configuration to support CIR of: • 1 – 10 Mb/s, increments of 1 Mbps (Range 1) • 10 – 100 Mb/s, increments of 10 Mbps (Range 2) • 100 – 1000 Mb/s, increments of 100 Mbps (Range 3) • 1 – 10 Gb/s, increments of 1 Gbps (Range 4) It **MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color aware" and it **MUST** have CBS ≥ 12176 Bytes
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval *T*, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_1** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_1$ **Map at $ENNI_1$** S-VLAN ID: 111 → OVC End Point: $OVC\ EP_{11}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_1** OVC End Point: $OVC\ EP_1$ — Parameters: $CIR_1\ CBS_1\ EIR_1\ EBS_1\ CF_1\ CM_1$ Note 1: CIR_1 = 3 Mbps Note 2: $CBS_1 \geq 12176$ Bytes Note 3: EIR_1, EBS_1, and CF_1 equal to 0 Note 4: CM_1 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{11}$ — Parameters: $CIR_{11}\ CBS_{11}\ EIR_{11}\ EBS_{11}\ CF_{11}\ CM_{11}$ Note 1: CIR_{11} = 3 Mbps Note 2: $CBS_{11} \geq 12176$ Bytes Note 3: EIR_{11}, EBS_{11}, and CF_{11} equal to 0 Note 4: CM_{11} in color-aware mode
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 11, CE-VLAN CoS equal to 1, S-VLAN ID equal to 111 and S-VLAN CoS equal to Green of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point ($OVC\ EP_{11}$ at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 11 and CE-VLAN CoS equal to 1 delivered at the egress OVC End Point ($OVC\ EP_1$ at UNI_1). The amount of traffic delivered at the egress $OVC\ EP_1$ at UNI_1 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval *T* that should be delivered to the egress $OVC\ EP_1$ at UNI_1 • Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 11, CE-VLAN CoS equal to 1, S-VLAN ID equal to 111 and S-VLAN CoS equal to Yellow of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point ($OVC\ EP_{11}$ at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 11 and CE-VLAN CoS equal to 1 delivered at the egress OVC End Point ($OVC\ EP_1$ at UNI_1). The amount of traffic delivered at the egress $OVC\ EP_1$ at UNI_1 must be zero
Units	Number of valid frames received at the UNI
Variables	UNI and ENNI interface speeds, ENNI Frame length λ, time interval *T*, tolerance F_{CBS} and bandwidth profile parameters CBS_1, CBS_{11}
Results	Pass or fail
Remarks	Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4

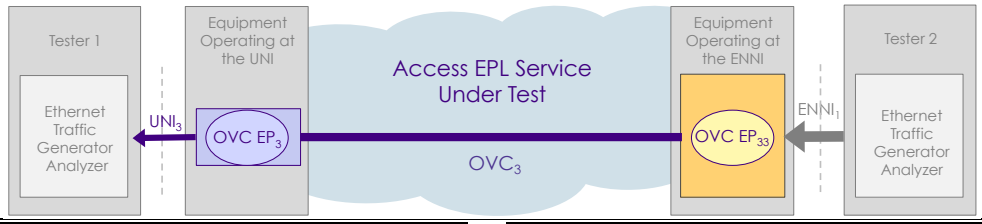
Test Case 20.1: Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 2

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 2</td></tr>
<tr><td>Test Definition ID</td><td>AEPL20_R11_R12</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R11] The CoS Identifier for ENNI Frames MUST be the OVC End Point to which the ENNI Frame is mapped; that OVC MUST have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}
[R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 30 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI2</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP2</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>222</td><td>OVC EP22</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI2</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP2</td><td>CIR2 CBS2 EIR2 EBS2 CF2 CM2</td></tr>
<tr><td colspan="2">Note 1: CIR2 = 30 Mbps
Note 2: CBS2 ≥ 12176 Bytes
Note 3: EIR2, EBS2, and CF2 equal to 0
Note 4: CM2 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP22</td><td>CIR22 CBS22 EIR22 EBS22 CF22 CM22</td></tr>
<tr><td colspan="2">Note 1: CIR22 = 30 Mbps
Note 2: CBS22 ≥ 12176 Bytes
Note 3: EIR22, EBS22, and CF22 equal to 0
Note 4: CM22 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 12, CE-VLAN CoS equal to 2, S-VLAN ID equal to 222 and S-VLAN CoS equal to Green of length λ at a constant rate greater than CIR_{22} to the ingress OVC End Point (OVC EP_{22} at $ENNI_1$) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 12 and CE-VLAN CoS equal to 2 delivered at the egress OVC End Point (OVC EP_2 at UNI_2). The amount of traffic delivered at the egress OVC EP_2 at UNI_2 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP_2 at UNI_2
• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 12, CE-VLAN CoS equal to 2, S-VLAN ID equal to 222 and S-VLAN CoS equal to Yellow of length λ at a constant rate greater than CIR_{22} to the ingress OVC End Point (OVC EP_{22} at $ENNI_1$) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 12 and CE-VLAN CoS equal to 2 delivered at the egress OVC End Point (OVC EP_2 at UNI_2). The amount of traffic delivered at the egress OVC EP_2 at UNI_2 must be zero</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the UNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, ENNI Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS_2, CBS_{22}</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

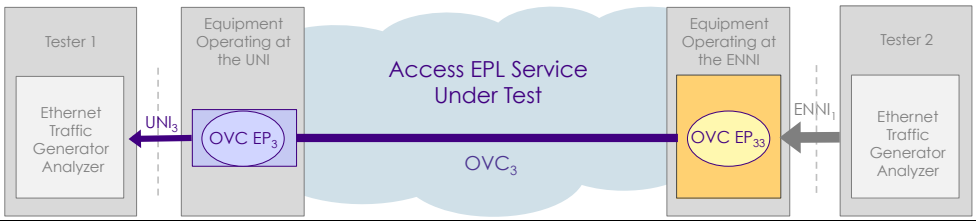
Test Case 21.1: Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 2

Abstract Test Suite for Ethernet Access Services	
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 2
Test Definition ID	AEPL21_R11_R12
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R11] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and **MUST** allow configuration to support CIR of: • 1 – 10 Mb/s, increments of 1 Mbps (Range 1) • 10 – 100 Mb/s, increments of 10 Mbps (Range 2) • 100 – 1000 Mb/s, increments of 100 Mbps (Range 3) • 1 – 10 Gb/s, increments of 1 Gbps (Range 4) It **MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color aware" and it **MUST** have CBS ≥ 12176 Bytes
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 30 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval *T*, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	Map at UNI_2: CE-VLAN ID = 1,2*…4095; OVC End Point = $OVC\ EP_2$ Map at $ENNI_1$: S-VLAN ID = 222; OVC End Point = $OVC\ EP_{22}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	Ingress Bandwidth Profile per OVC EP at UNI_2: OVC End Point = $OVC\ EP_2$; Parameters = $CIR_2\ CBS_2\ EIR_2\ EBS_2\ CF_2\ CM_2$ Note 1: CIR_2 = 30 Mbps Note 2: $CBS_2 \geq$ 12176 Bytes Note 3: EIR_2, EBS_2, and CF_2 equal to 0 Note 4: CM_2 in color-blind mode Ingress Bandwidth Profile per OVC EP at $ENNI_1$: OVC End Point = $OVC\ EP_{22}$; Parameters = $CIR_{22}\ CBS_{22}\ EIR_{22}\ EBS_{22}\ CF_{22}\ CM_{22}$ Note 1: CIR_{22} = 30 Mbps Note 2: $CBS_{22} \geq$ 12176 Bytes Note 3: EIR_{22}, EBS_{22}, and CF_{22} equal to 0 Note 4: CM_{22} in color-aware mode
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 12, CE-VLAN CoS equal to 2, S-VLAN ID equal to 222 and S-VLAN CoS equal to Green of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP_{22} at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 12 and CE-VLAN CoS equal to 2 delivered at the egress OVC End Point (OVC EP_2 at UNI_2). The amount of traffic delivered at the egress OVC EP_2 at UNI_2 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval *T* that should be delivered to the egress OVC EP_2 at UNI_2 • Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 12, CE-VLAN CoS equal to 2, S-VLAN ID equal to 222 and S-VLAN CoS equal to Yellow of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP_{22} at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 12 and CE-VLAN CoS equal to 2 delivered at the egress OVC End Point (OVC EP_2 at UNI_2). The amount of traffic delivered at the egress OVC EP_2 at UNI_2 must be zero
Units	Number of valid frames received at the UNI
Variables	UNI and ENNI interface speeds, ENNI Frame length λ, time interval *T*, tolerance F_{CBS} and bandwidth profile parameters CBS_2, CBS_{22}
Results	Pass or fail
Remarks	Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4

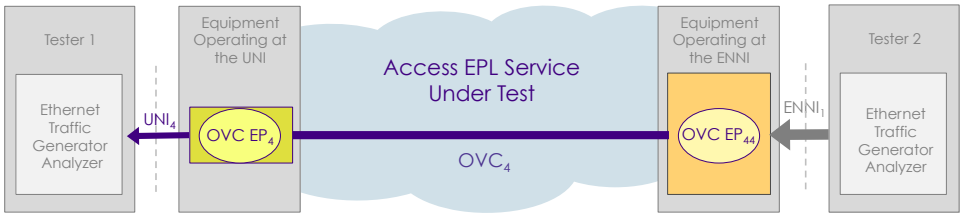
Test Case 22.1: Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 3

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 3</td></tr>
<tr><td>Test Definition ID</td><td>AEPL22_R11_R12</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R11] The CoS Identifier for ENNI Frames MUST be the OVC End Point to which the ENNI Frame is mapped; that OVC MUST have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}
[R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI3</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP3</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>333</td><td>OVC EP33</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI3</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP3</td><td>CIR3 CBS3 EIR3 EBS3 CF3 CM3</td></tr>
<tr><td colspan="2">Note 1: CIR3 = 300 Mbps
Note 2: CBS3 ≥ 12176 Bytes
Note 3: EIR3, EBS3, and CF3 equal to 0
Note 4: CM3 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP33</td><td>CIR33 CBS33 EIR33 EBS33 CF33 CM33</td></tr>
<tr><td colspan="2">Note 1: CIR33 = 300 Mbps
Note 2: CBS33 ≥ 12176 Bytes
Note 3: EIR33, EBS33, and CF33 equal to 0
Note 4: CM33 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 13, CE-VLAN CoS equal to 3, S-VLAN ID equal to 333 and S-VLAN CoS equal to Green of length λ at a constant rate greater than CIR_{33} to the ingress OVC End Point (OVC EP_{33} at $ENNI_1$) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 13 and CE-VLAN CoS equal to 3 delivered at the egress OVC End Point (OVC EP_3 at UNI_3). The amount of traffic delivered at the egress OVC EP_3 at UNI_3 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP_3 at UNI_3
• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 13, CE-VLAN CoS equal to 3, S-VLAN ID equal to 333 and S-VLAN CoS equal to Yellow of length λ at a constant rate greater than CIR_{33} to the ingress OVC End Point (OVC EP_{33} at $ENNI_1$) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 13 and CE-VLAN CoS equal to 3 delivered at the egress OVC End Point (OVC EP_3 at UNI_3). The amount of traffic delivered at the egress OVC EP_3 at UNI_3 must be zero</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the UNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, ENNI Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS_3, CBS_{33}</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

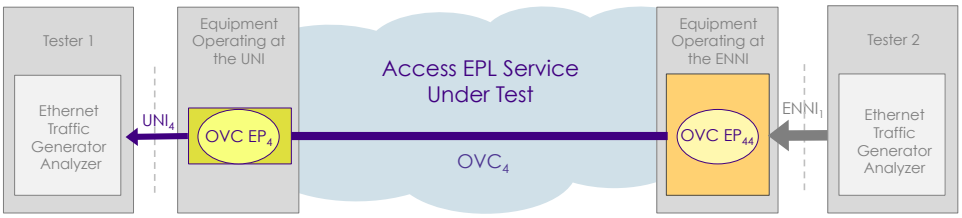
Test Case 23.1: Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 3

Abstract Test Suite for Ethernet Access Services	
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 3
Test Definition ID	AEPL23_R11_R12
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R11] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and **MUST** allow configuration to support CIR of: • 1 – 10 Mb/s, increments of 1 Mbps (Range 1) • 10 – 100 Mb/s, increments of 10 Mbps (Range 2) • 100 – 1000 Mb/s, increments of 100 Mbps (Range 3) • 1 – 10 Gb/s, increments of 1 Gbps (Range 4) It **MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color aware" and it **MUST** have CBS ≥ 12176 Bytes
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval *T*, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_3** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_3$ **Map at $ENNI_1$** S-VLAN ID: 333 → OVC End Point: $OVC\ EP_{33}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_3** OVC End Point: $OVC\ EP_3$ — Parameters: $CIR_3\ CBS_3\ EIR_3\ EBS_3\ CF_3\ CM_3$ Note 1: CIR_3 = 300 Mbps Note 2: $CBS_3 \geq$ 12176 Bytes Note 3: EIR_3, EBS_3, and CF_3 equal to 0 Note 4: CM_3 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{33}$ — Parameters: $CIR_{33}\ CBS_{33}\ EIR_{33}\ EBS_{33}\ CF_{33}\ CM_{33}$ Note 1: CIR_{33} = 300 Mbps Note 2: $CBS_{33} \geq$ 12176 Bytes Note 3: EIR_{33}, EBS_{33}, and CF_{33} equal to 0 Note 4: CM_{33} in color-aware mode
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 13, CE-VLAN CoS equal to 3, S-VLAN ID equal to 333 and S-VLAN CoS equal to Green of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP_{33} at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 13 and CE-VLAN CoS equal to 3 delivered at the egress OVC End Point (OVC EP_3 at UNI_3). The amount of traffic delivered at the egress OVC EP_3 at UNI_3 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval *T* that should be delivered to the egress OVC EP_3 at UNI_3 • Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 13, CE-VLAN CoS equal to 3, S-VLAN ID equal to 333 and S-VLAN CoS equal to Yellow of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP_{33} at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 13 and CE-VLAN CoS equal to 3 delivered at the egress OVC End Point (OVC EP_3 at UNI_3). The amount of traffic delivered at the egress OVC EP_3 at UNI_3 must be zero
Units	Number of valid frames received at the UNI
Variables	UNI and ENNI interface speeds, ENNI Frame length λ, time interval *T*, tolerance F_{CBS} and bandwidth profile parameters CBS_3, CBS_{33}
Results	Pass or fail
Remarks	Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4

Test Case 24.1: Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 4

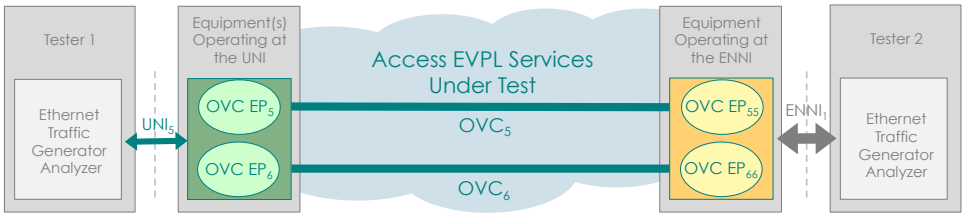
<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 4</td></tr>
<tr><td>Test Definition ID</td><td>AEPL24_R11_R12</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if the ENNI Speed is greater than 1Gbps</td></tr>
<tr><td>Requirement Description</td><td>[R11] The CoS Identifier for ENNI Frames MUST be the OVC End Point to which the ENNI Frame is mapped; that OVC MUST have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}
[R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Gbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI4</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP4</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>444</td><td>OVC EP44</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI4</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP4</td><td>CIR4 CBS4 EIR4 EBS4 CF4 CM4</td></tr>
<tr><td colspan="2">Note 1: CIR4 = 3 Gbps
Note 2: CBS4 ≥ 12176 Bytes
Note 3: EIR4, EBS4, and CF4 equal to 0
Note 4: CM4 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP44</td><td>CIR44 CBS44 EIR44 EBS44 CF44 CM44</td></tr>
<tr><td colspan="2">Note 1: CIR44 = 3 Gbps
Note 2: CBS44 ≥ 12176 Bytes
Note 3: EIR44, EBS44, and CF44 equal to 0
Note 4: CM44 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 14, CE-VLAN CoS equal to 4, S-VLAN ID equal to 444 and S-VLAN CoS equal to Green of length λ at a constant rate greater than CIR44 to the ingress OVC End Point (OVC EP44 at ENNI1) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 14 and CE-VLAN CoS equal to 4 delivered at the egress OVC End Point (OVC EP4 at UNI4). The amount of traffic delivered at the egress OVC EP4 at UNI4 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP4 at UNI4
• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 14, CE-VLAN CoS equal to 4, S-VLAN ID equal to 444 and S-VLAN CoS equal to Yellow of length λ at a constant rate greater than CIR44 to the ingress OVC End Point (OVC EP44 at ENNI1) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 14 and CE-VLAN CoS equal to 4 delivered at the egress OVC End Point (OVC EP4 at UNI4). The amount of traffic delivered at the egress OVC EP4 at UNI4 must be zero</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the UNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, ENNI Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS4, CBS44</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

Test Case 25.1: Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 4

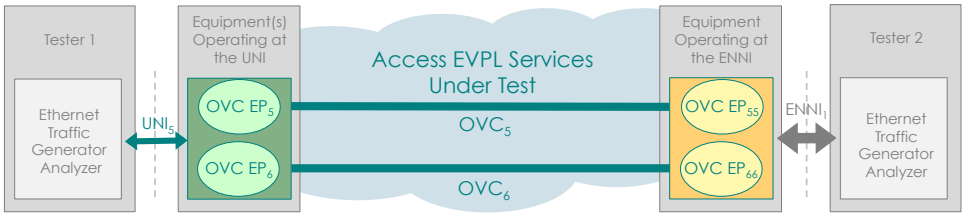
Abstract Test Suite for Ethernet Access Services	
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 4
Test Definition ID	AEPL25_R11_R12
Test Type	Conformance
Test Status	Mandatory if the ENNI Speed is greater than 1Gbps
Requirement Description	[R11] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and **MUST** allow configuration to support CIR of: • 1 – 10 Mb/s, increments of 1 Mbps (Range 1) • 10 – 100 Mb/s, increments of 10 Mbps (Range 2) • 100 – 1000 Mb/s, increments of 100 Mbps (Range 3) • 1 – 10 Gb/s, increments of 1 Gbps (Range 4) It **MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color aware" and it **MUST** have CBS ≥ 12176 Bytes
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Gbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval *T*, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_4** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_4$ **Map at $ENNI_1$** S-VLAN ID: 444 → OVC End Point: $OVC\ EP_{44}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_4** OVC End Point: $OVC\ EP_4$ — Parameters: $CIR_4\ CBS_4\ EIR_4\ EBS_4\ CF_4\ CM_4$ Note 1: CIR_4 = 3 Gbps Note 2: $CBS_4 \geq 12176$ Bytes Note 3: EIR_4, EBS_4, and CF_4 equal to 0 Note 4: CM_4 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{44}$ — Parameters: $CIR_{44}\ CBS_{44}\ EIR_{44}\ EBS_{44}\ CF_{44}\ CM_{44}$ Note 1: CIR_{44} = 3 Gbps Note 2: $CBS_{44} \geq 12176$ Bytes Note 3: EIR_{44}, EBS_{44}, and CF_{44} equal to 0 Note 4: CM_{44} in color-aware mode
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 14, CE-VLAN CoS equal to 4, S-VLAN ID equal to 444 and S-VLAN CoS equal to Green of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP_{44} at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 14 and CE-VLAN CoS equal to 4 delivered at the egress OVC End Point (OVC EP_4 at UNI_4). The amount of traffic delivered at the egress OVC EP_4 at UNI_4 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval *T* that should be delivered to the egress OVC EP_4 at UNI_4 • Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 14, CE-VLAN CoS equal to 4, S-VLAN ID equal to 444 and S-VLAN CoS equal to Yellow of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP_{44} at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 14 and CE-VLAN CoS equal to 4 delivered at the egress OVC End Point (OVC EP_4 at UNI_4). The amount of traffic delivered at the egress OVC EP_4 at UNI_4 must be zero
Units	Number of valid frames received at the UNI
Variables	UNI and ENNI interface speeds, ENNI Frame length λ, time interval *T*, tolerance F_{CBS} and bandwidth profile parameters CBS_4, CBS_{44}
Results	Pass or fail
Remarks	Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4

11.1 Test Cases for Access EVPL – Operator Service Attributes

Test Case 1.2: CE-VLAN ID For Untagged and Priority Tagged Frames

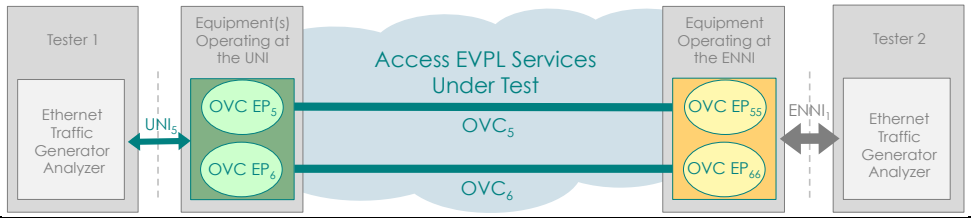
Abstract Test Suite for Ethernet Access Services	
Test Name	CE-VLAN ID For Untagged and Priority Tagged Frames
Test Definition ID	AEVPL1_R21_R22_R23_R25_R35
Test Type	Conformance
Test Status	Mandatory if untagged and priority tagged frames are supported
Requirement Description	[R21] For an Access EVPL service, the CE-VLAN ID for untagged and priority tagged frames **MUST** be specified if untagged / priority tagged frames are to be supported, and that CE-VLAN ID **MUST** be included in the OVC End point Map [R25] For an Access EVPL service, the OVC EP Map **MUST** specify mapping table of CE-VLAN ID to OVC EP and it **MUST NOT** contain all CE-VLAN ID values mapped to a single OVC [R22] The Maximum number of OVCs per UNI **MUST** be ≥ 1 [R23] Maximum number of CE-VLAN IDs per OVC: The end point Map **MUST** support a value = 1 [R35] Each S-VLAN ID value associated with an instance of Access EVPL Service **MUST** map to a distinct End Point, of Type = "OVC"
Test Object	Verify that if untagged and priority tagged frames are supported for an Access EVPL service, the CE-VLAN ID for untagged and priority tagged frames is specified and included in the OVC End point Map
Test Configuration	At least two OVCs, each one associating one OVC EP at the UNI and one OVC EP at the ENNI are configured. One CE-VLAN ID is mapped to each OVC EP at the UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_5** CE-VLAN ID: 15* → OVC End Point: $OVC\ EP_5$ CE-VLAN ID: 16 → OVC End Point: $OVC\ EP_6$ **Map at $ENNI_1$** S-VLAN ID: 555 → OVC End Point: $OVC\ EP_{55}$ S-VLAN ID: 666 → OVC End Point: $OVC\ EP_{66}$ Note: Use of other S-VLAN IDs at the ENNI, use of other CE-VLAN IDs at the UNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_5** $OVC\ EP_5$: $CIR_5\ CBS_5\ EIR_5\ EBS_5\ CF_5\ CM_5$ $OVC\ EP_6$: $CIR_6\ CBS_6\ EIR_6\ EBS_6\ CF_6\ CM_6$ Note 1: CIR_5 = 3 Mbps and CIR_6 = 30 Mbps Note 2: $CBS_5 \geq$ 12176 Bytes and $CBS_6 \geq$ 12176 Bytes Note 3: EIR_5, EIR_6, EBS_5, EBS_6, CF_5 and CF_6 equal to 0 Note 4: CM_5 and CM_6 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** $OVC\ EP_{55}$: $CIR_{55}\ CBS_{55}\ EIR_{55}\ EBS_{55}\ CF_{55}\ CM_{55}$ $OVC\ EP_{66}$: $CIR_{66}\ CBS_{66}\ EIR_{66}\ EBS_{66}\ CF_{66}\ CM_{66}$ Note 1: CIR_{55} = 3 Mbps and CIR_{66} = 30 Mbps Note 2: $CBS_{55} \geq$ 12176 Bytes and $CBS_{66} \geq$ 12176 Bytes Note 3: EIR_{55}, EIR_{66}, EBS_{55}, EBS_{66}, CF_{55} and CF_{66} equal to 0 Note 4: CM_{55} and CM_{66} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers untagged and priority tagged Service Frames at UNI_5 configured in OVC_5 • Tester 2 verifies that the untagged Service Frames offered at UNI_5 are delivered single-tagged with S-VLAN ID equal to 555 and that the priority tagged Service Frames offered at UNI_5 are delivered double-tagged with CE-VLAN ID equal to 0 and S-VLAN ID equal to 555 at $ENNI_1$ configured in OVC_5 • Tester 2 offers single-tagged ENNI Frames with S-VLAN ID equal to 555 and double-tagged ENNI frames with CE-VLAN ID equal to 0 and S-VLAN ID equal to 555 at $ENNI_1$ configured in OVC_5 • Tester 1 verifies that the single-tagged ENNI Frames with S-VLAN ID equal to 555 are delivered untagged at UNI_5 configured in OVC_5 and that the double-tagged ENNI frames with CE-VLAN ID equal to 0 and S-VLAN ID equal to 555 are delivered with CE-VLAN ID equal to 0 at UNI_5 configured in OVC_5
Units	CE-VLAN ID and S-VLAN ID values
Variables	UNI and ENNI interface speeds and bandwidth profile parameters CBS_5, CBS_6, CBS_{55}, CBS_{66}
Results	Pass or fail
Remarks	C-tag and S-tag formats are specified in IEEE 802.1ad sections 9.5, 9.6 and 9.7

Test Case 2.2: Maximum Number of CE-VLAN IDs per OVC

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Maximum Number of CE-VLAN IDs per OVC</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL2_R22_R24_R25_R35</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if the maximum number of OVCs per UNI is greater than 1</td></tr>
<tr><td>Requirement Description</td><td>[R24] Maximum number of CE-VLAN IDs per OVC for an Access EVPL Service: The end point Map SHOULD support a value > 1
[R25] For an Access EVPL service, the OVC EP Map MUST specify mapping table of CE-VLAN ID to OVC EP and it MUST NOT contain all CE-VLAN ID values mapped to a single OVC
[R22] The Maximum number of OVCs per UNI MUST be ≥ 1
[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = “OVC”</td></tr>
<tr><td>Test Object</td><td>Verify that for an Access EVPL service, the Maximum number of CE-VLAN IDs mapped to the OVC EP is > 1</td></tr>
<tr><td>Test Configuration</td><td>At least two OVCs, each one associating one OVC EP at the UNI and one OVC EP at the ENNI are configured. One CE-VLAN ID is mapped to each OVC EP at the UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>X5…Y5</td><td>OVC EP5</td></tr>
<tr><td>X6…Y6</td><td>OVC EP6</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>555</td><td>OVC EP55</td></tr>
<tr><td>666</td><td>OVC EP66</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN IDs at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP5</td><td>CIR5 CBS5 EIR5 EBS5 CF5 CM5</td></tr>
<tr><td>OVC EP6</td><td>CIR6 CBS6 EIR6 EBS6 CF6 CM6</td></tr>
<tr><td colspan="2">Note 1: CIR5 = 3 Mbps and CIR6 = 30 Mbps
Note 2: CBS5 ≥ 12176 Bytes and CBS6 ≥ 12176 Bytes
Note 3: EIR5, EIR6, EBS5, EBS6, CF5 and CF6 equal to 0
Note 4: CM5 and CM6 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP55</td><td>CIR55 CBS55 EIR55 EBS55 CF55 CM55</td></tr>
<tr><td>OVC EP66</td><td>CIR66 CBS66 EIR66 EBS66 CF66 CM66</td></tr>
<tr><td colspan="2">Note 1: CIR55 = 3 Mbps and CIR66 = 30 Mbps
Note 2: CBS55 ≥ 12176 Bytes and CBS66 ≥ 12176 Bytes
Note 3: EIR55, EIR66, EBS55, EBS66, CF55 and CF66 equal to 0
Note 4: CM55 and CM66 in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>

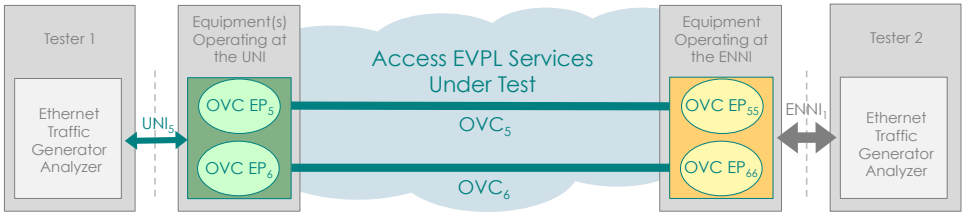
Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to X5…Y5 at UNI5 configured in OVC5 and C-tagged Service Frames with CE-VLAN ID equal to X6…Y6 at UNI5 configured in OVC6
Tester 2 verifies that all the C-tagged Service Frames with CE-VLAN ID equal to X5…Y5 offered at UNI5 are delivered double-tagged with S-VLAN ID equal to 555 at ENNI1 configured in OVC5. Tester 2 also verifies that all the C-tagged Service Frames with CE-VLAN ID equal to X6…Y6 offered at UNI5 are delivered double-tagged with S-VLAN ID equal to 666 at ENNI1 configured in OVC6
Tester 2 offers double-tagged ENNI frames with CE-VLAN ID equal to equal to X5…Y5 and S-VLAN ID equal to 555 at ENNI1 configured in OVC5. Tester 2 also offers double-tagged ENNI frames with CE-VLAN ID equal to equal to X6…Y6 and S-VLAN ID equal to 666 at ENNI1 configured in OVC6
Tester 1 verifies that all the ENNI Frames with S-VLAN ID 555 offered at ENNI1 configured in OVC5 are received C-tagged with CE-VLAN ID equal to equal to X5…Y5 at UNI5. Tester 1 also verifies that all the ENNI Frames with S-VLAN ID 666 offered at ENNI1 configured in OVC6 are received C-tagged with CE-VLAN ID equal to equal to X6…Y6 at UNI5
</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the external interfaces</td></tr>
<tr><td>Variables</td><td>Maximum number of CE-VLAN IDs per OVC, UNI and ENNI interface speeds and bandwidth profile parameters CBS5, CBS6, CBS55, CBS66</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>The maximum number of CE-VLAN IDs per OVC is to be provided by the Operator</td></tr>
</table>

Test Case 3.2: OVC Maximum Transmission Unit Size

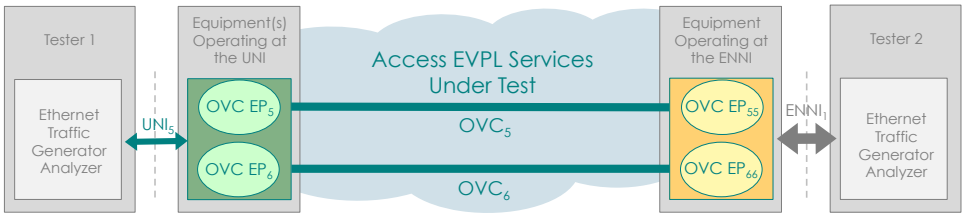
<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>OVC Maximum Transmission Unit Size</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL3_R22_R23_R25_R28_R35</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R28] For an Access EVPL service, the OVC Maximum Transmission Unit Size MUST be integer number of bytes ≥1526
[R25] For an Access EVPL service, the OVC EP Map MUST specify mapping table of CE-VLAN ID to OVC EP and it MUST NOT contain all CE-VLAN ID values mapped to a single OVC
[R22] The Maximum number of OVCs per UNI MUST be ≥ 1
[R23] Maximum number of CE-VLAN IDs per OVC: The end point Map MUST support a value = 1
[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = “OVC”</td></tr>
<tr><td>Test Object</td><td>Verify that for an Access EVPL service, the OVC Maximum Transmission Unit Size is an integer number of bytes ≥1526</td></tr>
<tr><td>Test Configuration</td><td>At least two OVCs, each one associating one OVC EP at the UNI and one OVC EP at the ENNI are configured. One CE-VLAN ID is mapped to each OVC EP at the UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI$_5$</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>15</td><td>OVC EP$_5$</td></tr>
<tr><td>16</td><td>OVC EP$_6$</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI$_1$</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>555</td><td>OVC EP$_{55}$</td></tr>
<tr><td>666</td><td>OVC EP$_{66}$</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and use of other CE-VLAN IDs at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI$_5$</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP$_5$</td><td>CIR$_5$ CBS$_5$ EIR$_5$ EBS$_5$ CF$_5$ CM$_5$</td></tr>
<tr><td>OVC EP$_6$</td><td>CIR$_6$ CBS$_6$ EIR$_6$ EBS$_6$ CF$_6$ CM$_6$</td></tr>
<tr><td colspan="2">Note 1: CIR$_5$ = 3 Mbps and CIR$_6$ = 30 Mbps
Note 2: CBS$_5$ ≥ 12176 Bytes and CBS$_6$ ≥ 12176 Bytes
Note 3: EIR$_5$, EIR$_6$, EBS$_5$, EBS$_6$, CF$_5$ and CF$_6$ equal to 0
Note 4: CM$_5$ and CM$_6$ in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI$_1$</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP$_{55}$</td><td>CIR$_{55}$ CBS$_{55}$ EIR$_{55}$ EBS$_{55}$ CF$_{55}$ CM$_{55}$</td></tr>
<tr><td>OVC EP$_{66}$</td><td>CIR$_{66}$ CBS$_{66}$ EIR$_{66}$ EBS$_{66}$ CF$_{66}$ CM$_{66}$</td></tr>
<tr><td colspan="2">Note 1: CIR$_{55}$ = 3 Mbps and CIR$_{66}$ = 30 Mbps
Note 2: CBS$_{55}$ ≥ 12176 Bytes and CBS$_{66}$ ≥ 12176 Bytes
Note 3: EIR$_{55}$, EIR$_{66}$, EBS$_{55}$, EBS$_{66}$, CF$_{55}$ and CF$_{66}$ equal to 0
Note 4: CM$_{55}$ and CM$_{66}$ in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>

Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 15 and frame size equal to the OVC$_5$ MTU size at UNI$_5$ configured in OVC$_5$ and C-tagged Service Frames with CE-VLAN ID equal to 16 and frame size equal to the OVC$_6$ MTU size at UNI$_5$ configured in OVC$_6$
Tester 2 verifies that all the C-tagged Service Frames with CE-VLAN ID equal to 15 offered at UNI$_5$ are delivered double-tagged with CE-VLAN ID equal to 15 and S-VLAN ID equal to 555 at ENNI$_1$ configured in OVC$_5$. Tester 2 also verifies that all the C-tagged Service Frames with CE-VLAN ID equal to 16 offered at UNI$_5$ are delivered double-tagged with CE-VLAN ID equal to 16 and S-VLAN ID equal to 666 at ENNI$_1$ configured in OVC$_6$
Tester 2 offers double-tagged ENNI frames with CE-VLAN ID equal to 15, S-VLAN ID equal to 555 and frame size equal to the OVC$_5$ MTU size at ENNI$_1$ configured in OVC$_5$. Tester 2 also offers double-tagged ENNI frames with CE-VLAN ID equal to 16, S-VLAN ID equal to 666 and frame size equal to the OVC$_6$ MTU size at ENNI$_1$ configured in OVC$_6$
Tester 1 verifies that all the ENNI Frames with S-VLAN ID 555 offered at ENNI$_1$ configured in OVC$_5$ are received C-tagged with CE-VLAN ID equal to 15 at UNI$_5$. Tester 1 also verifies that all the ENNI Frames with S-VLAN ID 666 offered at ENNI$_1$ configured in OVC$_6$ are received C-tagged with CE-VLAN ID equal to 16 at UNI$_5$
</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the external interfaces</td></tr>
<tr><td>Variables</td><td>OVC MTU size, UNI and ENNI interface speeds and bandwidth profile parameters CBS$_5$, CBS$_6$, CBS$_{55}$, CBS$_{66}$</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: OVC MTU size of the services under test are to be provided by the Operator
Note 2: The OVC MTU size MUST be ≤ to the MTU size of each External Interface where an OVC EP exists that is associated by the OVC</td></tr>
</table>

Test Case 4.2: CE-VLAN ID Preservation

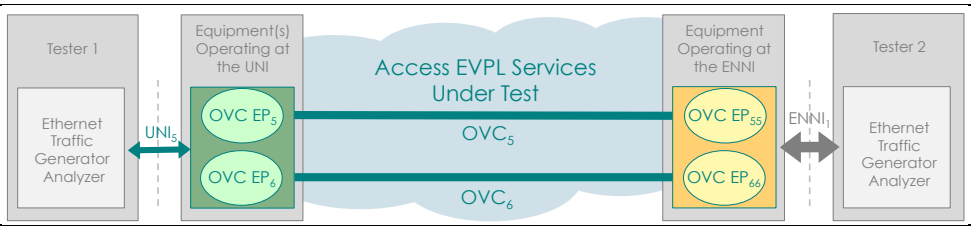
Abstract Test Suite for Ethernet Access Services	
Test Name	CE-VLAN ID Preservation
Test Definition ID	AEVPL4_R22_R23_R25_R29_R35
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R29] For an Access EVPL service, CE-VLAN ID Preservation **MUST** be Yes [R25] For an Access EVPL service, the OVC EP Map **MUST** specify mapping table of CE-VLAN ID to OVC EP and it **MUST NOT** contain all CE-VLAN ID values mapped to a single OVC [R22] The Maximum number of OVCs per UNI **MUST** be ≥ 1 [R23] Maximum number of CE-VLAN IDs per OVC: The end point Map **MUST** support a value = 1 [R35] Each S-VLAN ID value associated with an instance of Access EVPL Service **MUST** map to a distinct End Point, of Type = "OVC"
Test Object	Verify that for an Access EVPL service, all CE-VLAN IDs mapped to the OVC are preserved
Test Configuration	At least two OVCs, each one associating one OVC EP at the UNI and one OVC EP at the ENNI are configured. One CE-VLAN ID is mapped to each OVC EP at the UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_5** CE-VLAN ID: 15 → OVC End Point: $OVC\ EP_5$ CE-VLAN ID: 16 → OVC End Point: $OVC\ EP_6$ **Map at $ENNI_1$** S-VLAN ID: 555 → OVC End Point: $OVC\ EP_{55}$ S-VLAN ID: 666 → OVC End Point: $OVC\ EP_{66}$ Note: Use of other S-VLAN IDs at the ENNI and use of other CE-VLAN IDs at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_5** OVC End Point: $OVC\ EP_5$ → Parameters: $CIR_5\ CBS_5\ EIR_5\ EBS_5\ CF_5\ CM_5$ OVC End Point: $OVC\ EP_6$ → Parameters: $CIR_6\ CBS_6\ EIR_6\ EBS_6\ CF_6\ CM_6$ Note 1: CIR_5 = 3 Mbps and CIR_6 = 30 Mbps Note 2: $CBS_5 \geq$ 12176 Bytes and $CBS_6 \geq$ 12176 Bytes Note 3: EIR_5, EIR_6, EBS_5, EBS_6, CF_5 and CF_6 equal to 0 Note 4: CM_5 and CM_6 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{55}$ → Parameters: $CIR_{55}\ CBS_{55}\ EIR_{55}\ EBS_{55}\ CF_{55}\ CM_{55}$ OVC End Point: $OVC\ EP_{66}$ → Parameters: $CIR_{66}\ CBS_{66}\ EIR_{66}\ EBS_{66}\ CF_{66}\ CM_{66}$ Note 1: CIR_{55} = 3 Mbps and CIR_{66} = 30 Mbps Note 2: $CBS_{55} \geq$ 12176 Bytes and $CBS_{66} \geq$ 12176 Bytes Note 3: EIR_{55}, EIR_{66}, EBS_{55}, EBS_{66}, CF_{55} and CF_{66} equal to 0 Note 4: CM_{55} and CM_{66} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 15 at UNI_5 configured in OVC_5 and C-tagged Service Frames with CE-VLAN ID equal to 16 at UNI_5 configured in OVC_6 • Tester 2 verifies that the C-tagged Service Frames offered with CE-VLAN ID equal to 15 at UNI_5 are delivered double-tagged with CE-VLAN ID equal to 15 and S-VLAN ID equal to 555 at $ENNI_1$ configured in OVC_5. Tester 2 also verifies that the C-tagged Service Frames offered with CE-VLAN ID equal to 16 at UNI_5 are delivered double-tagged with CE-VLAN ID equal to 16 and S-VLAN ID equal to 666 at $ENNI_1$ configured in OVC_6 • Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 15 and S-VLAN ID equal to 555 at $ENNI_1$ configured in OVC_5 and double-tagged ENNI Frames with CE-VLAN IDs equal to 16 and S-VLAN ID equal to 666 at the $ENNI_1$ configured in OVC_6 • Tester 1 verifies that the ENNI Frames offered at $ENNI_1$ double-tagged with CE-VLAN ID equal to 15 and S-VLAN ID equal to 555 are received C-tagged at UNI_5 configured in OVC_5 with CE-VLAN ID equal to 15 and that the ENNI Frames offered at $ENNI_1$ double-tagged with CE-VLAN ID equal to 16 and S-VLAN ID equal to 666 are received C-tagged at UNI_5 configured in OVC_6 with CE-VLAN ID equal to 16
Units	CE-VLAN ID and S-VLAN ID values
Variables	UNI and ENNI interface speeds and bandwidth profile parameters CBS_5, CBS_6, CBS_{55}, CBS_{66}
Results	Pass or fail
Remarks	C-tag and S-tag formats are specified in IEEE 802.1ad sections 9.5, 9.6 and 9.7

Test Case 5.2: CE-VLAN CoS ID Value Preservation

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>CE-VLAN CoS ID Value Preservation</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL5_R22_R23_R25_R30_R35</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R30] For an Access EVPL service, CE-VLAN CoS ID Value Preservation MUST be Yes
[R25] For an Access EVPL service, the OVC EP Map MUST specify mapping table of CE-VLAN ID to OVC EP and it MUST NOT contain all CE-VLAN ID values mapped to a single OVC
[R22] The Maximum number of OVCs per UNI MUST be ≥ 1
[R23] Maximum number of CE-VLAN IDs per OVC: The end point Map MUST support a value = 1
[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = “OVC”</td></tr>
<tr><td>Test Object</td><td>Verify that for an Access EVPL service, the CE-VLAN CoS are preserved</td></tr>
<tr><td>Test Configuration</td><td>At least two OVCs, each one associating one OVC EP at a UNI and one OVC EP at the ENNI are configured. One CE-VLAN ID with all CE-VLAN CoS values is mapped to each OVC EP at the UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><th>CE-VLAN ID</th><th>OVC End Point</th></tr>
<tr><td>15</td><td>OVC EP5</td></tr>
<tr><td>16</td><td>OVC EP6</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><th>S-VLAN ID</th><th>OVC End Point</th></tr>
<tr><td>555</td><td>OVC EP55</td></tr>
<tr><td>666</td><td>OVC EP66</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and use of other CE-VLAN IDs at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><th>OVC End Point</th><th>Parameters</th></tr>
<tr><td>OVC EP5</td><td>CIR5 CBS5 EIR5 EBS5 CF5 CM5</td></tr>
<tr><td>OVC EP6</td><td>CIR6 CBS6 EIR6 EBS6 CF6 CM6</td></tr>
<tr><td colspan="2">Note 1: CIR5 = 3 Mbps and CIR6 = 30 Mbps
Note 2: CBS5 ≥ 12176 Bytes and CBS6 ≥ 12176 Bytes
Note 3: EIR5, EIR6, EBS5, EBS6, CF5 and CF6 equal to 0
Note 4: CM5 and CM6 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><th>OVC End Point</th><th>Parameters</th></tr>
<tr><td>OVC EP55</td><td>CIR55 CBS55 EIR55 EBS55 CF55 CM55</td></tr>
<tr><td>OVC EP66</td><td>CIR66 CBS66 EIR66 EBS66 CF66 CM66</td></tr>
<tr><td colspan="2">Note 1: CIR55 = 3 Mbps and CIR66 = 30 Mbps
Note 2: CBS55 ≥ 12176 Bytes and CBS66 ≥ 12176 Bytes
Note 3: EIR55, EIR66, EBS55, EBS66, CF55 and CF66 equal to 0
Note 4: CM55 and CM66 in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>

Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 15 and CE-VLAN CoS equal to 0,1,2…7 at UNI5 configured in OVC5 and C-tagged Service Frames with CE-VLAN ID equal to 16 and CE-VLAN CoS equal to 0,1,2…7 at UNI5 configured in OVC6
Tester 2 verifies that the C-tagged Service Frames offered at UNI5 with CE-VLAN ID equal to 15 and CE-VLAN CoS equal to 0,1,2…7 are delivered double-tagged with CE-VLAN ID equal to 15, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 555 at ENNI1 configured in OVC5. Tester 2 also verifies that the C-tagged Service Frames offered at UNI5 with CE-VLAN ID equal to 16 and CE-VLAN CoS equal to 0,1,2…7 are delivered double-tagged with CE-VLAN ID equal to 16, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 666 at ENNI1 configured in OVC6
Tester 2 offers double-tagged ENNI Frames with with CE-VLAN ID equal to 15 and CE-VLAN CoS equal to 0,1,2...7 and S-VLAN ID equal to 555 at ENNI1 configured in OVC5 and double-tagged ENNI Frames with CE-VLAN ID equal to 16 and CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 666 at the ENNI1 configured in OVC6
Tester 1 verifies that the ENNI Frames offered at ENNI1 double-tagged with CE-VLAN ID equal to 15 and CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 555 are received C-tagged at UNI5 configured in OVC5 with CE-VLAN ID equal to 15 and CE-VLAN CoS equal to 0,1,2…7 and that the ENNI Frames offered at ENNI1 double-tagged with CE-VLAN ID equal to 16 and CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 666 are received C-tagged at UNI5 configured in OVC6 with CE-VLAN ID equal to 16 and CE-VLAN CoS equal to 0,1,2…7
</td></tr>
<tr><td>Units</td><td>CE-VLAN ID, CE-VLAN CoS and S-VLAN ID values</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds and bandwidth profile parameters CBS5, CBS6, CBS55, CBS66</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>C-tag and S-VLAN ID formats are specified in IEEE 802.1ad sections 9.5, 9.6 and 9.7</td></tr>
</table>

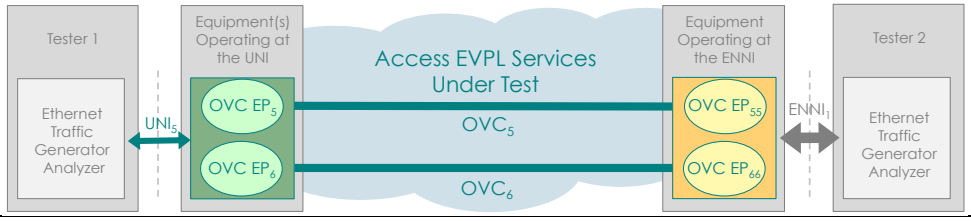
Test Case 6.2: Unicast, Multicast and Broadcast Unconditional Frame Delivery

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Unicast, Multicast and Broadcast Unconditional Frame Delivery</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL6_R22_R23_R25_R32_R35</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R32] For an Access EVPL service, deliver unicast, multicast and broadcast frames unconditionally or deliver them conditionally. If delivered conditionally, MUST specify the delivery criteria.
[R25] For an Access EVPL service, the OVC EP Map MUST specify mapping table of CE-VLAN ID to OVC EP and it MUST NOT contain all CE-VLAN ID values mapped to a single OVC
[R22] The Maximum number of OVCs per UNI MUST be ≥ 1
[R23] Maximum number of CE-VLAN IDs per OVC: The end point Map MUST support a value = 1
[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = “OVC”</td></tr>
<tr><td>Test Object</td><td>Verify that for an Access EVPL service, the unicast, multicast and broadcast frames are delivered unconditionally</td></tr>
<tr><td>Test Configuration</td><td>At least two OVCs, each one associating one OVC EP at the UNI and one OVC EP at the ENNI are configured. One CE-VLAN ID is mapped to each OVC EP at the UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>15</td><td>OVC EP5</td></tr>
<tr><td>16</td><td>OVC EP6</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>555</td><td>OVC EP55</td></tr>
<tr><td>666</td><td>OVC EP66</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and use of other CE-VLAN IDs at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP5</td><td>CIR5 CBS5 EIR5 EBS5 CF5 CM5</td></tr>
<tr><td>OVC EP6</td><td>CIR6 CBS6 EIR6 EBS6 CF6 CM6</td></tr>
<tr><td colspan="2">Note 1: CIR5 = 3 Mbps and CIR6 = 30 Mbps
Note 2: CBS5 ≥ 12176 Bytes and CBS6 ≥ 12176 Bytes
Note 3: EIR5, EIR6, EBS5, EBS6, CF5 and CF6 equal to 0
Note 4: CM5 and CM6 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP55</td><td>CIR55 CBS55 EIR55 EBS55 CF55 CM55</td></tr>
<tr><td>OVC EP66</td><td>CIR66 CBS66 EIR66 EBS66 CF66 CM66</td></tr>
<tr><td colspan="2">Note 1: CIR55 = 3 Mbps and CIR66 = 30 Mbps
Note 2: CBS55 ≥ 12176 Bytes and CBS66 ≥ 12176 Bytes
Note 3: EIR55, EIR66, EBS55, EBS66, CF55 and CF66 equal to 0
Note 4: CM55 and CM66 in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>

Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 15 with unicast, multicast and broadcast destination address at UNI5 configured in OVC5 and C-tagged Service Frames with CE-VLAN ID equal to 16 with unicast, multicast and broadcast destination address at UNI5 configured in OVC6
Tester 2 verifies that all the unicast, multicast and broadcast C-tagged Service Frames with CE-VLAN ID equal to 15 offered at UNI5 are delivered double-tagged with CE-VLAN ID equal to 15 and S-VLAN ID equal to 555 at ENNI1 configured in OVC5. Tester 2 also verifies that all the unicast, multicast and broadcast C-tagged Service Frames with CE-VLAN ID 16 offered at UNI5 are delivered double-tagged with CE-VLAN ID equal to 16 and S-VLAN ID equal to 666 at ENNI1 configured in OVC6
Tester 2 offers unicast, multicast and broadcast double-tagged ENNI frames with CE-VLAN ID equal to 15 and S-VLAN ID equal to 555 at ENNI1 configured in OVC5. Tester 2 also offers unicast, multicast and broadcast double-tagged ENNI frames with CE-VLAN ID equal to 16 and S-VLAN ID equal to 666 at ENNI1 configured in OVC6
Tester 1 verifies that all the unicast, multicast and broadcast ENNI Frames with S-VLAN ID 555 offered at ENNI1 configured in OVC5 are received C-tagged with CE-VLAN ID equal to 15 at UNI5. Tester 1 also verifies that all the unicast, multicast and broadcast ENNI Frames with S-VLAN ID 666 offered at ENNI1 configured in OVC6 are received C-tagged with CE-VLAN ID equal to 16 at UNI5
</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the external interfaces</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds and bandwidth profile parameters CBS5, CBS6, CBS55, CBS66</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>The multicast frames MUST NOT be Layer 2 Control Protocol frames</td></tr>
</table>

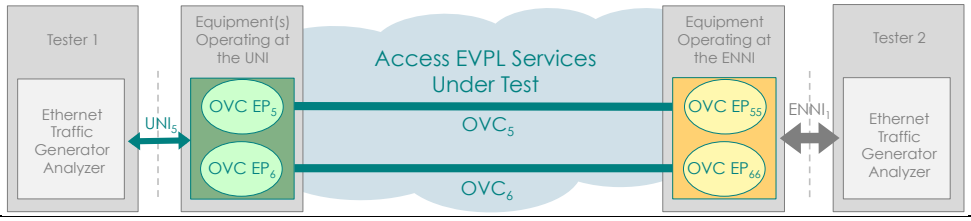
11.2 Test Cases for Access EVPL – Service OAM Frames Handling

Test Case 7.2: Service OAM Connectivity Check Messages (CCM) Handling

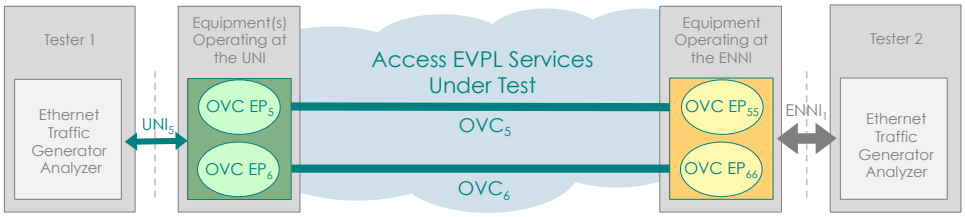
<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Service OAM Connectivity Check Messages (CCM) Handling</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL7_R22_R23_R25_R35_R36</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if untagged and priority tagged frames are supported</td></tr>
<tr><td>Requirement Description</td><td>[R36] The Access EVPL Service MUST be configurable to tunnel all SOAM frames at the default Test and Subscriber MEG levels as defined in the SOAM FM IA (MEF 30) document, section 7.1
[R25] For an Access EVPL service, the OVC EP Map MUST specify mapping table of CE-VLAN ID to OVC EP and it MUST NOT contain all CE-VLAN ID values mapped to a single OVC
[R22] The Maximum number of OVCs per UNI MUST be ≥ 1
[R23] Maximum number of CE-VLAN IDs per OVC: The end point Map MUST support a value = 1
[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = “OVC”</td></tr>
<tr><td>Test Object</td><td>Verify that for an Access EVPL service, CCM frames are tunneled at the default Test, and Subscriber MEG levels as defined in the SOAM FM IA (MEF 30), section 7.1</td></tr>
<tr><td>Test Configuration</td><td>At least two OVCs, each one associating one OVC EP at the UNI and one OVC EP at the ENNI are configured. One CE-VLAN ID is mapped to each OVC EP at the UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>15*</td><td>OVC EP5</td></tr>
<tr><td>16</td><td>OVC EP6</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>555</td><td>OVC EP55</td></tr>
<tr><td>666</td><td>OVC EP66</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI, use of other CE-VLAN IDs at the UNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP5</td><td>CIR5 CBS5 EIR5 EBS5 CF5 CM5</td></tr>
<tr><td>OVC EP6</td><td>CIR6 CBS6 EIR6 EBS6 CF6 CM6</td></tr>
<tr><td colspan="2">Note 1: CIR5 = 3 Mbps and CIR6 = 30 Mbps
Note 2: CBS5 ≥ 12176 Bytes and CBS6 ≥ 12176 Bytes
Note 3: EIR5, EIR6, EBS5, EBS6, CF5 and CF6 equal to 0
Note 4: CM5 and CM6 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP55</td><td>CIR55 CBS55 EIR55 EBS55 CF55 CM55</td></tr>
<tr><td>OVC EP66</td><td>CIR66 CBS66 EIR66 EBS66 CF66 CM66</td></tr>
<tr><td colspan="2">Note 1: CIR55 = 3 Mbps and CIR66 = 30 Mbps
Note 2: CBS55 ≥ 12176 Bytes and CBS66 ≥ 12176 Bytes
Note 3: EIR55, EIR66, EBS55, EBS66, CF55 and CF66 equal to 0
Note 4: CM55 and CM66 in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>

Tester 1 offers untagged CCM messages at MEG level 5 and 6 at UNI5 configured in OVC5
Tester 2 verifies that all the untagged CCM messages at MEG level 5 and 6 offered at UNI5 are delivered single-tagged with S-VLAN ID equal to 555 at ENNI1 configured in OVC5
Tester 2 offers single-tagged CCM messages at MEG level 5 and 6 with S-VLAN ID equal to 555 at ENNI1 configured in OVC5
Tester 1 verifies that all the single-tagged CCM messages at MEG level 5 and 6 with S-VLAN ID equal to 555 offered at ENNI1 are received untagged at UNI5 configured in OVC5
</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the external interfaces</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds and bandwidth profile parameters CBS5, CBS6, CBS55, CBS66</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td></td></tr>
</table>

Test Case 8.2: Service OAM Linktrace Messages (LTM/LTR) Handling

Abstract Test Suite for Ethernet Access Services	
Test Name	Service OAM Linktrace Messages (LTM/LTR) Handling
Test Definition ID	AEVPL8_R22_R23_R25_R35_R36
Test Type	Conformance
Test Status	Mandatory if untagged and priority tagged frames are supported
Requirement Description	[R36] The Access EVPL Service **MUST** be configurable to tunnel all SOAM frames at the default **Test** and **Subscriber** MEG levels as defined in the SOAM FM IA (MEF 30) document, section 7.1 [R25] For an Access EVPL service, the OVC EP Map **MUST** specify mapping table of CE-VLAN ID to OVC EP and it **MUST NOT** contain all CE-VLAN ID values mapped to a single OVC [R22] The Maximum number of OVCs per UNI **MUST** be ≥ 1 [R23] Maximum number of CE-VLAN IDs per OVC: The end point Map **MUST** support a value = 1 [R35] Each S-VLAN ID value associated with an instance of Access EVPL Service **MUST** map to a distinct End Point, of Type = "OVC"
Test Object	Verify that for an Access EVPL service, LTM and LTR frames are tunneled at the default Test, and Subscriber MEG levels as defined in the SOAM FM IA (MEF 30), section 7.1
Test Configuration	At least two OVCs, each one associating one OVC EP at the UNI and one OVC EP at the ENNI are configured. One CE-VLAN ID is mapped to each OVC EP at the UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_5** CE-VLAN ID: 15* → OVC End Point: $OVC\ EP_5$ CE-VLAN ID: 16 → OVC End Point: $OVC\ EP_6$ **Map at $ENNI_1$** S-VLAN ID: 555 → OVC End Point: $OVC\ EP_{55}$ S-VLAN ID: 666 → OVC End Point: $OVC\ EP_{66}$ Note: Use of other S-VLAN IDs at the ENNI, use of other CE-VLAN IDs at the UNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_5** OVC End Point: $OVC\ EP_5$ → Parameters: $CIR_5\ CBS_5\ EIR_5\ EBS_5\ CF_5\ CM_5$ OVC End Point: $OVC\ EP_6$ → Parameters: $CIR_6\ CBS_6\ EIR_6\ EBS_6\ CF_6\ CM_6$ Note 1: CIR_5 = 3 Mbps and CIR_6 = 30 Mbps Note 2: $CBS_5 \geq 12176$ Bytes and $CBS_6 \geq 12176$ Bytes Note 3: EIR_5, EIR_6, EBS_5, EBS_6, CF_5 and CF_6 equal to 0 Note 4: CM_5 and CM_6 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{55}$ → Parameters: $CIR_{55}\ CBS_{55}\ EIR_{55}\ EBS_{55}\ CF_{55}\ CM_{55}$ OVC End Point: $OVC\ EP_{66}$ → Parameters: $CIR_{66}\ CBS_{66}\ EIR_{66}\ EBS_{66}\ CF_{66}\ CM_{66}$ Note 1: CIR_{55} = 3 Mbps and CIR_{66} = 30 Mbps Note 2: $CBS_{55} \geq 12176$ Bytes and $CBS_{66} \geq 12176$ Bytes Note 3: EIR_{55}, EIR_{66}, EBS_{55}, EBS_{66}, CF_{55} and CF_{66} equal to 0 Note 4: CM_{55} and CM_{66} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers untagged LTM and LTR messages at MEG level 5 and 6 at UNI_5 configured in OVC_5 • Tester 2 verifies that all the untagged LTM and LTR messages at MEG level 5 and 6 offered at UNI_5 are delivered single-tagged with S-VLAN ID equal to 555 at $ENNI_1$ configured in OVC_5 • Tester 2 offers single-tagged LTM and LTR messages at MEG level 5 and 6 with S-VLAN ID equal to 555 at $ENNI_1$ configured in OVC_5 • Tester 1 verifies that all the single-tagged LTM and LTR messages at MEG level 5 and 6 with S-VLAN ID equal to 555 offered at $ENNI_1$ are received untagged at UNI_5 configured in OVC_5
Units	Number of valid frames received at the external interfaces
Variables	UNI and ENNI interface speeds and bandwidth profile parameters CBS_5, CBS_6, CBS_{55}, CBS_{66}
Results	Pass or fail
Remarks	

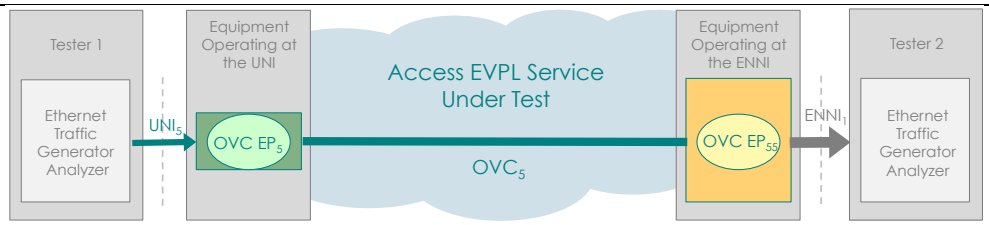
Test Case 9.2: Service OAM Loopback Messages (LBM/LBR) Handling

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Service OAM Loopback Messages (LBM/LBR) Handling</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL9_R22_R23_R25_R35_R36</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if untagged and priority tagged frames are supported</td></tr>
<tr><td>Requirement Description</td><td>[R36] The Access EVPL Service MUST be configurable to tunnel all SOAM frames at the default Test and Subscriber MEG levels as defined in the SOAM FM IA (MEF 30) document, section 7.1
[R25] For an Access EVPL service, the OVC EP Map MUST specify mapping table of CE-VLAN ID to OVC EP and it MUST NOT contain all CE-VLAN ID values mapped to a single OVC
[R22] The Maximum number of OVCs per UNI MUST be ≥ 1
[R23] Maximum number of CE-VLAN IDs per OVC: The end point Map MUST support a value = 1
[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = “OVC”</td></tr>
<tr><td>Test Object</td><td>Verify that for an Access EVPL service, LBM and LBR frames are tunneled at the default Test, and Subscriber MEG levels as defined in the SOAM FM IA (MEF 30), section 7.1</td></tr>
<tr><td>Test Configuration</td><td>At least two OVCs, each one associating one OVC EP at the UNI and one OVC EP at the ENNI are configured. One CE-VLAN ID is mapped to each OVC EP at the UNI and a specific S-VLAN ID is mapped to each OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI$_5$</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>15*</td><td>OVC EP$_5$</td></tr>
<tr><td>16</td><td>OVC EP$_6$</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI$_1$</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>555</td><td>OVC EP$_{55}$</td></tr>
<tr><td>666</td><td>OVC EP$_{66}$</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI, use of other CE-VLAN IDs at the UNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI$_5$</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP$_5$</td><td>CIR$_5$ CBS$_5$ EIR$_5$ EBS$_5$ CF$_5$ CM$_5$</td></tr>
<tr><td>OVC EP$_6$</td><td>CIR$_6$ CBS$_6$ EIR$_6$ EBS$_6$ CF$_6$ CM$_6$</td></tr>
<tr><td colspan="2">Note 1: CIR$_5$ = 3 Mbps and CIR$_6$ = 30 Mbps
Note 2: CBS$_5$ ≥ 12176 Bytes and CBS$_6$ ≥ 12176 Bytes
Note 3: EIR$_5$, EIR$_6$, EBS$_5$, EBS$_6$, CF$_5$ and CF$_6$ equal to 0
Note 4: CM$_5$ and CM$_6$ in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI$_1$</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP$_{55}$</td><td>CIR$_{55}$ CBS$_{55}$ EIR$_{55}$ EBS$_{55}$ CF$_{55}$ CM$_{55}$</td></tr>
<tr><td>OVC EP$_{66}$</td><td>CIR$_{66}$ CBS$_{66}$ EIR$_{66}$ EBS$_{66}$ CF$_{66}$ CM$_{66}$</td></tr>
<tr><td colspan="2">Note 1: CIR$_{55}$ = 3 Mbps and CIR$_{66}$ = 30 Mbps
Note 2: CBS$_{55}$ ≥ 12176 Bytes and CBS$_{66}$ ≥ 12176 Bytes
Note 3: EIR$_{55}$, EIR$_{66}$, EBS$_{55}$, EBS$_{66}$, CF$_{55}$ and CF$_{66}$ equal to 0
Note 4: CM$_{55}$ and CM$_{66}$ in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>

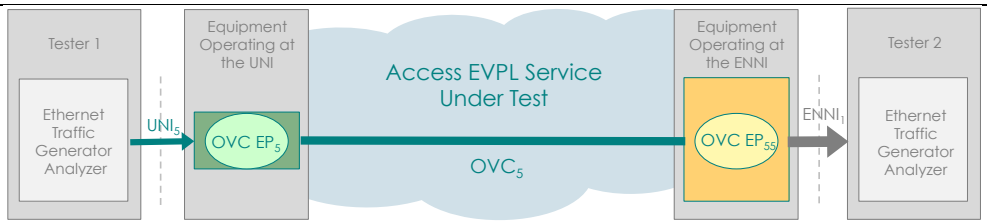
Tester 1 offers untagged LBM and LBR messages at MEG level 5 and 6 at UNI$_5$ configured in OVC$_5$
Tester 2 verifies that all the untagged LBM and LBR messages at MEG level 5 and 6 offered at UNI$_5$ are delivered single-tagged with S-VLAN ID equal to 555 at ENNI$_1$ configured in OVC$_5$
Tester 2 offers single-tagged LBM and LBR messages at MEG level 5 and 6 with S-VLAN ID equal to 555 at ENNI$_1$ configured in OVC$_5$
Tester 1 verifies that all the single-tagged LBM and LBR messages at MEG level 5 and 6 with S-VLAN ID equal to 555 offered at ENNI$_1$ are received untagged at UNI$_5$ configured in OVC$_5$
</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the external interfaces</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds and bandwidth profile parameters CBS$_5$, CBS$_6$, CBS$_{55}$, CBS$_{66}$</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td></td></tr>
</table>

11.3 Test Cases for Access EVPL – Bandwidth Profile

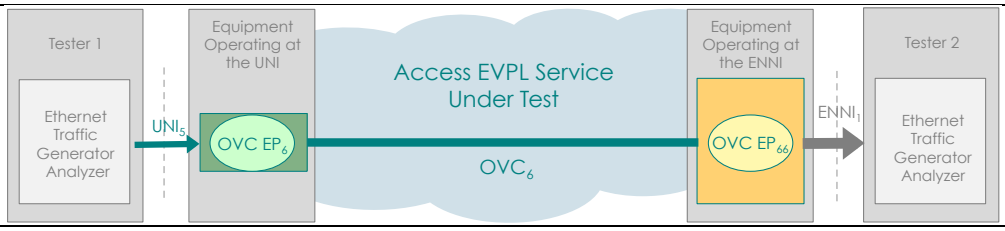
Test Case 10.2: Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 1

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 1</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL10_R26_R27_R31</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R26] The CoS Identifier for Service Frames MUST be the OVC End Point to which the Service Frame is mapped; that OVC MUST have a single CoS Name
[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R31] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>15</td><td>OVC EP5</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>555</td><td>OVC EP55</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP5</td><td>CIR5 CBS5 EIR5 EBS5 CF5 CM5</td></tr>
<tr><td colspan="2">Note 1: CIR5 = 3 Mbps
Note 2: CBS5 ≥ 12176 Bytes
Note 3: EIR5, EBS5, and CF5 equal to 0
Note 4: CM5 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP55</td><td>CIR55 CBS55 EIR55 EBS55 CF55 CM55</td></tr>
<tr><td colspan="2">Note 1: CIR55 = 3 Mbps
Note 2: CBS55 ≥ 12176 Bytes
Note 3: EIR55, EBS55, and CF55 equal to 0
Note 4: CM55 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 15 and CE-VLAN CoS equal to 0,1,2…7 of length λ at a constant rate greater than CIR5 to the ingress OVC End Point (OVC EP5 at UNI5) during a time interval T
• Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 15, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 555 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP55 at ENNI1).
• The amount of Green traffic delivered at the egress OVC EP55 at ENNI1 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP55 at ENNI1</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS5, CBS55</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

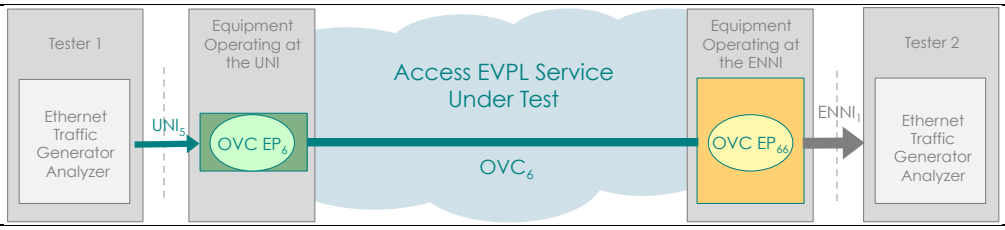
Test Case 11.2: Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 1

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 1</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL11_R26_R27_R31</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R26] The CoS Identifier for Service Frames MUST be the OVC End Point to which the Service Frame is mapped; that OVC MUST have a single CoS Name
[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R31] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI, and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>15</td><td>OVC EP5</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>555</td><td>OVC EP55</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP5</td><td>CIR5 CBS5 EIR5 EBS5 CF5 CM5</td></tr>
<tr><td colspan="2">Note 1: CIR5 = 3 Mbps
Note 2: CBS5 ≥ 12176 Bytes
Note 3: EIR5, EBS5, and CF5 equal to 0
Note 4: CM5 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP55</td><td>CIR55 CBS55 EIR55 EBS55 CF55 CM55</td></tr>
<tr><td colspan="2">Note 1: CIR55 = 3 Mbps
Note 2: CBS55 ≥ 12176 Bytes
Note 3: EIR55, EBS55, and CF55 equal to 0
Note 4: CM55 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 15 and CE-VLAN CoS equal to 0,1,2…7 of length λ, using an input traffic pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP5 at UNI5) during a time interval T
• Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 15, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 555 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP55 at ENNI1)
• The amount of Green traffic delivered at the egress OVC EP55 at ENNI1 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP55 at ENNI1</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, Burst length B, idle period I, time interval T, tolerance F_{CBS} and bandwidth profile parameters CBS5, CBS55</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</td></tr>
</table>

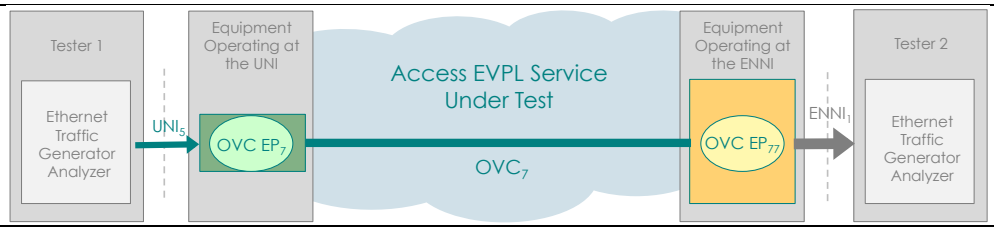
Test Case 12.2: Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 2

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 2</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL12_R26_R27_R31</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if the UNI Speed is greater than 10 Mbps</td></tr>
<tr><td>Requirement Description</td><td>[R26] The CoS Identifier for Service Frames MUST be the OVC End Point to which the Service Frame is mapped; that OVC MUST have a single CoS Name
[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
1 – 10 Mb/s, increments of 1 Mbps (Range 1)
10 – 100 Mb/s, increments of 10 Mbps (Range 2)
100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R31] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 30 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI$_5$</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>16</td><td>OVC EP$_6$</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI$_1$</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>666</td><td>OVC EP$_{66}$</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI$_5$</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP$_6$</td><td>CIR$_6$ CBS$_6$ EIR$_6$ EBS$_6$ CF$_6$ CM$_6$</td></tr>
<tr><td colspan="2">Note 1: CIR$_6$ = 30 Mbps
Note 2: CBS$_6$ ≥ 12176 Bytes
Note 3: EIR$_6$, EBS$_6$, and CF$_6$ equal to 0
Note 4: CM$_6$ in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI$_1$</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP$_{66}$</td><td>CIR$_{66}$ CBS$_{66}$ EIR$_{66}$ EBS$_{66}$ CF$_{66}$ CM$_{66}$</td></tr>
<tr><td colspan="2">Note 1: CIR$_{66}$ = 30 Mbps
Note 2: CBS$_{66}$ ≥ 12176 Bytes
Note 3: EIR$_{66}$, EBS$_{66}$, and CF$_{66}$ equal to 0
Note 4: CM$_{66}$ in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 16 and CE-VLAN CoS equal to 0,1,2…7 of length λ at a constant rate greater than CIR$_6$ to the ingress OVC End Point (OVC EP$_6$ at UNI$_5$) during a time interval T
Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 16, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 666 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP$_{66}$ at ENNI$_1$).
The amount of Green traffic delivered at the egress OVC EP$_{66}$ at ENNI$_1$ must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP$_{66}$ at ENNI$_1$</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS$_6$, CBS$_{66}$</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

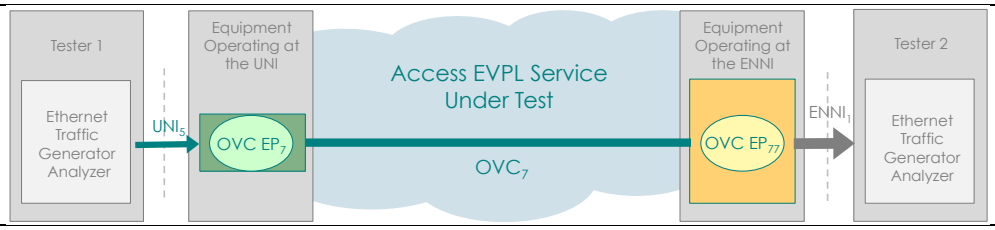
Test Case 13.2: Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 2

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 2</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL13_R26_R27_R31</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if the UNI Speed is greater than 10 Mbps</td></tr>
<tr><td>Requirement Description</td><td>[R26] The CoS Identifier for Service Frames MUST be the OVC End Point to which the Service Frame is mapped; that OVC MUST have a single CoS Name
[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R31] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 30 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI, and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>16</td><td>OVC EP6</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>666</td><td>OVC EP66</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP6</td><td>CIR6 CBS6 EIR6 EBS6 CF6 CM6</td></tr>
<tr><td colspan="2">Note 1: CIR6 = 30 Mbps
Note 2: CBS6 ≥ 12176 Bytes
Note 3: EIR6, EBS6, and CF6 equal to 0
Note 4: CM6 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP66</td><td>CIR66 CBS66 EIR66 EBS66 CF66 CM66</td></tr>
<tr><td colspan="2">Note 1: CIR66 = 30 Mbps
Note 2: CBS66 ≥ 12176 Bytes
Note 3: EIR66, EBS66, and CF66 equal to 0
Note 4: CM66 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 16 and CE-VLAN CoS equal to 0,1,2…7 of length λ, using an input traffic pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP6 at UNI5) during a time interval T
• Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 16, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 666 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP66 at ENNI1)
• The amount of Green traffic delivered at the egress OVC EP66 at ENNI1 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP66 at ENNI1</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, Burst length B, idle period I, time interval T, tolerance F_{CBS} and bandwidth profile parameters CBS6, CBS66</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</td></tr>
</table>

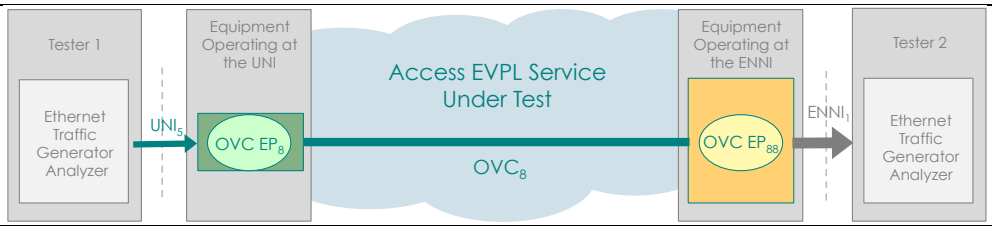
Test Case 14.2: Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 3

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 3</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL14_R26_R27_R31</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if the UNI Speed is greater than 100 Mbps</td></tr>
<tr><td>Requirement Description</td><td>[R26] The CoS Identifier for Service Frames MUST be the OVC End Point to which the Service Frame is mapped; that OVC MUST have a single CoS Name
[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R31] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>17</td><td>OVC EP7</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>777</td><td>OVC EP77</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP7</td><td>CIR7 CBS7 EIR7 EBS7 CF7 CM7</td></tr>
<tr><td colspan="2">Note 1: CIR7 = 300 Mbps
Note 2: CBS7 ≥ 12176 Bytes
Note 3: EIR7, EBS7, and CF7 equal to 0
Note 4: CM7 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP77</td><td>CIR77 CBS77 EIR77 EBS77 CF77 CM77</td></tr>
<tr><td colspan="2">Note 1: CIR77 = 300 Mbps
Note 2: CBS77 ≥ 12176 Bytes
Note 3: EIR77, EBS77, and CF77 equal to 0
Note 4: CM77 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 17 and CE-VLAN CoS equal to 0,1,2…7 of length λ at a constant rate greater than CIR7 to the ingress OVC End Point (OVC EP7 at UNI5) during a time interval T
• Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 17, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 777 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP77 at ENNI1).
• The amount of Green traffic delivered at the egress OVC EP77 at ENNI1 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP77 at ENNI1</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS7, CBS77</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

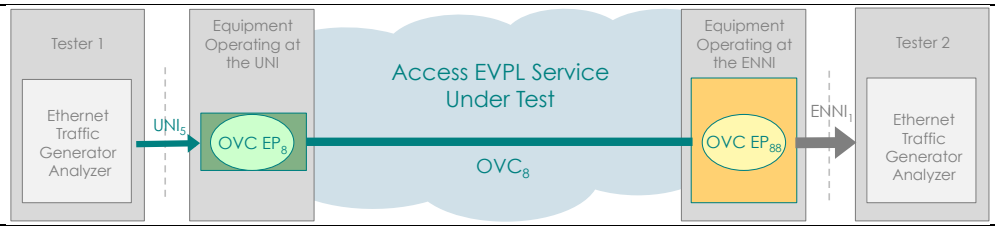
Test Case 15.2: Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 3

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 3</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL15_R26_R27_R31</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if the UNI Speed is greater than 100 Mbps</td></tr>
<tr><td>Requirement Description</td><td>[R26] The CoS Identifier for Service Frames MUST be the OVC End Point to which the Service Frame is mapped; that OVC MUST have a single CoS Name
[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R31] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI, and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>17</td><td>OVC EP7</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>777</td><td>OVC EP77</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP7</td><td>CIR7 CBS7 EIR7 EBS7 CF7 CM7</td></tr>
<tr><td colspan="2">Note 1: CIR7 = 300 Mbps
Note 2: CBS7 ≥ 12176 Bytes
Note 3: EIR7, EBS7, and CF7 equal to 0
Note 4: CM7 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP77</td><td>CIR77 CBS77 EIR77 EBS77 CF77 CM77</td></tr>
<tr><td colspan="2">Note 1: CIR77 = 300 Mbps
Note 2: CBS77 ≥ 12176 Bytes
Note 3: EIR77, EBS77, and CF77 equal to 0
Note 4: CM77 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 17 and CE-VLAN CoS equal to 0,1,2…7 of length λ, using an input traffic pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP7 at UNI5) during a time interval T
• Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 17, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 777 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP77 at ENNI1)
• The amount of Green traffic delivered at the egress OVC EP77 at ENNI1 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP77 at ENNI1</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, Burst length B, idle period I, time interval T, tolerance F_{CBS} and bandwidth profile parameters CBS7, CBS77</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</td></tr>
</table>

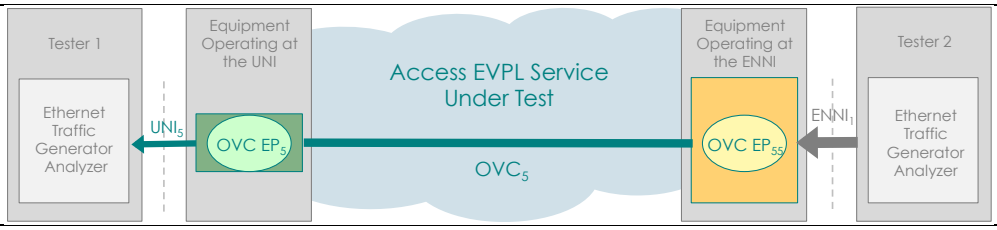
Test Case 16.2: Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 4

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 4</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL16_R26_R27_R31</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory if the UNI Speed is greater than 1 Gbps</td></tr>
<tr><td>Requirement Description</td><td>[R26] The CoS Identifier for Service Frames MUST be the OVC End Point to which the Service Frame is mapped; that OVC MUST have a single CoS Name
[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:
1 – 10 Mb/s, increments of 1 Mbps (Range 1)
10 – 100 Mb/s, increments of 10 Mbps (Range 2)
100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes
[R31] Color Forwarding SHOULD be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI MUST be marked green via the S-Tag as per MEF 23.1</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Gbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>18</td><td>OVC EP8</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>888</td><td>OVC EP88</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP8</td><td>CIR8 CBS8 EIR8 EBS8 CF8 CM8</td></tr>
<tr><td colspan="2">Note 1: CIR8 = 3 Gbps
Note 2: CBS8 ≥ 12176 Bytes
Note 3: EIR8, EBS8, and CF8 equal to 0
Note 4: CM8 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP88</td><td>CIR88 CBS88 EIR88 EBS88 CF88 CM88</td></tr>
<tr><td colspan="2">Note 1: CIR88 = 3 Gbps
Note 2: CBS88 ≥ 12176 Bytes
Note 3: EIR88, EBS88, and CF88 equal to 0
Note 4: CM88 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 18 and CE-VLAN CoS equal to 0,1,2…7 of length λ at a constant rate greater than CIR8 to the ingress OVC End Point (OVC EP8 at UNI5) during a time interval T
Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 18, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 888 and S-VLAN CoS equal to Green delivered at the egress OVC End Point (OVC EP88 at ENNI1).
The amount of Green traffic delivered at the egress OVC EP88 at ENNI1 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP88 at ENNI1</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, Service Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS8, CBS88</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

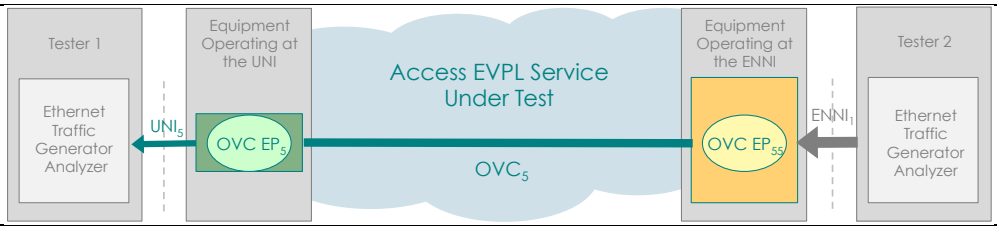
Test Case 17.2: Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 4

Abstract Test Suite for Ethernet Access Services	
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 4
Test Definition ID	AEVPL17_R26_R27_R31
Test Type	Conformance
Test Status	Mandatory if the UNI Speed is greater than 1 Gbps
Requirement Description	[R26] The CoS Identifier for Service Frames **MUST** be the OVC End Point to which the Service Frame is mapped; that OVC **MUST** have a single CoS Name [R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and **MUST** allow configuration to support CIR of: • 1 – 10 Mb/s, increments of 1 Mbps (Range 1) • 10 – 100 Mb/s, increments of 10 Mbps (Range 2) • 100 – 1000 Mb/s, increments of 100 Mbps (Range 3) • 1 – 10 Gb/s, increments of 1 Gbps (Range 4) It **MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color blind" and it **MUST** have CBS ≥ 12176 Bytes [R31] Color Forwarding **SHOULD** be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI **MUST** be marked green via the S-Tag as per MEF 23.1
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Gbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the UNI, and Color Forwarding is Yes, the bandwidth profile is applied to all ingress Service Frames that are mapped to the given OVC EP and the amount of Green traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval *T*, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	Map at UNI_5: CE-VLAN ID = 18; OVC End Point = $OVC\ EP_8$ Map at $ENNI_1$: S-VLAN ID = 888; OVC End Point = $OVC\ EP_{88}$ Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	Ingress Bandwidth Profile per OVC EP at UNI_5: OVC End Point = $OVC\ EP_8$; Parameters = $CIR_8\ CBS_8\ EIR_8\ EBS_8\ CF_8\ CM_8$ Note 1: CIR_8 = 3 Gbps Note 2: CBS_8 ≥ 12176 Bytes Note 3: EIR_8, EBS_8, and CF_8 equal to 0 Note 4: CM_8 in color-blind mode Ingress Bandwidth Profile per OVC EP at $ENNI_1$: OVC End Point = $OVC\ EP_{88}$; Parameters = $CIR_{88}\ CBS_{88}\ EIR_{88}\ EBS_{88}\ CF_{88}\ CM_{88}$ Note 1: CIR_{88} = 3 Gbps Note 2: CBS_{88} ≥ 12176 Bytes Note 3: EIR_{88}, EBS_{88}, and CF_{88} equal to 0 Note 4: CM_{88} in color-aware mode
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 18 and CE-VLAN CoS equal to 0,1,2…7 of length λ, using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point ($OVC\ EP_8$ at UNI_5) during a time interval *T* • Tester 2 measures the number of double-tagged ENNI frames with CE-VLAN ID equal to 18, CE-VLAN CoS equal to 0,1,2…7 and S-VLAN ID equal to 888 and S-VLAN CoS equal to Green delivered at the egress OVC End Point ($OVC\ EP_{88}$ at $ENNI_1$) • The amount of Green traffic delivered at the egress $OVC\ EP_{88}$ at $ENNI_1$ must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval *T* that should be delivered to the egress $OVC\ EP_{88}$ at $ENNI_1$
Units	Number of valid frames received at the ENNI
Variables	UNI and ENNI interface speeds, Service Frame length λ, Burst length *B*, idle period *I*, time interval *T*, tolerance F_{CBS} and bandwidth profile parameters CBS_8, CBS_{88}
Results	Pass or fail
Remarks	Note 1: Bandwidth profile is measured in terms of ENNI Frame traffic where the ENNI Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence Note 2: Green Color Identifiers defined in MEF 23.1 Table 4

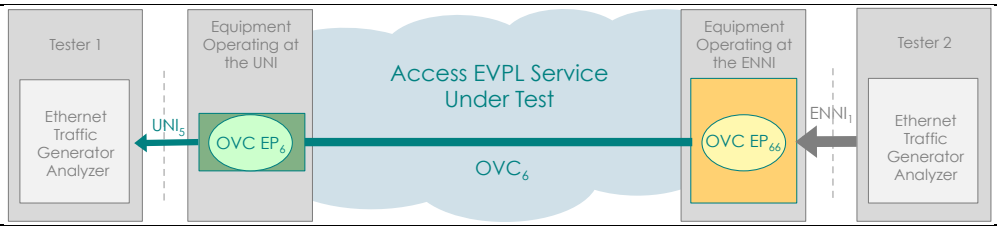
Test Case 18.2: Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 1

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 1</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL18_R33_R34</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R33] The CoS Identifier for ENNI Frames MUST be the OVC End Point to which the ENNI Frame is mapped; that OVC MUST have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}
[R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>15</td><td>OVC EP5</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>555</td><td>OVC EP55</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP5</td><td>CIR5 CBS5 EIR5 EBS5 CF5 CM5</td></tr>
<tr><td colspan="2">Note 1: CIR5 = 3 Mbps
Note 2: CBS5 ≥ 12176 Bytes
Note 3: EIR5, EBS5, and CF5 equal to 0
Note 4: CM5 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP55</td><td>CIR55 CBS55 EIR55 EBS55 CF55 CM55</td></tr>
<tr><td colspan="2">Note 1: CIR55 = 3 Mbps
Note 2: CBS55 ≥ 12176 Bytes
Note 3: EIR55, EBS55, and CF55 equal to 0
Note 4: CM55 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 15, CE-VLAN CoS equal to 5, S-VLAN ID equal to 555 and S-VLAN CoS equal to Green of length λ at a constant rate greater than CIR55 to the ingress OVC End Point (OVC EP55 at ENNI1) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 15 and CE-VLAN CoS equal to 5 delivered at the egress OVC End Point (OVC EP5 at UNI5). The amount of traffic delivered at the egress OVC EP5 at UNI5 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP5 at UNI5
• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 15, CE-VLAN CoS equal to 5, S-VLAN ID equal to 555 and S-VLAN CoS equal to Yellow of length λ at a constant rate greater than CIR55 to the ingress OVC End Point (OVC EP55 at ENNI1) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 15 and CE-VLAN CoS equal to 5 delivered at the egress OVC End Point (OVC EP5 at UNI5). The amount of traffic delivered at the egress OVC EP5 at UNI5 must be zero</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the UNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, ENNI Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS5, CBS55</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

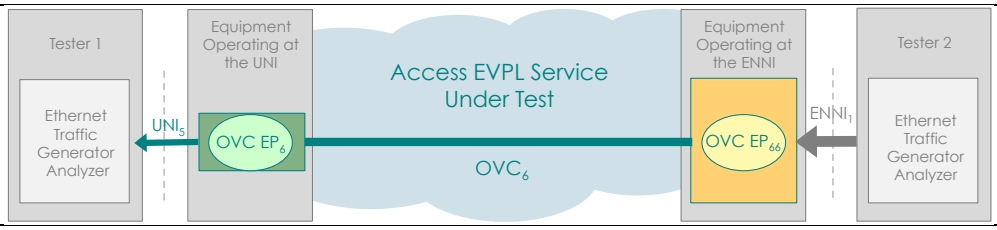
Test Case 19.2: Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 1

Abstract Test Suite for Ethernet Access Services	
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 1
Test Definition ID	AEVPL19_R33_R34
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R33] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and **MUST** allow configuration to support CIR of: • 1 – 10 Mb/s, increments of 1 Mbps (Range 1) • 10 – 100 Mb/s, increments of 10 Mbps (Range 2) • 100 – 1000 Mb/s, increments of 100 Mbps (Range 3) • 1 – 10 Gb/s, increments of 1 Gbps (Range 4) It **MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color aware" and it **MUST** have CBS ≥ 12176 Bytes
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval *T*, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_5** CE-VLAN ID: 15 → OVC End Point: OVC EP_5 **Map at $ENNI_1$** S-VLAN ID: 555 → OVC End Point: OVC EP_{55} Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_5** OVC End Point: OVC EP_5 — Parameters: CIR_5 CBS_5 EIR_5 EBS_5 CF_5 CM_5 Note 1: CIR_5 = 3 Mbps Note 2: CBS_5 ≥ 12176 Bytes Note 3: EIR_5, EBS_5, and CF_5 equal to 0 Note 4: CM_5 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: OVC EP_{55} — Parameters: CIR_{55} CBS_{55} EIR_{55} EBS_{55} CF_{55} CM_{55} Note 1: CIR_{55} = 3 Mbps Note 2: CBS_{55} ≥ 12176 Bytes Note 3: EIR_{55}, EBS_{55}, and CF_{55} equal to 0 Note 4: CM_{55} in color-aware mode
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 15, CE-VLAN CoS equal to 5, S-VLAN ID equal to 555 and S-VLAN CoS equal to Green of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP_{55} at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 15 and CE-VLAN CoS equal to 5 delivered at the egress OVC End Point (OVC EP_5 at UNI_5). The amount of traffic delivered at the egress OVC EP_5 at UNI_5 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval *T* that should be delivered to the egress OVC EP_5 at UNI_5 • Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 15, CE-VLAN CoS equal to 5, S-VLAN ID equal to 555 and S-VLAN CoS equal to Yellow of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP_{55} at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 15 and CE-VLAN CoS equal to 5 delivered at the egress OVC End Point (OVC EP_5 at UNI_5). The amount of traffic delivered at the egress OVC EP_5 at UNI_5 must be zero
Units	Number of valid frames received at the UNI
Variables	UNI and ENNI interface speeds, ENNI Frame length λ, time interval *T*, tolerance F_{CBS} and bandwidth profile parameters CBS_5, CBS_{55}
Results	Pass or fail
Remarks	Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4

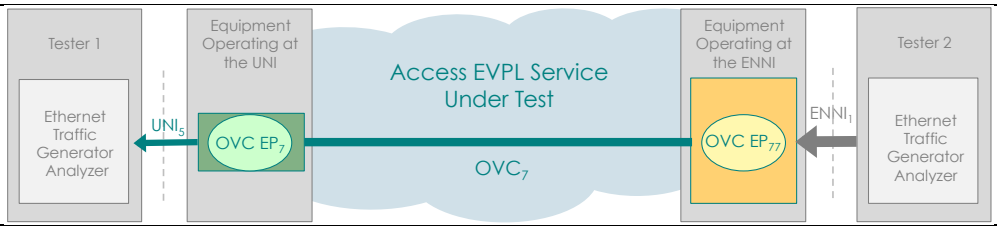
Test Case 20.2: Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 2

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 2</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL20_R33_R34</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R33] The CoS Identifier for ENNI Frames MUST be the OVC End Point to which the ENNI Frame is mapped; that OVC MUST have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}
[R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 30 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force for a the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>16</td><td>OVC EP6</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>666</td><td>OVC EP66</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP6</td><td>CIR6 CBS6 EIR6 EBS6 CF6 CM6</td></tr>
<tr><td colspan="2">Note 1: CIR6 = 30 Mbps
Note 2: CBS6 ≥ 12176 Bytes
Note 3: EIR6, EBS6, and CF6 equal to 0
Note 4: CM6 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP66</td><td>CIR66 CBS66 EIR66 EBS66 CF66 CM66</td></tr>
<tr><td colspan="2">Note 1: CIR66 = 30 Mbps
Note 2: CBS66 ≥ 12176 Bytes
Note 3: EIR66, EBS66, and CF66 equal to 0
Note 4: CM66 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 16, CE-VLAN CoS equal to 6, S-VLAN ID equal to 666 and S-VLAN CoS equal to Green of length λ at a constant rate greater than CIR_{66} to the ingress OVC End Point (OVC EP_{66} at $ENNI_1$) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 16 and CE-VLAN CoS equal to 6 delivered at the egress OVC End Point (OVC EP_6 at UNI_5). The amount of traffic delivered at the egress OVC EP_6 at UNI_5 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP_6 at UNI_5
• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 16, CE-VLAN CoS equal to 6, S-VLAN ID equal to 666 and S-VLAN CoS equal to Yellow of length λ at a constant rate greater than CIR_{66} to the ingress OVC End Point (OVC EP_{66} at $ENNI_1$) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 16 and CE-VLAN CoS equal to 6 delivered at the egress OVC End Point (OVC EP_6 at UNI_5). The amount of traffic delivered at the egress OVC EP_6 at UNI_5 must be zero</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the UNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, ENNI Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS_6, CBS_{66}</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

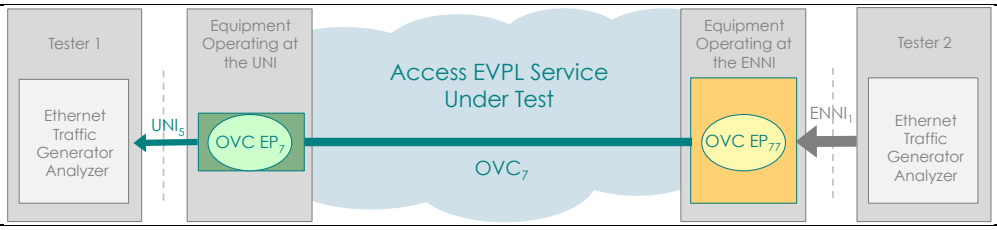
Test Case 21.2: Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 2

Abstract Test Suite for Ethernet Access Services	
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 2
Test Definition ID	AEVPL21_R33_R34
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R33] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and **MUST** allow configuration to support CIR of: • 1 – 10 Mb/s, increments of 1 Mbps (Range 1) • 10 – 100 Mb/s, increments of 10 Mbps (Range 2) • 100 – 1000 Mb/s, increments of 100 Mbps (Range 3) • 1 – 10 Gb/s, increments of 1 Gbps (Range 4) It **MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color aware" and it **MUST** have CBS ≥ 12176 Bytes
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 30 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval *T*, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	Map at UNI_5: CE-VLAN ID = 16; OVC End Point = $OVC\ EP_6$ Map at $ENNI_1$: S-VLAN ID = 666; OVC End Point = $OVC\ EP_{66}$ Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	Ingress Bandwidth Profile per OVC EP at UNI_5: OVC End Point = $OVC\ EP_6$; Parameters = $CIR_6\ CBS_6\ EIR_6\ EBS_6\ CF_6\ CM_6$ Note 1: CIR_6 = 30 Mbps Note 2: $CBS_6 \geq$ 12176 Bytes Note 3: EIR_6, EBS_6, and CF_6 equal to 0 Note 4: CM_6 in color-blind mode Ingress Bandwidth Profile per OVC EP at $ENNI_1$: OVC End Point = $OVC\ EP_{66}$; Parameters = $CIR_{66}\ CBS_{66}\ EIR_{66}\ EBS_{66}\ CF_{66}\ CM_{66}$ Note 1: CIR_{66} = 30 Mbps Note 2: $CBS_{66} \geq$ 12176 Bytes Note 3: EIR_{66}, EBS_{66}, and CF_{66} equal to 0 Note 4: CM_{66} in color-aware mode
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 16, CE-VLAN CoS equal to 6, S-VLAN ID equal to 666 and S-VLAN CoS equal to Green of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point ($OVC\ EP_{66}$ at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 16 and CE-VLAN CoS equal to 6 delivered at the egress OVC End Point ($OVC\ EP_6$ at UNI_5). The amount of traffic delivered at the egress $OVC\ EP_6$ at UNI_5 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval *T* that should be delivered to the egress $OVC\ EP_6$ at UNI_5 • Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 16, CE-VLAN CoS equal to 6, S-VLAN ID equal to 666 and S-VLAN CoS equal to Yellow of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point ($OVC\ EP_{66}$ at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 16 and CE-VLAN CoS equal to 6 delivered at the egress OVC End Point ($OVC\ EP_6$ at UNI_5). The amount of traffic delivered at the egress $OVC\ EP_6$ at UNI_5 must be zero
Units	Number of valid frames received at the UNI
Variables	UNI and ENNI interface speeds, ENNI Frame length λ, time interval *T*, tolerance F_{CBS} and bandwidth profile parameters CBS_6, CBS_{66}
Results	Pass or fail
Remarks	Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4

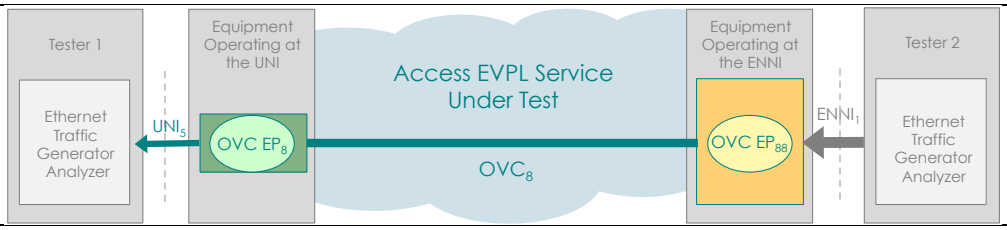
Test Case 22.2: Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 3

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 3</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL22_R33_R34</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R33] The CoS Identifier for ENNI Frames MUST be the OVC End Point to which the ENNI Frame is mapped; that OVC MUST have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}
[R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force for a the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered at a constant rate greater than CIR</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>17</td><td>OVC EP7</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>777</td><td>OVC EP77</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP7</td><td>CIR7 CBS7 EIR7 EBS7 CF7 CM7</td></tr>
<tr><td colspan="2">Note 1: CIR7 = 300 Mbps
Note 2: CBS7 ≥ 12176 Bytes
Note 3: EIR7, EBS7, and CF7 equal to 0
Note 4: CM7 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP77</td><td>CIR77 CBS77 EIR77 EBS77 CF77 CM77</td></tr>
<tr><td colspan="2">Note 1: CIR77 = 300 Mbps
Note 2: CBS77 ≥ 12176 Bytes
Note 3: EIR77, EBS77, and CF77 equal to 0
Note 4: CM77 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 17, CE-VLAN CoS equal to 7, S-VLAN ID equal to 777 and S-VLAN CoS equal to Green of length λ at a constant rate greater than CIR77 to the ingress OVC End Point (OVC EP77 at ENNI1) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 17 and CE-VLAN CoS equal to 7 delivered at the egress OVC End Point (OVC EP7 at UNI5). The amount of traffic delivered at the egress OVC EP7 at UNI5 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP7 at UNI5
• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 17, CE-VLAN CoS equal to 7, S-VLAN ID equal to 777 and S-VLAN CoS equal to Yellow of length λ at a constant rate greater than CIR77 to the ingress OVC End Point (OVC EP77 at ENNI1) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 17 and CE-VLAN CoS equal to 7 delivered at the egress OVC End Point (OVC EP7 at UNI5). The amount of traffic delivered at the egress OVC EP7 at UNI5 must be zero</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the UNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, ENNI Frame length λ, time interval T, tolerance F_{CIR} and bandwidth profile parameters CBS7, CBS77</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4
Note 3: The length of the time interval T must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test</td></tr>
</table>

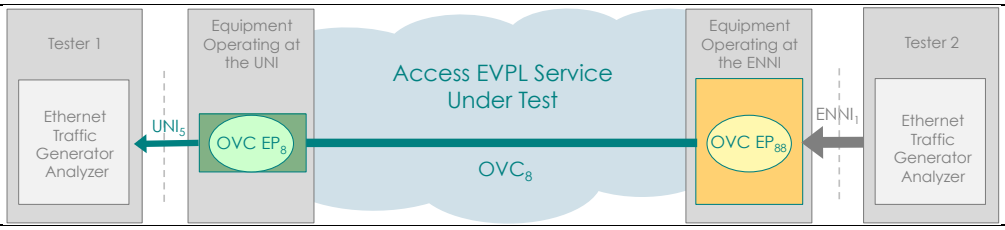
Test Case 23.2: Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 3

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 3</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL23_R33_R34</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R33] The CoS Identifier for ENNI Frames MUST be the OVC End Point to which the ENNI Frame is mapped; that OVC MUST have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}
[R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:
• 1 – 10 Mb/s, increments of 1 Mbps (Range 1)
• 10 – 100 Mb/s, increments of 10 Mbps (Range 2)
• 100 – 1000 Mb/s, increments of 100 Mbps (Range 3)
• 1 – 10 Gb/s, increments of 1 Gbps (Range 4)
It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</td></tr>
<tr><td>Test Object</td><td>Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval T, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>17</td><td>OVC EP7</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>777</td><td>OVC EP77</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP7</td><td>CIR7 CBS7 EIR7 EBS7 CF7 CM7</td></tr>
<tr><td colspan="2">Note 1: CIR7 = 300 Mbps
Note 2: CBS7 ≥ 12176 Bytes
Note 3: EIR7, EBS7, and CF7 equal to 0
Note 4: CM7 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP77</td><td>CIR77 CBS77 EIR77 EBS77 CF77 CM77</td></tr>
<tr><td colspan="2">Note 1: CIR77 = 300 Mbps
Note 2: CBS77 ≥ 12176 Bytes
Note 3: EIR77, EBS77, and CF77 equal to 0
Note 4: CM77 in color-aware mode</td></tr>
</table></td></tr>
<tr><td>Test Procedure</td><td>• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 17, CE-VLAN CoS equal to 7, S-VLAN ID equal to 777 and S-VLAN CoS equal to Green of length λ using an input traffic pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP77 at ENNI1) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 17 and CE-VLAN CoS equal to 7 delivered at the egress OVC End Point (OVC EP7 at UNI5). The amount of traffic delivered at the egress OVC EP7 at UNI5 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP7 at UNI5
• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 17, CE-VLAN CoS equal to 7, S-VLAN ID equal to 777 and S-VLAN CoS equal to Yellow of length λ using an input traffic pattern of repeated bursts and idle periods where each burst B is longer than necessary to empty the token bucket and each idle period I is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP77 at ENNI1) during a time interval T
• Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 17 and CE-VLAN CoS equal to 7 delivered at the egress OVC End Point (OVC EP7 at UNI5). The amount of traffic delivered at the egress OVC EP7 at UNI5 must be zero</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the UNI</td></tr>
<tr><td>Variables</td><td>UNI and ENNI interface speeds, ENNI Frame length λ, time interval T, tolerance F_{CBS} and bandwidth profile parameters CBS7, CBS77</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence
Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</td></tr>
</table>

Test Case 24.2: Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 4

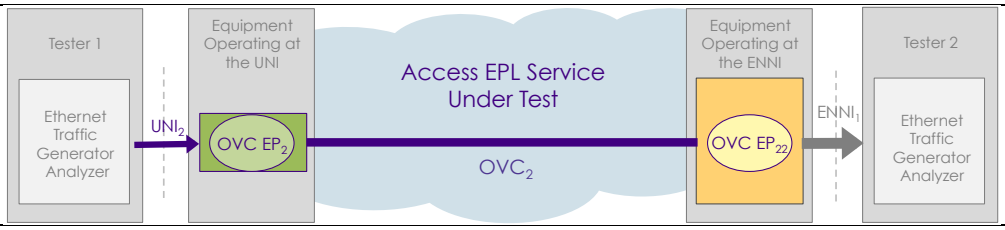
Abstract Test Suite for Ethernet Access Services	
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 4
Test Definition ID	AEVPL24_R33_R34
Test Type	Conformance
Test Status	Mandatory if the ENNI Speed is greater than 1 Gbps
Requirement Description	[R33] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and **MUST** allow configuration to support CIR of: • 1 – 10 Mb/s, increments of 1 Mbps (Range 1) • 10 – 100 Mb/s, increments of 10 Mbps (Range 2) • 100 – 1000 Mb/s, increments of 100 Mbps (Range 3) • 1 – 10 Gb/s, increments of 1 Gbps (Range 4) It **MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color aware" and it **MUST** have CBS ≥ 12176 Bytes
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Gbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force for a the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green at the ingress during a time interval *T*, provided that the ingress traffic is offered at a constant rate greater than CIR
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	Map at UNI_5: CE-VLAN ID = 18; OVC End Point = $OVC\ EP_8$ Map at $ENNI_1$: S-VLAN ID = 888; OVC End Point = $OVC\ EP_{88}$ Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	Ingress Bandwidth Profile per OVC EP at UNI_5: OVC End Point = $OVC\ EP_8$; Parameters = $CIR_8\ CBS_8\ EIR_8\ EBS_8\ CF_8\ CM_8$ Note 1: CIR_8 = 3 Gbps Note 2: $CBS_8 \geq 12176$ Bytes Note 3: EIR_8, EBS_8, and CF_8 equal to 0 Note 4: CM_8 in color-blind mode Ingress Bandwidth Profile per OVC EP at $ENNI_1$: OVC End Point = $OVC\ EP_{88}$; Parameters = $CIR_{88}\ CBS_{88}\ EIR_{88}\ EBS_{88}\ CF_{88}\ CM_{88}$ Note 1: CIR_{88} = 3 Gbps Note 2: $CBS_{88} \geq 12176$ Bytes Note 3: EIR_{88}, EBS_{88}, and CF_{88} equal to 0 Note 4: CM_{88} in color-aware mode
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 18, CE-VLAN CoS equal to 0, S-VLAN ID equal to 888 and S-VLAN CoS equal to Green of length λ at a constant rate greater than CIR_{88} to the ingress OVC End Point (OVC EP_{88} at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 18 and CE-VLAN CoS equal to 0 delivered at the egress OVC End Point (OVC EP_8 at UNI_5). The amount of traffic delivered at the egress OVC EP_8 at UNI_5 must be within +/- (F_{CIR}) of the calculated amount of traffic accepted as Green over the time interval *T* that should be delivered to the egress OVC EP_8 at UNI_5 • Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 18, CE-VLAN CoS equal to 0, S-VLAN ID equal to 888 and S-VLAN CoS equal to Yellow of length λ at a constant rate greater than CIR_{88} to the ingress OVC End Point (OVC EP_{88} at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 18 and CE-VLAN CoS equal to 0 delivered at the egress OVC End Point (OVC EP_8 at UNI_5). The amount of traffic delivered at the egress OVC EP_8 at UNI_5 must be zero
Units	Number of valid frames received at the UNI
Variables	UNI and ENNI interface speeds, ENNI Frame length λ, time interval *T*, tolerance F_{CIR} and bandwidth profile parameters CBS_8, CBS_{88}
Results	Pass or fail
Remarks	Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4 Note 3: The length of the time interval *T* must be such that the number of bytes in CBS is negligible compared to the total volume of traffic received over the duration of the test

Test Case 25.2: Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 4

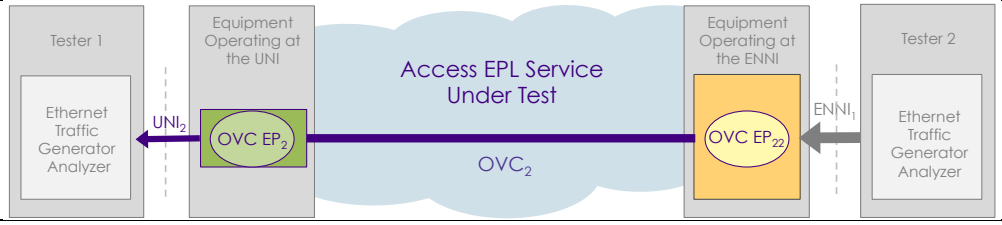
Abstract Test Suite for Ethernet Access Services	
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CBS Enforcement Range 4
Test Definition ID	AEVPL25_R33_R34
Test Type	Conformance
Test Status	Mandatory if the ENNI Speed is greater than 1 Gbps
Requirement Description	[R33] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and **MUST** allow configuration to support CIR of: • 1 – 10 Mb/s, increments of 1 Mbps (Range 1) • 10 – 100 Mb/s, increments of 10 Mbps (Range 2) • 100 – 1000 Mb/s, increments of 100 Mbps (Range 3) • 1 – 10 Gb/s, increments of 1 Gbps (Range 4) It **MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color aware" and it **MUST** have CBS ≥ 12176 Bytes
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Gbps, CBS ≥ 12176 Bytes, EIR = 0 and EBS = 0 is in force at the ENNI, the bandwidth profile is applied to all ingress ENNI Frames that are mapped to the given OVC EP and the amount of traffic delivered at the egress OVC EP is within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green at the ingress during a time interval *T*, provided that the ingress traffic is offered as a pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_5** CE-VLAN ID: 18 — OVC End Point: $OVC\ EP_8$ **Map at $ENNI_1$** S-VLAN ID: 888 — OVC End Point: $OVC\ EP_{88}$ Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_5** OVC End Point: $OVC\ EP_8$ — Parameters: $CIR_8\ CBS_8\ EIR_8\ EBS_8\ CF_8\ CM_8$ Note 1: CIR_8 = 3 Gbps Note 2: $CBS_8 \geq$ 12176 Bytes Note 3: EIR_8, EBS_8, and CF_8 equal to 0 Note 4: CM_8 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{88}$ — Parameters: $CIR_{88}\ CBS_{88}\ EIR_{88}\ EBS_{88}\ CF_{88}\ CM_{88}$ Note 1: CIR_{88} = 3 Gbps Note 2: $CBS_{88} \geq$ 12176 Bytes Note 3: EIR_{88}, EBS_{88}, and CF_{88} equal to 0 Note 4: CM_{88} in color-aware mode
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 18, CE-VLAN CoS equal to 0, S-VLAN ID equal to 888 and S-VLAN CoS equal to Green of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP_{88} at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 18 and CE-VLAN CoS equal to 0 delivered at the egress OVC End Point (OVC EP_8 at UNI_5). The amount of traffic delivered at the egress OVC EP_8 at UNI_5 must be within +/- (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval *T* that should be delivered to the egress OVC EP_8 at UNI_5 • Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 18, CE-VLAN CoS equal to 0, S-VLAN ID equal to 888 and S-VLAN CoS equal to Yellow of length λ using an input traffic pattern of repeated bursts and idle periods where each burst *B* is longer than necessary to empty the token bucket and each idle period *I* is longer than necessary to fill the token bucket, to the ingress OVC End Point (OVC EP_{88} at $ENNI_1$) during a time interval *T* • Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 18 and CE-VLAN CoS equal to 0 delivered at the egress OVC End Point (OVC EP_8 at UNI_5). The amount of traffic delivered at the egress OVC EP_8 at UNI_5 must be zero
Units	Number of valid frames received at the UNI
Variables	UNI and ENNI interface speeds, ENNI Frame length λ, time interval *T*, tolerance F_{CBS} and bandwidth profile parameters CBS_8, CBS_{88}
Results	Pass or fail
Remarks	Note 1: Bandwidth profile is measured in terms of Service Frame traffic where the Service Frame consists of the first bit of the Destination MAC Address through the last bit of the Frame Check Sequence Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4

12 Test Cases for Access EPL – Performance Attributes

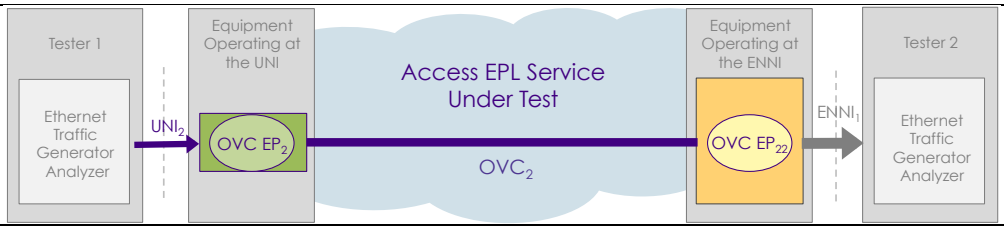
Test Case 26.1: One-Way Frame Delay Performance From UNI To ENNI

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>One-Way Frame Delay Performance From UNI To ENNI</td></tr>
<tr><td>Test Definition ID</td><td>AEPL26_R4_R15_R16</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name
[R15] The CoS ID for each frame in a CoS Frame Set at an EI MUST indicate the same CoS Name and the CoS Label MUST be one of the CoS Labels defined in MEF 23.1 Table 4
[R16] An SLS, that is based on a MEF CoS Label MUST include at least one of either MFD or FD Performance as part of the SLS.
And, in an SLS that includes FD Performance and is based on a MEF CoS Label, the SLS MUST be specified per:
FD Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected
Specified Percentile P_d and Time Interval T parameters for FD defined in MEF 23.1 Table 5</td></tr>
<tr><td>Test Object</td><td>For the Access EPL Service under test, verify that for all Qualified Service Frames associated with the a particular CoS Label, that arrive at the ENNI during a time interval T, the One-Way Frame Delay Performance is less than or equal to the One-Way Frame Delay Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI2</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP2</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>222</td><td>OVC EP22</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI2</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP2</td><td>CIR2 CBS2 EIR2 EBS2 CF2 CM2</td></tr>
<tr><td colspan="2">Note 1: CIR2 = 30 Mbps
Note 2: CBS2 ≥ 12176 Bytes
Note 3: EIR2, EBS2, and CF2 equal to 0
Note 4: CM2 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP22</td><td>CIR22 CBS22 EIR22 EBS22 CF22 CM22</td></tr>
<tr><td colspan="2">Note 1: CIR22 = 30 Mbps
Note 2: CBS22 ≥ 12176 Bytes
Note 3: EIR22, EBS22, and CF22 equal to 0
Note 4: CM22 in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 12 and CE-VLAN CoS equal to 0,1,2…7, of length λ at an average rate up to CIR_2, using a test traffic profile which exercises both configured CIR_2 and CBS_2 at the same time, to the ingress OVC End Point (OVC EP_2 at UNI_2) and Frame Delay is measured as the time elapsed from the reception of the first bit of the ingress frame declared Green until the transmission of the last bit of the corresponding frame at the egress OVC End Point (OVC EP_{22} at $ENNI_1$)
One-Way Frame Delay Performance from UNI_2 to $ENNI_1$ is then calculated for a time interval T, as the P-percentile of the Frame Delay for all frames successfully delivered between the External Interfaces (UNI_2 to $ENNI_1$)
The One-Way Frame Delay Performance from UNI_2 to $ENNI_1$ must be less than or equal to the One-Way Frame Delay Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT</td></tr>
<tr><td>Units</td><td>Time units</td></tr>
<tr><td>Variables</td><td>CoS Label, PT, UNI and ENNI interface speeds, Service Frame length λ, time interval T and bandwidth profile parameters CBS_2, CBS_{22}</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td></td></tr>
</table>

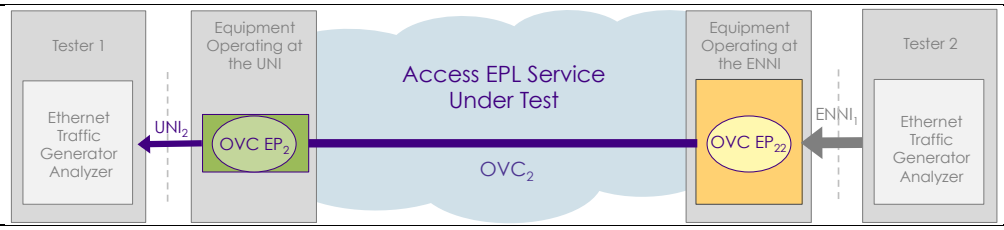
Test Case 27.1: One-Way Frame Delay Performance From ENNI To UNI

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>One-Way Frame Delay Performance From ENNI to UNI</td></tr>
<tr><td>Test Definition ID</td><td>AEPL27_R11_R15_R16</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R11] The CoS Identifier for ENNI Frames MUST be the OVC End Point to which the ENNI Frame is mapped; that OVC MUST have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}
[R15] The CoS ID for each frame in a CoS Frame Set at an EI MUST indicate the same CoS Name and the CoS Label MUST be one of the CoS Labels defined in MEF 23.1 Table 4
[R16] An SLS, that is based on a MEF CoS Label MUST include at least one of either MFD or FD Performance as part of the SLS.
And, in an SLS that includes FD Performance and is based on a MEF CoS Label, the SLS MUST be specified per:
• FD Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected
• Specified Percentile P_d and Time Interval T parameters for FD defined in MEF 23.1 Table 5</td></tr>
<tr><td>Test Object</td><td>For the Access EPL Service under test, verify that for all Qualified ENNI Frames associated with a particular CoS Label, that arrive at the UNI during a time interval T, the One-Way Frame Delay Performance is less than or equal to the One-Way Frame Delay Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI2</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP2</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>222</td><td>OVC EP22</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI2</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP2</td><td>CIR2 CBS2 EIR2 EBS2 CF2 CM2</td></tr>
<tr><td colspan="2">Note 1: CIR2 = 30 Mbps
Note 2: CBS2 ≥ 12176 Bytes
Note 3: EIR2, EBS2, and CF2 equal to 0
Note 4: CM2 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP22</td><td>CIR22 CBS22 EIR22 EBS22 CF22 CM22</td></tr>
<tr><td colspan="2">Note 1: CIR22 = 30 Mbps
Note 2: CBS22 ≥ 12176 Bytes
Note 3: EIR22, EBS22, and CF22 equal to 0
Note 4: CM22 in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 12, CE-VLAN CoS equal to 2, S-VLAN ID equal to 222 and S-VLAN CoS equal to Green, of length λ at an average rate up to CIR_{22}, using a test traffic profile which exercises both configured CIR_{22} and CBS_{22} at the same time, to the ingress OVC End Point (OVC EP_{22} at $ENNI_1$) and Frame Delay is measured as the time elapsed from the reception of the first bit of the ingress frame declared Green until the transmission of the last bit of the corresponding frame at the egress OVC End Point (OVC EP_2 at UNI_2)
• One-Way Frame Delay Performance from $ENNI_1$ to UNI_2 is then calculated for a time interval T, as the P-percentile of the Frame Delay for all frames successfully delivered between the External Interfaces ($ENNI_1$ to UNI_2)
• The One-Way Frame Delay Performance from $ENNI_1$ to UNI_2 must be less than or equal to the One-Way Frame Delay Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT</td></tr>
<tr><td>Units</td><td>Time units</td></tr>
<tr><td>Variables</td><td>CoS Label, PT, UNI and ENNI interface speeds, ENNI Frame length λ, time interval T and bandwidth profile parameters CBS_2, CBS_{22}</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Green Color Identifiers defined in MEF 23.1 Table 4</td></tr>
</table>

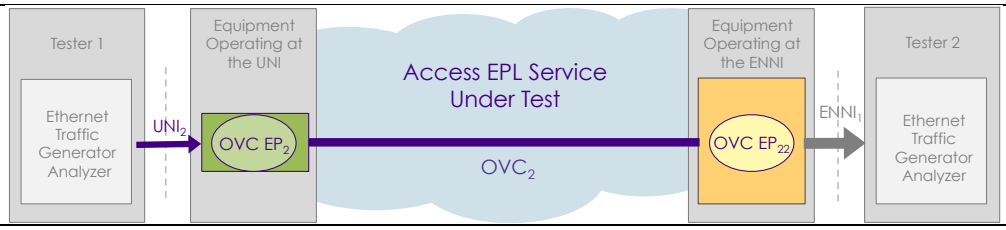
Test Case 28.1: One-Way Mean Frame Delay Performance From UNI To ENNI

Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Mean Frame Delay Performance From UNI To ENNI
Test Definition ID	AEPL28_R4_R15_R17
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R4] The CoS Identifier for Service Frames **MUST** be the OVC End Point; that OVC **MUST** have a single CoS Name [R15] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R17] An SLS, that is based on a MEF CoS Label **MUST** include at least one of either MFD or FD Performance as part of the SLS. And, in an SLS that includes MFD Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • MFD Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Time Interval *T* parameter for MFD defined in MEF 23.1 Table 5
Test Object	For the Access EPL Service under test, verify that for all Qualified Service Frames associated with a particular CoS Label, that arrive at the ENNI during a time interval *T*, the One-Way Mean Frame Delay Performance is less than or equal to the One-Way Mean Frame Delay Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	Map at UNI_2: CE-VLAN ID = 1,2*…4095; OVC End Point = $OVC\ EP_2$ Map at $ENNI_1$: S-VLAN ID = 222; OVC End Point = $OVC\ EP_{22}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	Ingress Bandwidth Profile per OVC EP at UNI_2: OVC End Point = $OVC\ EP_2$; Parameters = $CIR_2\ CBS_2\ EIR_2\ EBS_2\ CF_2\ CM_2$ Note 1: CIR_2 = 30 Mbps Note 2: $CBS_2 \geq$ 12176 Bytes Note 3: EIR_2, EBS_2, and CF_2 equal to 0 Note 4: CM_2 in color-blind mode Ingress Bandwidth Profile per OVC EP at $ENNI_1$: OVC End Point = $OVC\ EP_{22}$; Parameters = $CIR_{22}\ CBS_{22}\ EIR_{22}\ EBS_{22}\ CF_{22}\ CM_{22}$ Note 1: CIR_{22} = 30 Mbps Note 2: $CBS_{22} \geq$ 12176 Bytes Note 3: EIR_{22}, EBS_{22}, and CF_{22} equal to 0 Note 4: CM_{22} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 12 and CE-VLAN CoS equal to 0,1,2…7, of length λ at an average rate up to CIR_2, using a test traffic profile which exercises both configured CIR_2 and CBS_2 at the same time, to the ingress OVC End Point ($OVC\ EP_2$ at UNI_2) and Frame Delay is measured as the time elapsed from the reception of the first bit of the ingress frame declared Green until the transmission of the last bit of the corresponding frame at the egress OVC End Point ($OVC\ EP_{22}$ at $ENNI_1$) • One-Way Mean Frame Delay Performance from UNI_2 to $ENNI_1$ is then calculated for a time interval *T*, as the arithmetic mean of Frame Delays for all frames successfully delivered between the External Interfaces (UNI_2 to $ENNI_1$) • The One-Way Mean Frame Delay Performance from UNI_2 to $ENNI_1$ must be less than or equal to the One-Way Mean Frame Delay Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Time units
Variables	CoS Label, PT, UNI and ENNI interface speeds, Service Frame length λ, time interval *T* and bandwidth profile parameters CBS_2, CBS_{22}
Results	Pass or fail
Remarks	

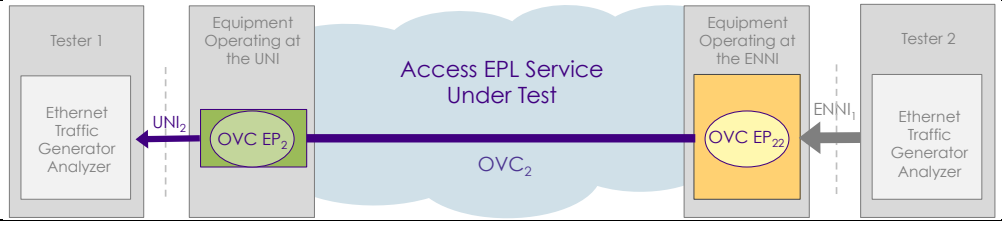
Test Case 29.1: One-Way Mean Frame Delay Performance From ENNI To UNI

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>One-Way Mean Frame Delay Performance From ENNI To UNI</td></tr>
<tr><td>Test Definition ID</td><td>AEPL29_R11_R15_R17</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R11] The CoS Identifier for ENNI Frames MUST be the OVC End Point to which the ENNI Frame is mapped; that OVC MUST have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}
[R15] The CoS ID for each frame in a CoS Frame Set at an EI MUST indicate the same CoS Name and the CoS Label MUST be one of the CoS Labels defined in MEF 23.1 Table 4
[R17] An SLS, that is based on a MEF CoS Label MUST include at least one of either MFD or FD Performance as part of the SLS.
And, in an SLS that includes MFD Performance and is based on a MEF CoS Label, the SLS MUST be specified per:
• MFD Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected
• Specified Time Interval T parameter for MFD defined in MEF 23.1 Table 5</td></tr>
<tr><td>Test Object</td><td>For the Access EPL Service under test, verify that for all Qualified ENNI Frames associated with a particular CoS Label, that arrive at the UNI during a time interval T, the One-Way Mean Frame Delay Performance is less than or equal to the One-Way Mean Frame Delay Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI2</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP2</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>222</td><td>OVC EP22</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI2</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP2</td><td>CIR2 CBS2 EIR2 EBS2 CF2 CM2</td></tr>
<tr><td colspan="2">Note 1: CIR2 = 30 Mbps
Note 2: CBS2 ≥ 12176 Bytes
Note 3: EIR2, EBS2, and CF2 equal to 0
Note 4: CM2 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP22</td><td>CIR22 CBS22 EIR22 EBS22 CF22 CM22</td></tr>
<tr><td colspan="2">Note 1: CIR22 = 30 Mbps
Note 2: CBS22 ≥ 12176 Bytes
Note 3: EIR22, EBS22, and CF22 equal to 0
Note 4: CM22 in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 12, CE-VLAN CoS equal to 2, S-VLAN ID equal to 222 and S-VLAN CoS equal to Green, of length λ at an average rate up to CIR22, using a test traffic profile which exercises both configured CIR22 and CBS22 at the same time, to the ingress OVC End Point (OVC EP22 at ENNI1) and Frame Delay is measured as the time elapsed from the reception of the first bit of the ingress frame declared Green until the transmission of the last bit of the corresponding frame at the egress OVC End Point (OVC EP2 at UNI2)
• One-Way Mean Frame Delay Performance from ENNI1 to UNI2 is then calculated for a time interval T, as the arithmetic mean of Frame Delays for all frames successfully delivered between the External Interfaces (ENNI1 to UNI2)
• The One-Way Mean Frame Delay Performance from ENNI1 to UNI2 must be less than or equal to the One-Way Mean Frame Delay Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT</td></tr>
<tr><td>Units</td><td>Time units</td></tr>
<tr><td>Variables</td><td>CoS Label, PT, UNI and ENNI interface speeds, ENNI Frame length λ, time interval T and bandwidth profile parameters CBS2, CBS22</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Green Color Identifiers defined in MEF 23.1 Table 4</td></tr>
</table>

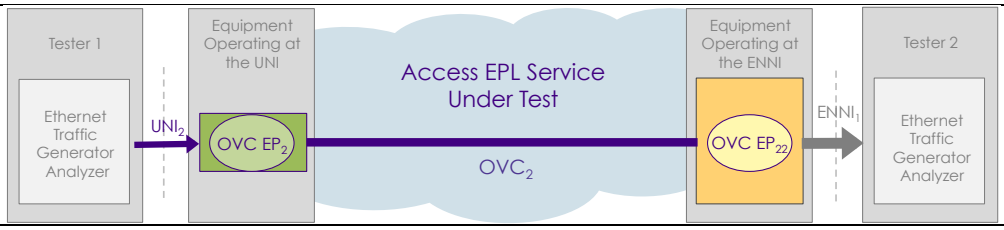
Test Case 30.1: One-Way Inter- Frame Delay Variation Performance From UNI To ENNI

Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Inter-Frame Delay Variation Performance From UNI To ENNI
Test Definition ID	AEPL30_R4_R15_R18
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R4] The CoS Identifier for Service Frames **MUST** be the OVC End Point; that OVC **MUST** have a single CoS Name [R15] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R18] An SLS, that is based on a MEF CoS Label **MUST** include at least one of either FDR or IFDV Performance as part of the SLS. And, in an SLS that includes IFDV Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • IFDV Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_v, Pair Interval Δt and Time Interval T parameters for IFDV defined in MEF 23.1 Table 5
Test Object	For the Access EPL Service under test, verify that for all Qualified Service Frames associated with a particular CoS Label, that arrive at the ENNI during a time interval T, the One-Way Inter-Frame Delay Variation Performance is less than or equal to the One-Way Inter-Frame Delay Variation Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	Map at UNI_2: CE-VLAN ID = 1,2*…4095; OVC End Point = $OVC\ EP_2$ Map at $ENNI_1$: S-VLAN ID = 222; OVC End Point = $OVC\ EP_{22}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	Ingress Bandwidth Profile per OVC EP at UNI_2: OVC End Point = $OVC\ EP_2$; Parameters = $CIR_2\ CBS_2\ EIR_2\ EBS_2\ CF_2\ CM_2$ Note 1: $CIR_2 = 30$ Mbps Note 2: $CBS_2 \geq 12176$ Bytes Note 3: EIR_2, EBS_2, and CF_2 equal to 0 Note 4: CM_2 in color-blind mode Ingress Bandwidth Profile per OVC EP at $ENNI_1$: OVC End Point = $OVC\ EP_{22}$; Parameters = $CIR_{22}\ CBS_{22}\ EIR_{22}\ EBS_{22}\ CF_{22}\ CM_{22}$ Note 1: $CIR_{22} = 30$ Mbps Note 2: $CBS_{22} \geq 12176$ Bytes Note 3: EIR_{22}, EBS_{22}, and CF_{22} equal to 0 Note 4: CM_{22} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 12 and CE-VLAN CoS equal to 0,1,2…7, of length λ at an average rate up to CIR_2, using a test traffic profile which exercises both configured CIR_2 and CBS_2 at the same time, to the ingress OVC End Point ($OVC\ EP_2$ at UNI_2) and One-Way Inter-Frame Delay Variation is measured as the difference between the one-way delays of a pair of selected frames • One-Way Inter-Frame Delay Variation Performance from UNI_2 to $ENNI_1$ is then calculated for a time interval T as the P-percentile of the absolute value of the difference between the Frame Delays of all Qualified Frame pairs whose difference in the arrival times of the first bit of each frame in the pair at the ingress OVC End Point ($OVC\ EP_2$ at UNI_2) was exactly Δt • The One-Way Inter-Frame Delay Variation Performance from UNI_2 to $ENNI_1$ must be less than or equal to the One-Way Inter-Frame Delay Variation Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Time units
Variables	CoS Label, PT, UNI and ENNI interface speeds, Service Frame length λ, time interval T and bandwidth profile parameters CBS_2, CBS_{22}
Results	Pass or fail
Remarks	

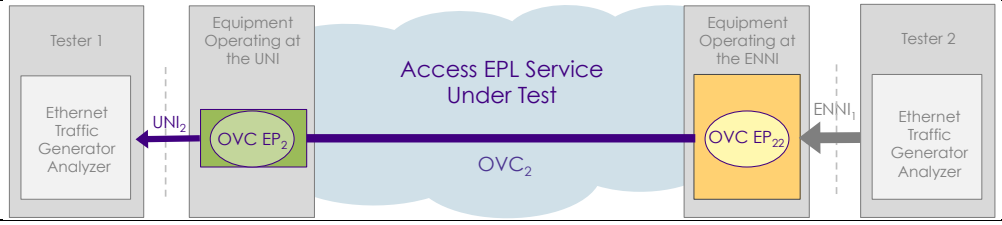
Test Case 31.1: One-Way Inter- Frame Delay Variation Performance From ENNI To UNI

Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Inter-Frame Delay Variation Performance From ENNI To UNI
Test Definition ID	AEPL31_R11_R15_R18
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R11] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R15] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R18] An SLS, that is based on a MEF CoS Label **MUST** include at least one of either FDR or IFDV Performance as part of the SLS. And, in an SLS that includes IFDV Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • IFDV Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_v, Pair Interval Δt and Time Interval T parameters for IFDV defined in MEF 23.1 Table 5
Test Object	For the Access EPL Service under test, verify that for all Qualified ENNI Frames associated with a particular CoS Label, that arrive at the UNI during a time interval T, the One-Way Inter-Frame Delay Variation Performance is less than or equal to the One-Way Inter-Frame Delay Variation Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_2** CE-VLAN ID: 1,2*…4095 — OVC End Point: $OVC\ EP_2$ **Map at $ENNI_1$** S-VLAN ID: 222 — OVC End Point: $OVC\ EP_{22}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_2** OVC End Point: $OVC\ EP_2$ — Parameters: $CIR_2\ CBS_2\ EIR_2\ EBS_2\ CF_2\ CM_2$ Note 1: CIR_2 = 30 Mbps Note 2: $CBS_2 \geq$ 12176 Bytes Note 3: EIR_2, EBS_2, and CF_2 equal to 0 Note 4: CM_2 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{22}$ — Parameters: $CIR_{22}\ CBS_{22}\ EIR_{22}\ EBS_{22}\ CF_{22}\ CM_{22}$ Note 1: CIR_{22} = 30 Mbps Note 2: $CBS_{22} \geq$ 12176 Bytes Note 3: EIR_{22}, EBS_{22}, and CF_{22} equal to 0 Note 4: CM_{22} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 12, CE-VLAN CoS equal to 2, S-VLAN ID equal to 222 and S-VLAN CoS equal to Green, of length λ at an average rate up to CIR_{22}, using a test traffic profile which exercises both configured CIR_{22} and CBS_{22} at the same time, to the ingress OVC End Point (OVC EP_{22} at $ENNI_1$) and One-Way Inter-Frame Delay Variation is measured as the difference between the one-way delays of a pair of selected frames • One-Way Inter-Frame Delay Variation Performance from $ENNI_1$ to UNI_2 is then calculated for a time interval T as the P-percentile of the absolute value of the difference between the Frame Delays of all Qualified Frame pairs whose difference in the arrival times of the first bit of each frame in the pair at the ingress OVC End Point (OVC EP_{22} at $ENNI_1$) was exactly Δt • The One-Way Inter-Frame Delay Variation Performance from $ENNI_1$ to UNI_2 must be less than or equal to the One-Way Inter-Frame Delay Variation Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Time units
Variables	CoS Label, PT, UNI and ENNI interface speeds, ENNI Frame length λ, time interval T and bandwidth profile parameters CBS_2, CBS_{22}
Results	Pass or fail
Remarks	Green Color Identifiers defined in MEF 23.1 Table 4

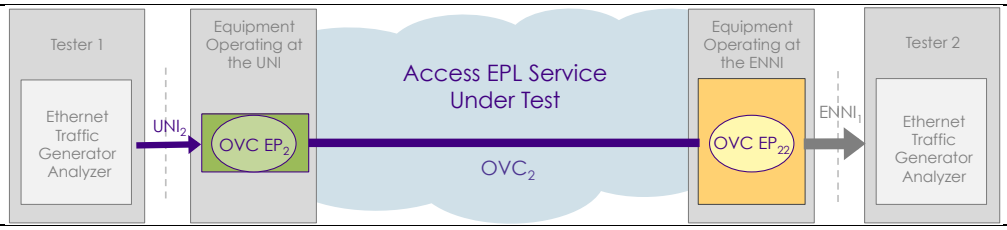
Test Case 32.1: One-Way Frame Delay Range Performance From UNI To ENNI

Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Frame Delay Range Performance From UNI To ENNI
Test Definition ID	AEPL32_R4_R15_R19
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R4] The CoS Identifier for Service Frames **MUST** be the OVC End Point; that OVC **MUST** have a single CoS Name [R15] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R19] An SLS, that is based on a MEF CoS Label **MUST** include at least one of either FDR or IFDV Performance as part of the SLS. And, in an SLS that includes FDR Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • FDR Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_r, and Time Interval T parameters for FDR idefined in MEF 23.1 Table 5
Test Object	For the Access EPL Service under test, verify that for all Qualified Service Frames associated with a particular CoS Label, that arrive at the ENNI during a time interval T, the One-Way Frame Delay Range Performance is less than or equal to the One-Way Frame Delay Range Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_2** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_2$ **Map at $ENNI_1$** S-VLAN ID: 222 → OVC End Point: $OVC\ EP_{22}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_2** OVC End Point: $OVC\ EP_2$ — Parameters: $CIR_2\ CBS_2\ EIR_2\ EBS_2\ CF_2\ CM_2$ Note 1: $CIR_2 = 30$ Mbps Note 2: $CBS_2 \geq 12176$ Bytes Note 3: EIR_2, EBS_2, and CF_2 equal to 0 Note 4: CM_2 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{22}$ — Parameters: $CIR_{22}\ CBS_{22}\ EIR_{22}\ EBS_{22}\ CF_{22}\ CM_{22}$ Note 1: $CIR_{22} = 30$ Mbps Note 2: $CBS_{22} \geq 12176$ Bytes Note 3: EIR_{22}, EBS_{22}, and CF_{22} equal to 0 Note 4: CM_{22} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 12 and CE-VLAN CoS equal to 0,1,2…7, of length λ at an average rate up to CIR_2, using a test traffic profile which exercises both configured CIR_2 and CBS_2 at the same time, to the ingress OVC End Point ($OVC\ EP_2$ at UNI_2) and Frame Delay is measured as the time elapsed from the reception of the first bit of the ingress frame declared Green until the transmission of the last bit of the corresponding frame at the egress OVC End Point ($OVC\ EP_{22}$ at $ENNI_1$) • One-Way Frame Delay Range Performance from UNI_2 to $ENNI_1$ is then calculated for a time interval T, as the difference between the delay value at percentile P_r and the minimum measured delay value, for all frames successfully delivered between the External Interfaces (UNI_2 to $ENNI_1$) • The One-Way Frame Delay Range Performance from UNI_2 to $ENNI_1$ must be less than or equal to the One-Way Frame Delay Range Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Time units
Variables	CoS Label, PT, UNI and ENNI interface speeds, Service Frame length λ, time interval T and bandwidth profile parameters CBS_2, CBS_{22}
Results	Pass or fail
Remarks	

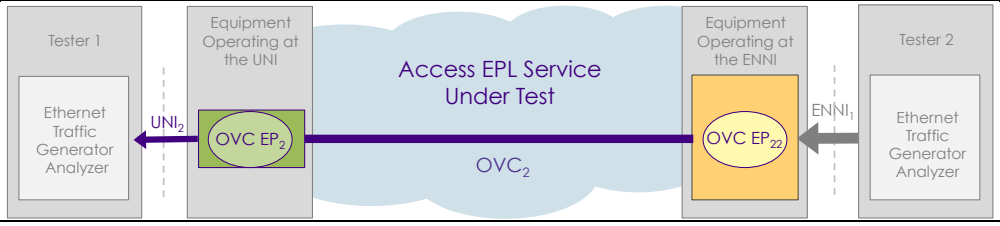
Test Case 33.1: One-Way Frame Delay Range Performance From ENNI To UNI

Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Frame Delay Range Performance From ENNI To UNI
Test Definition ID	AEPL33_R11_R15_R19
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R11] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R15] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R19] An SLS, that is based on a MEF CoS Label **MUST** include at least one of either FDR or IFDV Performance as part of the SLS. And, in an SLS that includes FDR Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • FDR Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_r, and Time Interval T parameters for FDR idefined in MEF 23.1 Table 5
Test Object	For the Access EPL Service under test, verify that for all Qualified ENNI Frames associated with a particular CoS Label, that arrive at the UNI during a time interval T, the One-Way Frame Delay Range Performance is less than or equal to the One-Way Frame Delay Range Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_2** CE-VLAN ID: 1,2*…4095 — OVC End Point: $OVC\ EP_2$ **Map at $ENNI_1$** S-VLAN ID: 222 — OVC End Point: $OVC\ EP_{22}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_2** OVC End Point: $OVC\ EP_2$ — Parameters: $CIR_2\ CBS_2\ EIR_2\ EBS_2\ CF_2\ CM_2$ Note 1: CIR_2 = 30 Mbps Note 2: $CBS_2 \geq$ 12176 Bytes Note 3: EIR_2, EBS_2, and CF_2 equal to 0 Note 4: CM_2 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{22}$ — Parameters: $CIR_{22}\ CBS_{22}\ EIR_{22}\ EBS_{22}\ CF_{22}\ CM_{22}$ Note 1: CIR_{22} = 30 Mbps Note 2: $CBS_{22} \geq$ 12176 Bytes Note 3: EIR_{22}, EBS_{22}, and CF_{22} equal to 0 Note 4: CM_{22} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 12, CE-VLAN CoS equal to 2, S-VLAN ID equal to 222 and S-VLAN CoS equal to Green, of length λ at an average rate up to CIR_{22}, using a test traffic profile which exercises both configured CIR_{22} and CBS_{22} at the same time, to the ingress OVC End Point ($OVC\ EP_{22}$ at $ENNI_1$) and Frame Delay is measured as the time elapsed from the reception of the first bit of the ingress frame declared Green until the transmission of the last bit of the corresponding frame at the egress OVC End Point ($OVC\ EP_2$ at UNI_2) • One-Way Frame Delay Range Performance from $ENNI_1$ to UNI_2 is then calculated for a time interval T, as the difference between the delay value at percentile P_r and the minimum measured delay value, for all fravmes successfully delivered between the External Interfaces ($ENNI_1$ to UNI_2) • The One-Way Frame Delay Range Performance from $ENNI_1$ to UNI_2 must be less than or equal to the One-Way Frame Delay Range Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Time units
Variables	CoS Label, PT, UNI and ENNI interface speeds, ENNI Frame length λ, time interval T and bandwidth profile parameters CBS_2, CBS_{22}
Results	Pass or fail
Remarks	Green Color Identifiers defined in MEF 23.1 Table 4

Test Case 34.1: One-Way Frame Loss Ratio Performance From UNI To ENNI

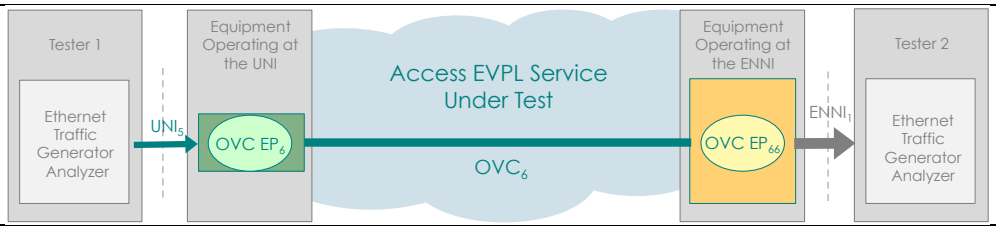
<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>One-Way Frame Loss Ratio Performance From UNI To ENNI</td></tr>
<tr><td>Test Definition ID</td><td>AEPL34_R4_R15_R20</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name
[R15] The CoS ID for each frame in a CoS Frame Set at an EI MUST indicate the same CoS Name and the CoS Label MUST be one of the CoS Labels defined in MEF 23.1 Table 4
[R20] In an SLS that includes FLR Performance and is based on a MEF CoS Label, the SLS MUST be specified per:
FLR Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected
Specified Time Interval T parameter for FLR defined in MEF 23.1 Table 5</td></tr>
<tr><td>Test Object</td><td>For the Access EPL Service under test, verify that for all Qualified Service Frames associated with a particular CoS Label, that arrive at the ENNI during a time interval T, the One-Way Frame Loss Ratio Performance is less than or equal to the One-Way Frame Loss Ratio Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI2</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>1,2*…4095</td><td>OVC EP2</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>222</td><td>OVC EP22</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI2</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP2</td><td>CIR2 CBS2 EIR2 EBS2 CF2 CM2</td></tr>
<tr><td colspan="2">Note 1: CIR2 = 30 Mbps
Note 2: CBS2 ≥ 12176 Bytes
Note 3: EIR2, EBS2, and CF2 equal to 0
Note 4: CM2 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP22</td><td>CIR22 CBS22 EIR22 EBS22 CF22 CM22</td></tr>
<tr><td colspan="2">Note 1: CIR22 = 30 Mbps
Note 2: CBS22 ≥ 12176 Bytes
Note 3: EIR22, EBS22, and CF22 equal to 0
Note 4: CM22 in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 12 and CE-VLAN CoS equal to 0,1,2…7, of length λ at an average rate up to CIR_2, using a test traffic profile which exercises both configured CIR_2 and CBS_2 at the same time, to the ingress OVC End Point (OVC EP_2 at UNI_2) and the number of ingress Qualified Frames and the number of unique (not duplicated) corresponding frames successfully delivered at the egress OVC End Point (OVC EP_{22} at $ENNI_1$) are counted
One-Way Frame Loss Ratio Performance from UNI_2 to $ENNI_1$ is then calculated for a time interval T, as the ratio, expressed as a percentage, of the number of ingress Qualified Frames not delivered at the egress OVC End Point (OVC EP_{22} at $ENNI_1$) divided by the total number of ingress Qualified Frames that should have been delivered
The One-Way Frame Loss Ratio Performance from UNI_2 to $ENNI_1$ must be less than or equal to the One-Way Frame Loss Ratio Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the ENNI</td></tr>
<tr><td>Variables</td><td>CoS Label, PT, UNI and ENNI interface speeds, Service Frame length λ, time interval T and bandwidth profile parameters CBS_2, CBS_{22}</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td></td></tr>
</table>

Test Case 35.1: One-Way Frame Loss Ratio Performance From ENNI To UNI

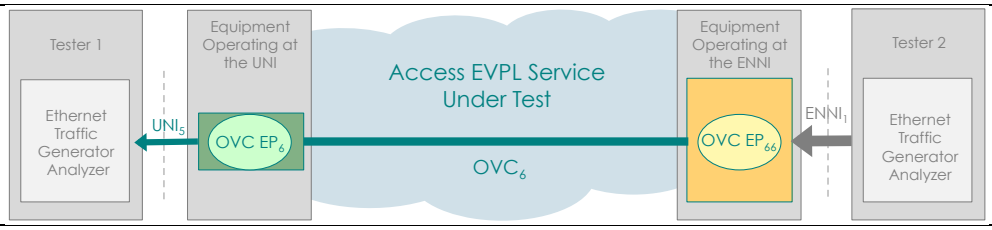
Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Frame Loss Ratio Performance From ENNI To UNI
Test Definition ID	AEPL35_R11_R15_R20
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R11] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R15] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R20] In an SLS that includes FLR Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • FLR Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Time Interval *T* parameter for FLR defined in MEF 23.1 Table 5
Test Object	For the Access EPL Service under test, verify that for all Qualified ENNI Frames associated with a particular CoS Label, that arrive at the UNI during a time interval *T*, the One-Way Frame Loss Ratio Performance is less than or equal to the One-Way Frame Loss Ratio Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_2** CE-VLAN ID: 1,2*…4095 → OVC End Point: $OVC\ EP_2$ **Map at $ENNI_1$** S-VLAN ID: 222 → OVC End Point: $OVC\ EP_{22}$ Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_2** OVC End Point: $OVC\ EP_2$ — Parameters: $CIR_2\ CBS_2\ EIR_2\ EBS_2\ CF_2\ CM_2$ Note 1: $CIR_2 = 30$ Mbps Note 2: $CBS_2 \geq 12176$ Bytes Note 3: EIR_2, EBS_2, and CF_2 equal to 0 Note 4: CM_2 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{22}$ — Parameters: $CIR_{22}\ CBS_{22}\ EIR_{22}\ EBS_{22}\ CF_{22}\ CM_{22}$ Note 1: $CIR_{22} = 30$ Mbps Note 2: $CBS_{22} \geq 12176$ Bytes Note 3: EIR_{22}, EBS_{22}, and CF_{22} equal to 0 Note 4: CM_{22} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 12, CE-VLAN CoS equal to 2, S-VLAN ID equal to 222 and S-VLAN CoS equal to Green, of length λ at an average rate up to CIR_{22}, using a test traffic profile which exercises both configured CIR_{22} and CBS_{22} at the same time, to the ingress OVC End Point ($OVC\ EP_{22}$ at $ENNI_1$) and the number of ingress Qualified Frames and the number of unique (not duplicated) corresponding frames successfully delivered at the egress OVC End Point ($OVC\ EP_{22}$ at $ENNI_1$) are counted • One-Way Frame Loss Ratio Performance from $ENNI_1$ to UNI_2 is then calculated for a time interval *T*, as the ratio, expressed as a percentage, of the number of ingress Qualified Frames not delivered at the egress OVC End Point ($OVC\ EP_2$ at UNI_2) divided by the total number of ingress Qualified Frames that should have been delivered • The One-Way Frame Loss Ratio Performance from $ENNI_1$ to UNI_2 must be less than or equal to the One-Way Frame Loss Ratio Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Number of valid frames received at the UNI
Variables	CoS Label, PT, UNI and ENNI interface speeds, ENNI Frame length λ, time interval *T* and bandwidth profile parameters CBS_2, CBS_{22}
Results	Pass or fail
Remarks	Green Color Identifiers defined in MEF 23.1 Table 4

13 Test Cases for Access EVPL – Performance Attributes

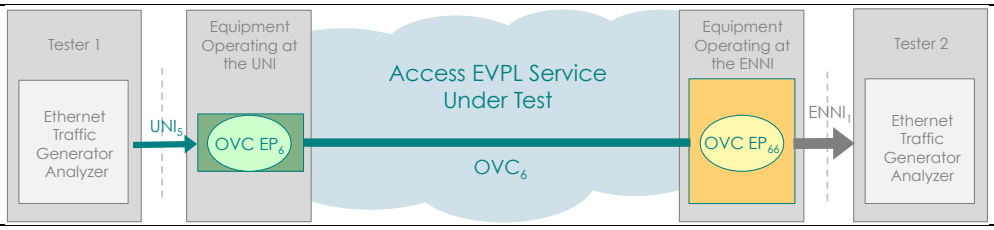
Test Case 26.2: One-Way Frame Delay Performance From UNI To ENNI

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>One-Way Frame Delay Performance From UNI To ENNI</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL26_R26_R37_R38</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R26] The CoS Identifier for Service Frames MUST be the OVC End Point to which the Service Frame is mapped; that OVC MUST have a single CoS Name
[R37] The CoS ID for each frame in a CoS Frame Set at an EI MUST indicate the same CoS Name and the CoS Label MUST be one of the CoS Labels defined in MEF 23.1 Table 4
[R38] An SLS, that is based on a MEF CoS Label MUST include at least one of either MFD or FD Performance as part of the SLS.
And, in an SLS that includes FD Performance and is based on a MEF CoS Label, the SLS MUST be specified per:
FD Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected
Specified Percentile P_d and Time Interval T parameters for FD defined in MEF 23.1 Table 5</td></tr>
<tr><td>Test Object</td><td>For the Access EVPL Service under test, verify that for all Qualified Service Frames associated with a particular CoS Label, that arrive at the ENNI during a time interval T, the One-Way Frame Delay Performance is less than or equal to the One-Way Frame Delay Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI_5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>16</td><td>$OVC\ EP_6$</td></tr>
</table>
<table>
<tr><th colspan="2">Map at $ENNI_1$</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>666</td><td>$OVC\ EP_{66}$</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI_5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>$OVC\ EP_6$</td><td>CIR_6 CBS_6 EIR_6 EBS_6 CF_6 CM_6</td></tr>
<tr><td colspan="2">Note 1: CIR_6 = 30 Mbps
Note 2: $CBS_6 \geq$ 12176 Bytes
Note 3: EIR_6, EBS_6, and CF_6 equal to 0
Note 4: CM_6 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at $ENNI_1$</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>$OVC\ EP_{66}$</td><td>CIR_{66} CBS_{66} EIR_{66} EBS_{66} CF_{66} CM_{66}</td></tr>
<tr><td colspan="2">Note 1: CIR_{66} = 30 Mbps
Note 2: $CBS_{66} \geq$ 12176 Bytes
Note 3: EIR_{66}, EBS_{66}, and CF_{66} equal to 0
Note 4: CM_{66} in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 16 and CE-VLAN CoS equal to 0,1,2…7, of length λ at an average rate up to CIR_6, using a test traffic profile which exercises both configured CIR_6 and CBS_6 at the same time, to the ingress OVC End Point ($OVC\ EP_6$ at UNI_5) and Frame Delay is measured as the time elapsed from the reception of the first bit of the ingress frame declared Green until the transmission of the last bit of the corresponding frame at the egress OVC End Point ($OVC\ EP_{66}$ at $ENNI_1$)
One-Way Frame Delay Performance from UNI_5 to $ENNI_1$ is then calculated for a time interval T, as the P-percentile of the Frame Delay for all frames successfully delivered between the External Interfaces (UNI_5 to $ENNI_1$)
The One-Way Frame Delay Performance from UNI_5 to $ENNI_1$ must be less than or equal to the One-Way Frame Delay Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT</td></tr>
<tr><td>Units</td><td>Time units</td></tr>
<tr><td>Variables</td><td>CoS Label, PT, UNI and ENNI interface speeds, Service Frame length λ, time interval T and bandwidth profile parameters CBS_6, CBS_{66}</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td></td></tr>
</table>

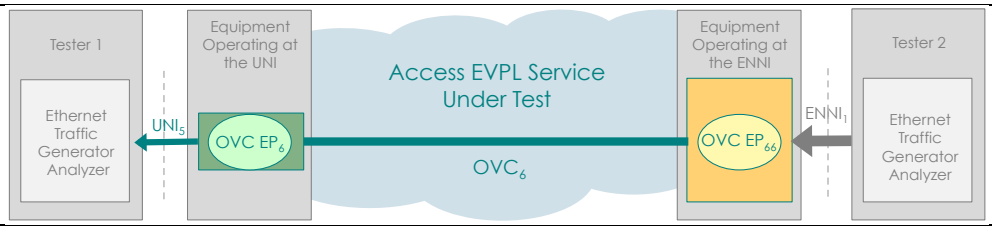
Test Case 27.2: One-Way Frame Delay Performance From ENNI To UNI

Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Frame Delay Performance From ENNI to UNI
Test Definition ID	AEVPL27_R33_R37_R38
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R33] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R37] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R38] An SLS, that is based on a MEF CoS Label **MUST** include at least one of either MFD or FD Performance as part of the SLS. And, in an SLS that includes FD Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • FD Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_d and Time Interval T parameters for FD defined in MEF 23.1 Table 5
Test Object	For the Access EVPL Service under test, verify that for all Qualified ENNI Frames associated with a particular CoS Label, that arrive at the UNI during a time interval T, the One-Way Frame Delay Performance is less than or equal to the One-Way Frame Delay Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_5** CE-VLAN ID: 16 — OVC End Point: $OVC\ EP_6$ **Map at $ENNI_1$** S-VLAN ID: 666 — OVC End Point: $OVC\ EP_{66}$ Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_5** OVC End Point: $OVC\ EP_6$ — Parameters: $CIR_6\ CBS_6\ EIR_6\ EBS_6\ CF_6\ CM_6$ Note 1: CIR_6 = 30 Mbps Note 2: $CBS_6 \geq$ 12176 Bytes Note 3: EIR_6, EBS_6, and CF_6 equal to 0 Note 4: CM_6 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{66}$ — Parameters: $CIR_{66}\ CBS_{66}\ EIR_{66}\ EBS_{66}\ CF_{66}\ CM_{66}$ Note 1: CIR_{66} = 30 Mbps Note 2: $CBS_{66} \geq$ 12176 Bytes Note 3: EIR_{66}, EBS_{66}, and CF_{66} equal to 0 Note 4: CM_{66} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 16, CE-VLAN CoS equal to 6, S-VLAN ID equal to 666 and S-VLAN CoS equal to Green, of length λ at an average rate up to CIR_{66}, using a test traffic profile which exercises both configured CIR_{66} and CBS_{66} at the same time, to the ingress OVC End Point ($OVC\ EP_{66}$ at $ENNI_1$) and Frame Delay is measured as the time elapsed from the reception of the first bit of the ingress frame declared Green until the transmission of the last bit of the corresponding frame at the egress OVC End Point ($OVC\ EP_6$ at UNI_5) • One-Way Frame Delay Performance from $ENNI_1$ to UNI_5 is then calculated for a time interval T, as the P-percentile of the Frame Delay for all frames successfully delivered between the External Interfaces ($ENNI_1$ to UNI_5) • The One-Way Frame Delay Performance from $ENNI_1$ to UNI_5 must be less than or equal to the One-Way Frame Delay Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Time units
Variables	CoS Label, PT, UNI and ENNI interface speeds, ENNI Frame length λ, time interval T and bandwidth profile parameters CBS_6, CBS_{66}
Results	Pass or fail
Remarks	Green Color Identifiers defined in MEF 23.1 Table 4

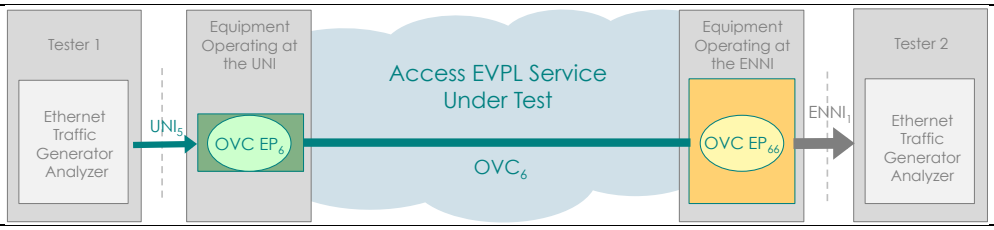
Test Case 28.2: One-Way Mean Frame Delay Performance From UNI To ENNI

Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Mean Frame Delay Performance From UNI To ENNI
Test Definition ID	AEVPL28_R26_R37_R39
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R26] The CoS Identifier for Service Frames **MUST** be the OVC End Point to which the Service Frame is mapped; that OVC **MUST** have a single CoS Name [R37] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R39] An SLS, that is based on a MEF CoS Label **MUST** include at least one of either MFD or FD Performance as part of the SLS. And, in an SLS that includes MFD Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • MFD Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Time Interval *T* parameter for MFD defined in MEF 23.1 Table 5
Test Object	For the Access EVPL Service under test, verify that for all Qualified Service Frames associated with a particular CoS Label, that arrive at the ENNI during a time interval *T*, the One-Way Mean Frame Delay Performance is less than or equal to the One-Way Mean Frame Delay Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	Map at UNI_5: CE-VLAN ID = 16; OVC End Point = $OVC\ EP_6$ Map at $ENNI_1$: S-VLAN ID = 666; OVC End Point = $OVC\ EP_{66}$ Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	Ingress Bandwidth Profile per OVC EP at UNI_5: OVC End Point = $OVC\ EP_6$; Parameters = $CIR_6\ CBS_6\ EIR_6\ EBS_6\ CF_6\ CM_6$ Note 1: CIR_6 = 30 Mbps Note 2: $CBS_6 \geq$ 12176 Bytes Note 3: EIR_6, EBS_6, and CF_6 equal to 0 Note 4: CM_6 in color-blind mode Ingress Bandwidth Profile per OVC EP at $ENNI_1$: OVC End Point = $OVC\ EP_{66}$; Parameters = $CIR_{66}\ CBS_{66}\ EIR_{66}\ EBS_{66}\ CF_{66}\ CM_{66}$ Note 1: CIR_{66} = 30 Mbps Note 2: $CBS_{66} \geq$ 12176 Bytes Note 3: EIR_{66}, EBS_{66}, and CF_{66} equal to 0 Note 4: CM_{66} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 16 and CE-VLAN CoS equal to 0,1,2…7, of length λ at an average rate up to CIR_6, using a test traffic profile which exercises both configured CIR_6 and CBS_6 at the same time, to the ingress OVC End Point ($OVC\ EP_6$ at UNI_5) and Frame Delay is measured as the time elapsed from the reception of the first bit of the ingress frame declared Green until the transmission of the last bit of the corresponding frame at the egress OVC End Point ($OVC\ EP_{66}$ at $ENNI_1$) • One-Way Mean Frame Delay Performance from UNI_5 to $ENNI_1$ is then calculated for a time interval *T*, as the arithmetic mean of Frame Delays for all frames successfully delivered between the External Interfaces (UNI_5 to $ENNI_1$) • The One-Way Mean Frame Delay Performance from UNI_5 to $ENNI_1$ must be less than or equal to the One-Way Mean Frame Delay Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Time units
Variables	CoS Label, PT, UNI and ENNI interface speeds, Service Frame length λ, time interval *T* and bandwidth profile parameters CBS_6, CBS_{66}
Results	Pass or fail
Remarks	

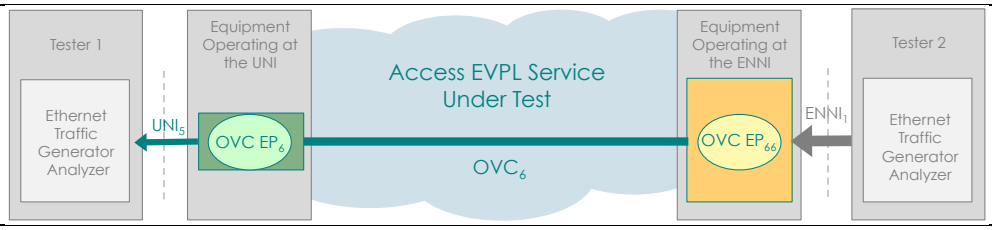
Test Case 29.2: One-Way Mean Frame Delay Performance From ENNI To UNI

Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Mean Frame Delay Performance From ENNI To UNI
Test Definition ID	AEVPL29_R33_R37_R39
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R33] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R37] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R39] An SLS, that is based on a MEF CoS Label **MUST** include at least one of either MFD or FD Performance as part of the SLS. And, in an SLS that includes MFD Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • MFD Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Time Interval *T* parameter for MFD defined in MEF 23.1 Table 5
Test Object	For the Access EVPL Service under test, verify that for all Qualified ENNI Frames associated with a particular CoS Label, that arrive at the UNI during a time interval *T*, the One-Way Mean Frame Delay Performance is less than or equal to the One-Way Mean Frame Delay Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_5** CE-VLAN ID: 16 — OVC End Point: $OVC\ EP_6$ **Map at $ENNI_1$** S-VLAN ID: 666 — OVC End Point: $OVC\ EP_{66}$ Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_5** OVC End Point: $OVC\ EP_6$ — Parameters: $CIR_6\ CBS_6\ EIR_6\ EBS_6\ CF_6\ CM_6$ Note 1: $CIR_6 = 30$ Mbps Note 2: $CBS_6 \geq 12176$ Bytes Note 3: EIR_6, EBS_6, and CF_6 equal to 0 Note 4: CM_6 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{66}$ — Parameters: $CIR_{66}\ CBS_{66}\ EIR_{66}\ EBS_{66}\ CF_{66}\ CM_{66}$ Note 1: $CIR_{66} = 30$ Mbps Note 2: $CBS_{66} \geq 12176$ Bytes Note 3: EIR_{66}, EBS_{66}, and CF_{66} equal to 0 Note 4: CM_{66} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 16, CE-VLAN CoS equal to 6, S-VLAN ID equal to 666 and S-VLAN CoS equal to Green, of length λ at an average rate up to CIR_{66}, using a test traffic profile which exercises both configured CIR_{66} and CBS_{66} at the same time, to the ingress OVC End Point ($OVC\ EP_{66}$ at $ENNI_1$) and Frame Delay is measured as the time elapsed from the reception of the first bit of the ingress frame declared Green until the transmission of the last bit of the corresponding frame at the egress OVC End Point ($OVC\ EP_6$ at UNI_5) • One-Way Mean Frame Delay Performance from $ENNI_1$ to UNI_5 is then calculated for a time interval *T*, as the arithmetic mean of Frame Delays for all frames successfully delivered between the External Interfaces ($ENNI_1$ to UNI_5) • The One-Way Mean Frame Delay Performance from $ENNI_1$ to UNI_5 must be less than or equal to the One-Way Mean Frame Delay Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Time units
Variables	CoS Label, PT, UNI and ENNI interface speeds, ENNI Frame length λ, time interval *T* and bandwidth profile parameters CBS_6, CBS_{66}
Results	Pass or fail
Remarks	Green Color Identifiers defined in MEF 23.1 Table 4

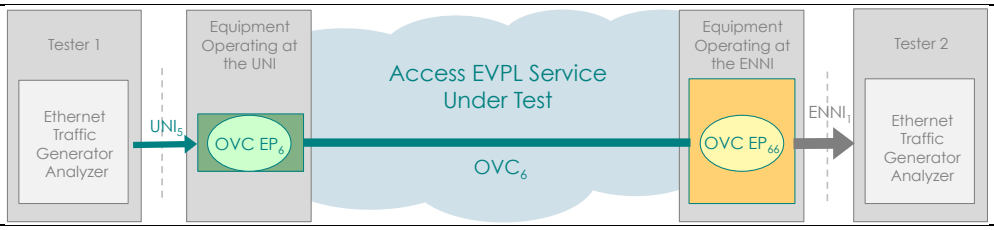
Test Case 30.2: One-Way Inter- Frame Delay Variation Performance From UNI To ENNI

Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Inter-Frame Delay Variation Performance From UNI To ENNI
Test Definition ID	AEVPL30_R26_R37_R40
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R26] The CoS Identifier for Service Frames **MUST** be the OVC End Point to which the Service Frame is mapped; that OVC **MUST** have a single CoS Name [R37] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R40] An SLS, that is based on a MEF CoS Label **MUST** include at least one of either FDR or IFDV Performance as part of the SLS. And, in an SLS that includes IFDV Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • IFDV Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_v, Pair Interval Δt and Time Interval T parameters for IFDV defined in MEF 23.1 Table 5
Test Object	For the Access EVPL Service under test, verify that for all Qualified Service Frames associated with a particular CoS Label, that arrive at the ENNI during a time interval T, the One-Way Inter-Frame Delay Variation Performance is less than or equal to the One-Way Inter-Frame Delay Variation Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	Map at UNI_5: CE-VLAN ID = 16; OVC End Point = $OVC\ EP_6$ Map at $ENNI_1$: S-VLAN ID = 666; OVC End Point = $OVC\ EP_{66}$ Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	Ingress Bandwidth Profile per OVC EP at UNI_5: OVC End Point = $OVC\ EP_6$; Parameters = $CIR_6\ CBS_6\ EIR_6\ EBS_6\ CF_6\ CM_6$ Note 1: CIR_6 = 30 Mbps Note 2: $CBS_6 \geq$ 12176 Bytes Note 3: EIR_6, EBS_6, and CF_6 equal to 0 Note 4: CM_6 in color-blind mode Ingress Bandwidth Profile per OVC EP at $ENNI_1$: OVC End Point = $OVC\ EP_{66}$; Parameters = $CIR_{66}\ CBS_{66}\ EIR_{66}\ EBS_{66}\ CF_{66}\ CM_{66}$ Note 1: CIR_{66} = 30 Mbps Note 2: $CBS_{66} \geq$ 12176 Bytes Note 3: EIR_{66}, EBS_{66}, and CF_{66} equal to 0 Note 4: CM_{66} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 16 and CE-VLAN CoS equal to 0,1,2…7, of length λ at an average rate up to CIR_6, using a test traffic profile which exercises both configured CIR_6 and CBS_6 at the same time, to the ingress OVC End Point ($OVC\ EP_6$ at UNI_5) and One-Way Inter-Frame Delay Variation is measured as the difference between the one-way delays of a pair of selected frames • One-Way Inter-Frame Delay Variation Performance from UNI_5 to $ENNI_1$ is then calculated for a time interval T as the P-percentile of the absolute value of the difference between the Frame Delays of all Qualified Frame pairs whose difference in the arrival times of the first bit of each frame in the pair at the ingress OVC End Point ($OVC\ EP_6$ at UNI_5) was exactly Δt • The One-Way Inter-Frame Delay Variation Performance from UNI_5 to $ENNI_1$ must be less than or equal to the One-Way Inter-Frame Delay Variation Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Time units
Variables	CoS Label, PT, UNI and ENNI interface speeds, Service Frame length λ, time interval T bandwidth profile parameters CBS_6, CBS_{66}
Results	Pass or fail
Remarks	

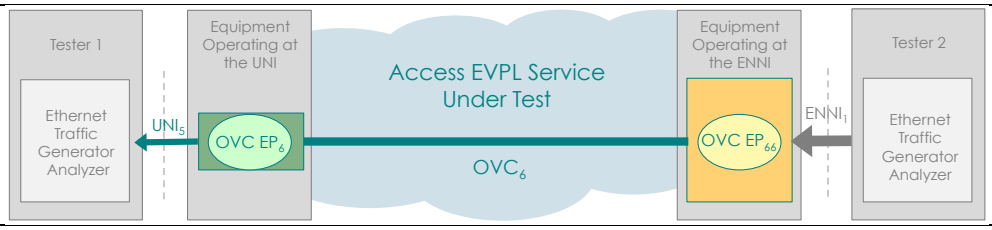
Test Case 31.2: One-Way Inter- Frame Delay Variation Performance From ENNI To UNI

Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Inter-Frame Delay Variation Performance From ENNI To UNI
Test Definition ID	AEVPL31_R33_R37_R40
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R33] The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7} [R37] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R40] An SLS, that is based on a MEF CoS Label **MUST** include at least one of either FDR or IFDV Performance as part of the SLS. And, in an SLS that includes IFDV Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • IFDV Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_v, Pair Interval Δt and Time Interval T parameters for IFDV defined in MEF 23.1 Table 5
Test Object	For the Access EVPL Service under test, verify that for all Qualified ENNI Frames associated with a particular CoS Label, that arrive at the UNI during a time interval T, the One-Way Inter-Frame Delay Variation Performance is less than or equal to the One-Way Inter-Frame Delay Variation Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_5** CE-VLAN ID: 16 — OVC End Point: $OVC\ EP_6$ **Map at $ENNI_1$** S-VLAN ID: 666 — OVC End Point: $OVC\ EP_{66}$ Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_5** OVC End Point: $OVC\ EP_6$ — Parameters: $CIR_6\ CBS_6\ EIR_6\ EBS_6\ CF_6\ CM_6$ Note 1: $CIR_6 = 30$ Mbps Note 2: $CBS_6 \geq 12176$ Bytes Note 3: EIR_6, EBS_6, and CF_6 equal to 0 Note 4: CM_6 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{66}$ — Parameters: $CIR_{66}\ CBS_{66}\ EIR_{66}\ EBS_{66}\ CF_{66}\ CM_{66}$ Note 1: $CIR_{66} = 30$ Mbps Note 2: $CBS_{66} \geq 12176$ Bytes Note 3: EIR_{66}, EBS_{66}, and CF_{66} equal to 0 Note 4: CM_{66} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 16, CE-VLAN CoS equal to 6, S-VLAN ID equal to 666 and S-VLAN CoS equal to Green, of length λ at an average rate up to CIR_{66}, using a test traffic profile which exercises both configured CIR_{66} and CBS_{66} at the same time, to the ingress OVC End Point ($OVC\ EP_{66}$ at $ENNI_1$) and One-Way Inter-Frame Delay Variation is measured as the difference between the one-way delays of a pair of selected frames • One-Way Inter-Frame Delay Variation Performance from $ENNI_1$ to UNI_5 is then calculated for a time interval T as the P-percentile of the absolute value of the difference between the Frame Delays of all Qualified Frame pairs whose difference in the arrival times of the first bit of each frame in the pair at the ingress OVC End Point ($OVC\ EP_{66}$ at $ENNI_1$) was exactly Δt • The One-Way Inter-Frame Delay Variation Performance from $ENNI_1$ to UNI_5 must be less than or equal to the One-Way Inter-Frame Delay Variation Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Time units
Variables	CoS Label, PT, UNI and ENNI interface speeds, ENNI Frame length λ, time interval T and bandwidth profile parameters CBS_6, CBS_{66}
Results	Pass or fail
Remarks	Green Color Identifiers defined in MEF 23.1 Table 4

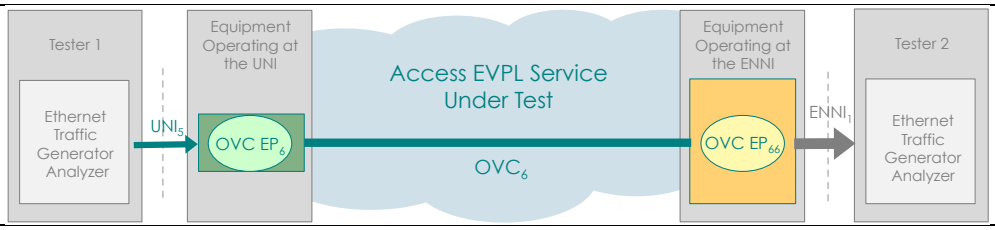
Test Case 32.2: One-Way Frame Delay Range Performance From UNI To ENNI

Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Frame Delay Range Performance From UNI To ENNI
Test Definition ID	AEVPL32_R26_R37_R41
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R26] The CoS Identifier for Service Frames **MUST** be the OVC End Point to which the Service Frame is mapped; that OVC **MUST** have a single CoS Name [R37] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R41] An SLS, that is based on a MEF CoS Label **MUST** include at least one of either FDR or IFDV Performance as part of the SLS. And, in an SLS that includes FDR Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • FDR Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_r, and Time Interval T parameters for FDR idefined in MEF 23.1 Table 5
Test Object	For the Access EVPL Service under test, verify that for all Qualified Service Frames associated with a particular CoS Label, that arrive at the ENNI during a time interval T, the One-Way Frame Delay Range Performance is less than or equal to the One-Way Frame Delay Range Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	Map at UNI_5: CE-VLAN ID = 16; OVC End Point = $OVC\ EP_6$ Map at $ENNI_1$: S-VLAN ID = 666; OVC End Point = $OVC\ EP_{66}$ Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	Ingress Bandwidth Profile per OVC EP at UNI_5: OVC End Point = $OVC\ EP_6$; Parameters = $CIR_6\ CBS_6\ EIR_6\ EBS_6\ CF_6\ CM_6$ Note 1: CIR_6 = 30 Mbps Note 2: $CBS_6 \geq$ 12176 Bytes Note 3: EIR_6, EBS_6, and CF_6 equal to 0 Note 4: CM_6 in color-blind mode Ingress Bandwidth Profile per OVC EP at $ENNI_1$: OVC End Point = $OVC\ EP_{66}$; Parameters = $CIR_{66}\ CBS_{66}\ EIR_{66}\ EBS_{66}\ CF_{66}\ CM_{66}$ Note 1: CIR_{66} = 30 Mbps Note 2: $CBS_{66} \geq$ 12176 Bytes Note 3: EIR_{66}, EBS_{66}, and CF_{66} equal to 0 Note 4: CM_{66} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 16 and CE-VLAN CoS equal to 0,1,2…7, of length λ at an average rate up to CIR_6, using a test traffic profile which exercises both configured CIR_6 and CBS_6 at the same time, to the ingress OVC End Point ($OVC\ EP_6$ at UNI_5) and Frame Delay is measured as the time elapsed from the reception of the first bit of the ingress frame declared Green until the transmission of the last bit of the corresponding frame at the egress OVC End Point ($OVC\ EP_{66}$ at $ENNI_1$) • One-Way Frame Delay Range Performance from UNI_5 to $ENNI_1$ is then calculated for a time interval T, as the difference between the delay value at percentile P_r and the minimum measured delay value, for all frames successfully delivered between the External Interfaces (UNI_5 to $ENNI_1$) • The One-Way Frame Delay Range Performance from UNI_5 to $ENNI_1$ must be less than or equal to the One-Way Frame Delay Range Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Time units
Variables	CoS Label, PT, UNI and ENNI interface speeds, Service Frame length λ, time interval T and bandwidth profile parameters CBS_6, CBS_{66}
Results	Pass or fail
Remarks	

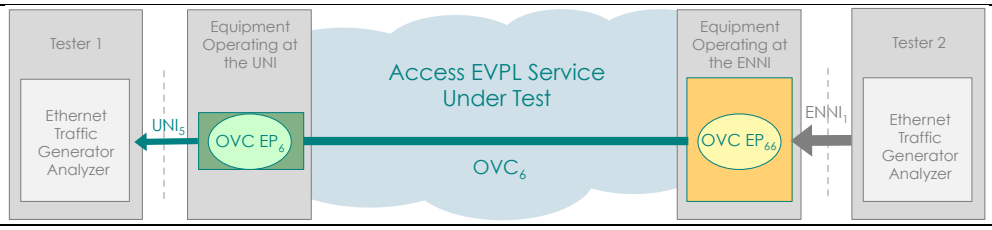
Test Case 33.2: One-Way Frame Delay Range Performance From ENNI To UNI

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>One-Way Frame Delay Range Performance From ENNI To UNI</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL33_R33_R37_R41</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R33] The CoS Identifier for ENNI Frames MUST be the OVC End Point to which the ENNI Frame is mapped; that OVC MUST have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}
[R37] The CoS ID for each frame in a CoS Frame Set at an EI MUST indicate the same CoS Name and the CoS Label MUST be one of the CoS Labels defined in MEF 23.1 Table 4
[R41] An SLS, that is based on a MEF CoS Label MUST include at least one of either FDR or IFDV Performance as part of the SLS. And, in an SLS that includes FDR Performance and is based on a MEF CoS Label, the SLS MUST be specified per:
FDR Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected
Specified Percentile P_r, and Time Interval T parameters for FDR idefined in MEF 23.1 Table 5</td></tr>
<tr><td>Test Object</td><td>For the Access EVPL Service under test, verify that for all Qualified ENNI Frames associated with a particular CoS Label, that arrive at the UNI during a time interval T, the One-Way Frame Delay Range Performance is less than or equal to the One-Way Frame Delay Range Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI5</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>16</td><td>OVC EP6</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI1</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>666</td><td>OVC EP66</td></tr>
</table>
Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI5</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP6</td><td>CIR6 CBS6 EIR6 EBS6 CF6 CM6</td></tr>
<tr><td colspan="2">Note 1: CIR6 = 30 Mbps
Note 2: CBS6 ≥ 12176 Bytes
Note 3: EIR6, EBS6, and CF6 equal to 0
Note 4: CM6 in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI1</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP66</td><td>CIR66 CBS66 EIR66 EBS66 CF66 CM66</td></tr>
<tr><td colspan="2">Note 1: CIR66 = 30 Mbps
Note 2: CBS66 ≥ 12176 Bytes
Note 3: EIR66, EBS66, and CF66 equal to 0
Note 4: CM66 in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 16, CE-VLAN CoS equal to 6, S-VLAN ID equal to 666 and S-VLAN CoS equal to Green, of length λ at an average rate up to CIR_{66}, using a test traffic profile which exercises both configured CIR_{66} and CBS_{66} at the same time, to the ingress OVC End Point (OVC EP_{66} at $ENNI_1$) and Frame Delay is measured as the time elapsed from the reception of the first bit of the ingress frame declared Green until the transmission of the last bit of the corresponding frame at the egress OVC End Point (OVC EP_6 at UNI_5)
One-Way Frame Delay Range Performance from $ENNI_1$ to UNI_5 is then calculated for a time interval T, as the difference between the delay value at percentile P_r and the minimum measured delay value, for all frames successfully delivered between the External Interfaces ($ENNI_1$ to UNI_5)
The One-Way Frame Delay Range Performance from $ENNI_1$ to UNI_5 must be less than or equal to the One-Way Frame Delay Range Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT</td></tr>
<tr><td>Units</td><td>Time units</td></tr>
<tr><td>Variables</td><td>CoS Label, PT, UNI and ENNI interface speeds, ENNI Frame length λ, time interval T and bandwidth profile parameters CBS_6, CBS_{66}</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Green Color Identifiers defined in MEF 23.1 Table 4</td></tr>
</table>

Test Case 34.2: One-Way Frame Loss Ratio Performance From UNI To ENNI

Abstract Test Suite for Ethernet Access Services	
Test Name	One-Way Frame Loss Ratio Performance From UNI To ENNI
Test Definition ID	AEVPL34_R26_R37_R42
Test Type	Conformance
Test Status	Mandatory
Requirement Description	[R26] The CoS Identifier for Service Frames **MUST** be the OVC End Point to which the Service Frame is mapped; that OVC **MUST** have a single CoS Name [R37] The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4 [R42] In an SLS that includes FLR Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • FLR Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Time Interval *T* parameter for FLR defined in MEF 23.1 Table 5
Test Object	For the Access EVPL Service under test, verify that for all Qualified Service Frames associated with a particular CoS Label, that arrive at the ENNI during a time interval *T*, the One-Way Frame Loss Ratio Performance is less than or equal to the One-Way Frame Loss Ratio Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT
Test Configuration	One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. One CE-VLAN ID is mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI
Test Configuration Schematic	
End Point Maps	**Map at UNI_5** CE-VLAN ID: 16 — OVC End Point: $OVC\ EP_6$ **Map at $ENNI_1$** S-VLAN ID: 666 — OVC End Point: $OVC\ EP_{66}$ Note: Use of other S-VLAN ID at the ENNI and of other CE-VLAN ID at the UNI is permitted provided that the configuration conforms to MEF 26.1
Bandwidth Profile	**Ingress Bandwidth Profile per OVC EP at UNI_5** OVC End Point: $OVC\ EP_6$ — Parameters: $CIR_6\ CBS_6\ EIR_6\ EBS_6\ CF_6\ CM_6$ Note 1: CIR_6 = 30 Mbps Note 2: $CBS_6 \geq$ 12176 Bytes Note 3: EIR_6, EBS_6, and CF_6 equal to 0 Note 4: CM_6 in color-blind mode **Ingress Bandwidth Profile per OVC EP at $ENNI_1$** OVC End Point: $OVC\ EP_{66}$ — Parameters: $CIR_{66}\ CBS_{66}\ EIR_{66}\ EBS_{66}\ CF_{66}\ CM_{66}$ Note 1: CIR_{66} = 30 Mbps Note 2: $CBS_{66} \geq$ 12176 Bytes Note 3: EIR_{66}, EBS_{66}, and CF_{66} equal to 0 Note 4: CM_{66} in color-aware mode Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1
Test Procedure	• Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 16 and CE-VLAN CoS equal to 0,1,2…7, of length λ at an average rate up to CIR_6, using a test traffic profile which exercises both configured CIR_6 and CBS_6 at the same time, to the ingress OVC End Point ($OVC\ EP_6$ at UNI_5) and, the number of ingress Qualified Frames and the number of unique (not duplicated) corresponding frames successfully delivered at the egress OVC End Point ($OVC\ EP_{66}$ at $ENNI_1$) are counted • One-Way Frame Loss Ratio Performance from UNI_5 to $ENNI_1$ is then calculated for a time interval *T*, as the ratio, expressed as a percentage, of the number of ingress Qualified Frames not delivered at the egress OVC End Point ($OVC\ EP_{66}$ at $ENNI_1$) divided by the total number of ingress Qualified Frames that should have been delivered • The One-Way Frame Loss Ratio Performance from UNI_5 to $ENNI_1$ must be less than or equal to the One-Way Frame Loss Ratio Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT
Units	Number of valid frames received at the ENNI
Variables	CoS Label, PT, UNI and ENNI interface speeds, Service Frame length λ, time interval *T* and bandwidth profile parameters CBS_6, CBS_{66}
Results	Pass or fail
Remarks	

Test Case 35.2: One-Way Frame Loss Ratio Performance From ENNI To UNI

<table>
<tr><th colspan="2">Abstract Test Suite for Ethernet Access Services</th></tr>
<tr><td>Test Name</td><td>One-Way Frame Loss Ratio Performance From ENNI To UNI</td></tr>
<tr><td>Test Definition ID</td><td>AEVPL35_R33_R37_R42</td></tr>
<tr><td>Test Type</td><td>Conformance</td></tr>
<tr><td>Test Status</td><td>Mandatory</td></tr>
<tr><td>Requirement Description</td><td>[R33] The CoS Identifier for ENNI Frames MUST be the OVC End Point to which the ENNI Frame is mapped; that OVC MUST have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}
[R37] The CoS ID for each frame in a CoS Frame Set at an EI MUST indicate the same CoS Name and the CoS Label MUST be one of the CoS Labels defined in MEF 23.1 Table 4
[R42] In an SLS that includes FLR Performance and is based on a MEF CoS Label, the SLS MUST be specified per:
FLR Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected
Specified Time Interval T parameter for FLR defined in MEF 23.1 Table 5</td></tr>
<tr><td>Test Object</td><td>For the Access EVPL Service under test, verify that for all Qualified ENNI Frames associated with a particular CoS Label, that arrive at the UNI during a time interval T, the One-Way Frame Loss Ratio Performance is less than or equal to the One-Way Frame Loss Ratio Performance Objective specified in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where the table selection is dependent on the applicable PT</td></tr>
<tr><td>Test Configuration</td><td>One OVC associating one OVC EP at the UNI and one OVC EP at the ENNI is configured. All CE-VLAN ID values are mapped to the OVC EP at the UNI and a specific S-VLAN ID is mapped to the OVC EP at the ENNI</td></tr>
<tr><td>Test Configuration Schematic</td><td> 
</td></tr>
<tr><td>End Point Maps</td><td>
<table>
<tr><th colspan="2">Map at UNI$_2$</th></tr>
<tr><td>CE-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>16</td><td>OVC EP$_2$</td></tr>
</table>
<table>
<tr><th colspan="2">Map at ENNI$_1$</th></tr>
<tr><td>S-VLAN ID</td><td>OVC End Point</td></tr>
<tr><td>666</td><td>OVC EP$_{22}$</td></tr>
</table>
Note: Use of other S-VLAN IDs at the ENNI and of other CE-VLAN ID* for untagged and priority tagged frames is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Bandwidth Profile</td><td>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI$_2$</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP$_2$</td><td>CIR$_2$ CBS$_2$ EIR$_2$ EBS$_2$ CF$_2$ CM$_2$</td></tr>
<tr><td colspan="2">Note 1: CIR$_2$ = 30 Mbps
Note 2: CBS$_2$ ≥ 12176 Bytes
Note 3: EIR$_2$, EBS$_2$, and CF$_2$ equal to 0
Note 4: CM$_2$ in color-blind mode</td></tr>
</table>
<table>
<tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI$_1$</th></tr>
<tr><td>OVC End Point</td><td>Parameters</td></tr>
<tr><td>OVC EP$_{22}$</td><td>CIR$_{22}$ CBS$_{22}$ EIR$_{22}$ EBS$_{22}$ CF$_{22}$ CM$_{22}$</td></tr>
<tr><td colspan="2">Note 1: CIR$_{22}$ = 30 Mbps
Note 2: CBS$_{22}$ ≥ 12176 Bytes
Note 3: EIR$_{22}$, EBS$_{22}$, and CF$_{22}$ equal to 0
Note 4: CM$_{22}$ in color-aware mode</td></tr>
</table>
Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</td></tr>
<tr><td>Test Procedure</td><td>Tester 2 offers double-tagged ENNI Frames with CE-VLAN ID equal to 16, CE-VLAN CoS equal to 6, S-VLAN ID equal to 666 and S-VLAN CoS equal to Green, of length λ at an average rate up to CIR$_{66}$, using a test traffic profile which exercises both configured CIR$_{66}$ and CBS$_{66}$ at the same time, to the ingress OVC End Point (OVC EP$_{66}$ at ENNI$_1$) and, the number of ingress Qualified Frames and the number of unique (not duplicated) corresponding frames successfully delivered at the egress OVC End Point (OVC EP$_{66}$ at ENNI$_1$) are counted
One-Way Frame Loss Ratio Performance from ENNI$_1$ to UNI$_5$ is then calculated for a time interval T, as the ratio, expressed as a percentage, of the number of ingress Qualified Frames not delivered at the egress OVC End Point (OVC EP$_6$ at UNI$_5$) divided by the total number of ingress Qualified Frames that should have been delivered
The One-Way Frame Loss Ratio Performance from ENNI$_1$ to UNI$_5$ must be less than or equal to the One-Way Frame Loss Ratio Performance Objective specified in MEF 23.1 for the applicable CoS Label and PT</td></tr>
<tr><td>Units</td><td>Number of valid frames received at the UNI</td></tr>
<tr><td>Variables</td><td>CoS Label, PT, UNI and ENNI interface speeds, ENNI Frame length λ, time interval T and bandwidth profile parameters CBS$_6$, CBS$_{66}$</td></tr>
<tr><td>Results</td><td>Pass or fail</td></tr>
<tr><td>Remarks</td><td>Green Color Identifiers defined in MEF 23.1 Table 4</td></tr>
</table>

Annex A.1

Requirements for Access EPL

Requirements for Operator Service Attributes

Requirement Number	Requirement Description for UNI Service Attributes	Reference
1	The CE-VLAN ID for untagged and priority tagged Frames **MUST** be a value from 1 – 4094	Ethernet Access Services Definition Table 4
2	The maximum number of OVCs per UNI **MUST** be 1	Ethernet Access Services Definition Table 4

Requirement Number	Requirements for OVC per UNI Service Attributes	Reference
3	The OVC EP Map **MUST** contain all CE-VLAN ID values {1, 2, …4095} mapped to a single OVC End Point	Ethernet Access Services Definition Table 5
4	The CoS Identifier for Service Frames **MUST** be the OVC End Point; that OVC **MUST** have a single CoS Name	Ethernet Access Services Definition Table 5
5	Ingress Bandwidth Profile per OVC EP at a UNI is required and **MUST** allow configuration to support CIR values* up to 70% of the UNI speed in the following increments: • 1 – 10 Mb/s, increments of 1 Mbps • 10 – 100 Mb/s, increments of 10 Mbps • 100 – 1000 Mb/s, increments of 100 Mbps • 1 – 10 Gb/s, increments of 1 Gbps **It MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color blind" **It MUST** have CBS ≥ 12176 Bytes **It MUST NOT** be combined with any other type of ingress bandwidth profile When the ingress Bandwidth Profile of the OVC End Point at the UNI has CIR > 0 and EIR = 0, each egress ENNI Frame **MUST** be marked Green via the S-Tag as per [MEF 23]. * MEF Bandwidth Profile traffic parameters such as CIR count only Service Frame bits, not interframe gap or preamble bits. Setting CIR above 76% of the physical layer speed of the EI has consequences, which are discussed in more detail in Ethernet Services Definitions Appendix A.	Ethernet Access Services Definition Table 5

Requirement Number	Requirements for OVC Service Attributes	Reference
6	The OVC Maximum Transmission Unit Size **MUST** be an integer number of bytes ≥ 1526	Ethernet Access Services Definition Table 6
7	CE-VLAN ID Preservation **MUST** be Yes	Ethernet Access Services Definition Table 6
8	CE-VLAN CoS ID Value Preservation **MUST** be Yes	Ethernet Access Services Definition Table 6
9	Color Forwarding **SHOULD** be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI **MUST** be marked green via the S-Tag as per MEF 23.1.	Ethernet Access Services Definition Tables 5 & 6
10	Unicast, multicast and broadcast frame delivery **MUST** be unconditional	Ethernet Access Services Definition Table 6

Requirement Number	Requirements for OVC EP per ENNI Service Attributes	Reference
11	The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}	Ethernet Access Services Definition Table 7
12	Ingress Bandwidth Profile per OVC EP at an ENNI** is required and **MUST** allow configuration to support CIR values* up to 70% of the ENNI speed, in the following increments: • 1 – 10 Mb/s, increments of 1 Mbps • 10 – 100 Mb/s, increments of 10 Mbps • 100 – 1000 Mb/s, increments of 100 Mbps • 1 – 10 Gb/s, increments of 1 Gbps **It MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color aware" **It MUST** have CBS ≥ 12176 bytes **It MUST NOT** be combined with any other type of ingress bandwidth profile • MEF Bandwidth Profile traffic parameters such as CIR count only Service Frame bits, not interframe gap or preamble bits. Setting CIR above 76% of the physical layer speed of the EI has consequences, which are discussed in more detail in Ethernet Services Definitions Appendix A. **The ingress CIR for an OVC at the ENNI should be greater than the corresponding ingress CIR at the UNI due to the presence of the added SVLAN tag (4 bytes) at the ENNI. As an example, if the average frame size was 200 bytes, the CIR should be increased by 2%.	Ethernet Access Services Definition Table 7

Requirement Number	Requirements for ENNI Service Attributes	Reference
13	Each S-VLAN ID value associated with an instance of Access EPL Service **MUST** map to a distinct End Point, of Type = "OVC"	Ethernet Access Services Definition Table 8

Requirements for Service OAM Frames Handling

Requirement Number	Requirement for Service OAM	Reference
14	The Access EPL Service **MUST** be configurable to tunnel all SOAM frames at the default **Test** and **Subscriber** MEG levels as defined in the SOAM FM IA (MEF 30) document, section 7.1.	Ethernet Access Services Definition [R13]

Requirement for CoS Labels and Performance Attributes

Requirement Number	Requirements for Cos Labels	Reference
15	The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4	Carrier Ethernet Class of Service Phase 2 [R1]

Requirement Number	Requirements for Performance Attributes	Reference
16	An SLS, that is based on a MEF CoS Label **MUST** include at least one of either MFD or FD Performance as part of the SLS. And, in an SLS that includes FD Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • FD Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_d and Time Interval T parameters for FD defined in MEF 23.1 Table 5	Carrier Ethernet Class of Service Phase 2 [R18], [R19]
17	An SLS, that is based on a MEF CoS Label **MUST** include at least one of either MFD or FD Performance as part of the SLS. And, in an SLS that includes MFD Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • MFD Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Time Interval T parameter for MFD defined in MEF 23.1 Table 5	Carrier Ethernet Class of Service Phase 2 [R18], [R20]
18	An SLS, that is based on a MEF CoS Label **MUST** include at least one of either FDR or IFDV Performance as part of the SLS. And, in an SLS that includes IFDV Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • IFDV Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_v, Pair Interval Δt and Time Interval T parameters for IFDV defined in MEF 23.1 Table 5	Carrier Ethernet Class of Service Phase 2 [R21], [R22]
19	An SLS, that is based on a MEF CoS Label **MUST** include at least one of either FDR or IFDV Performance as part of the SLS. And, in an SLS that includes FDR Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • FDR Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_r, and Time Interval T parameters for FDR idefined in MEF 23.1 Table 5	Carrier Ethernet Class of Service Phase 2 [R21], [R23]
20	In an SLS that is based on a MEF CoS Label, the SLS **MUST** be specified per: • FLR Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Time Interval T parameter for FLR defined in MEF 23.1 Table 5	Carrier Ethernet Class of Service Phase 2 [R24]

Annex A.2

Requirements for Access EVPL

Requirements for Operator Service Attributes

Requirement Number	Requirements Description for UNI Service Attributes	Reference
21	The CE-VLAN ID for untagged and priority tagged frames **MUST** be specified if untagged / priority tagged frames are to be supported, and that CE-VLAN ID **MUST** be included in the OVC End point Map	Ethernet Access Services Definition Table 9
22	The Maximum number of OVCs per UNI **MUST** be ≥ 1	Ethernet Access Services Definition Table 9
23	Maximum number of CE-VLAN IDs per OVC: The end point Map **MUST** support a value = 1	Ethernet Access Services Definition Table 9
24	Maximum number of CE-VLAN IDs per OVC: The end point Map **SHOULD** support a value > 1	Ethernet Access Services Definition Table 9

Requirement Number	Requirements for OVC per UNI Service Attributes	Reference
25	The OVC EP Map **MUST** specify mapping table of CE-VLAN ID to OVC End Point. It **MUST NOT** contain all CE-VLAN ID values mapped to a single OVC End Point. (This configuration is reserved for the Access EPL Service)	Ethernet Access Services Definition Table 10
26	The CoS Identifier for Service Frames **MUST** be the OVC End Point to which the Service Frame is mapped; that OVC **MUST** have a single CoS Name	Ethernet Access Services Definition Table 10
27	Ingress Bandwidth Profile per OVC EP at a UNI is required and **MUST** allow configuration to support CIR values* up to 70% of the UNI speed in the following increments: • 1 – 10 Mb/s, increments of 1 Mbps • 10 – 100 Mb/s, increments of 10 Mbps • 100 – 1000 Mb/s, increments of 100 Mbps • 1 – 10 Gb/s, increments of 1 Gbps **It MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color blind" **It MUST** have CBS ≥ 12176 Bytes **It MUST NOT** be combined with any other type of ingress bandwidth profile When the ingress Bandwidth Profile of the OVC End Point at the UNI has CIR > 0 and EIR = 0, each egress ENNI Frame **MUST** be marked Green via the S-Tag as per [MEF 23]. * MEF Bandwidth Profile traffic parameters such as CIR count only Service Frame bits, not interframe gap or preamble bits. Setting CIR above 76% of the physical layer speed of the EI has consequences, which are discussed in more detail in Ethernet Services Definitions Appendix A.	Ethernet Access Services Definition Table 10

Requirement Number	Requirements for OVC Service Attributes	Reference
28	The OVC Maximum Transmission Unit Size **MUST** be an integer number of bytes ≥ 1526	Ethernet Access Services Definition Table 11
29	CE-VLAN ID Preservation **MUST** be Yes	Ethernet Access Services Definition Table 11
30	CE-VLAN CoS ID Value Preservation **MUST** be Yes	Ethernet Access Services Definition Table 11
31	Color Forwarding **SHOULD** be yes. When Ingress BWP at UNI has EIR = 0 frames egressing at ENNI **MUST** be marked green via the S-Tag as per MEF 23.1	Ethernet Access Services Definition Table 11
32	Deliver Unconditionally or Deliver Conditionally. If Delivered Conditionally, **MUST** specify the delivery criteria.	Ethernet Access Services Definition Table 11

Requirement Number	Requirements for OVC EP per ENNI Service Attributes	Reference
33	The CoS Identifier for ENNI Frames **MUST** be the OVC End Point to which the ENNI Frame is mapped; that OVC **MUST** have a single CoS Name which is associated with the entire set of S-Tag PCP values {0 – 7}	Ethernet Access Services Definition Table 12
34	Ingress Bandwidth Profile per OVC EP at an ENNI** is required and **MUST** allow configuration to support CIR values* up to 70% of the ENNI speed, in the following increments: • 1 – 10 Mb/s, increments of 1 Mbps • 10 – 100 Mb/s, increments of 10 Mbps • 100 – 1000 Mb/s, increments of 100 Mbps • 1 – 10 Gb/s, increments of 1 Gbps **It MUST** allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = "color aware" **It MUST** have CBS ≥ 12176 Bytes **It MUST NOT** be combined with any other type of ingress bandwidth profile • MEF Bandwidth Profile traffic parameters such as CIR count only Service Frame bits, not interframe gap or preamble bits. Setting CIR above 76% of the physical layer speed of the EI has consequences, which are discussed in more detail in Ethernet Services Definitions Appendix A. ** The ingress CIR for an OVC at the ENNI should be greater than the corresponding ingress CIR at the UNI due to the presence of the added SVLAN tag (4 bytes) at the ENNI. As an example, if the average frame size was 200 bytes, the CIR should be increased by 2%.	Ethernet Access Services Definition Table 12

Requirement Number	Requirements for ENNI Service Attributes	Reference
35	Each S-VLAN ID value associated with an instance of Access EVPL Service **MUST** map to a distinct End Point, of Type = "OVC"	Ethernet Access Services Definition Table 13

Requirements for Service OAM Frames Handling

Requirement Number	Requirement for Service OAM	Reference
36	The Access EVPL Service **MUST** be configurable to tunnel all SOAM frames at the default **Test** and **Subscriber** MEG levels as defined in the SOAM FM IA (MEF 30) document, section 7.1	Ethernet Access Services Definition [R13]

Requirement for CoS Labels and Performance Attributes

Requirement Number	Requirements for Cos Labels	Reference
37	The CoS ID for each frame in a CoS Frame Set at an EI **MUST** indicate the same CoS Name and the CoS Label **MUST** be one of the CoS Labels defined in MEF 23.1 Table 4	Carrier Ethernet Class of Service Phase 2 [R1]

Requirement Number	Requirements for Performance Attributes	Reference
38	An SLS, that is based on a MEF CoS Label **MUST** include at least one of either MFD or FD Performance as part of the SLS. And, in an SLS that includes FD Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • FD Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_d and Time Interval T parameters for FD defined in MEF 23.1 Table 5	Carrier Ethernet Class of Service Phase 2 [R18], [R19]
39	An SLS, that is based on a MEF CoS Label **MUST** include at least one of either MFD or FD Performance as part of the SLS. And, in an SLS that includes MFD Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • MFD Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Time Interval T parameter for MFD defined in MEF 23.1 Table 5	Carrier Ethernet Class of Service Phase 2 [R18], [R20]
40	An SLS, that is based on a MEF CoS Label **MUST** include at least one of either FDR or IFDV Performance as part of the SLS. And, in an SLS that includes IFDV Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • IFDV Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_v, Pair Interval Δt and Time Interval T parameters for IFDV defined in MEF 23.1 Table 5	Carrier Ethernet Class of Service Phase 2 [R21], [R22]
41	An SLS, that is based on a MEF CoS Label **MUST** include at least one of either FDR or IFDV Performance as part of the SLS. And, in an SLS that includes FDR Performance and is based on a MEF CoS Label, the SLS **MUST** be specified per: • FDR Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Percentile P_r, and Time Interval T parameters for FDR idefined in MEF 23.1 Table 5	Carrier Ethernet Class of Service Phase 2 [R21], [R23]
42	In an SLS that is based on a MEF CoS Label, the SLS **MUST** be specified per: • FLR Performance Objective for the associated CoS Label and OVC Type defined in MEF 23.1 Table 6 for Metro PT CPOs, Table 7 for Regional PT CPOs, Table 8 for Continental PT CPOs, or Table 9 for Global PT CPOs, where Table selection is dependent on the PT selected • Specified Time Interval T parameter for FLR defined in MEF 23.1 Table 5	Carrier Ethernet Class of Service Phase 2 [R24]

